Normalization Practice

Objective:

- ✓ Learn and apply the concepts of 1NF, 2NF, and 3NF by *analyzing real-world business scenarios* and transforming unnormalized data structures into fully normalized tables.
- ✓ *Normalize* each unstructured table step-by-step. Understand how to eliminate redundancy, identify dependencies, and create relational schemas
- ✓ Make a self-descriptive report of Normalization (do your own research for all types of normalization) and upload it to the database course documentation, the report includes:
    - Describe every type and the case of using
    - illustrative examples for each type (before and after applying normalization)
- ✓ Search about De-Normalization, what it means? Why apply for it? When to apply it?

Instructions:

1. Read each system's unnormalized table.
2. Identify problems like:
    - Repeating groups
    - Partial dependencies
    - Transitive dependencies
3. Normalize the table step-by-step:
    - Convert to 1NF (atomic values only)
    - Convert to 2NF (no partial dependency)
    - Convert to 3NF (no transitive dependency)
4. Recreate the final normalized schema.
5. Create 2–3 sample rows for each table after normalization.

❖ **Case1: Company system – UNF table**

EmployeeID	EmployeeName	Department	Projects	Manager
E001	Ahmed	IT	P101:Website, P102:Mobile App	Eng. Khalid
E002	Salim	HR	P103:Recruitment	Ms. Amal
E003	Aisha	IT	P102:Mobile App, P104:Database Upgrade	Eng. Khalid

❖ **Case 2: University System – UNF Table**

StudentID	StudentName	Department	Courses Enrolled	Advisor
S001	Reem	CS	C101:DB, C102:AI	Dr. Omar
S002	Tariq	Business	C103:Marketing	Dr. Sarah
S003	Noura	CS	C101:DB, C104:Cybersecurity	Dr. Omar

❖ **Case 3: Airline System – UNF Table**

BookingID	PassengerName	Flights	SeatNumbers	PaymentMethod
B001	Salem	F101:Muscat-Dubai, F102:Dubai-London	12A, 14C	Credit Card
B002	Fatma	F103:Muscat-Istanbul	10B	PayPal
B003	Zayed	F104:Istanbul-Paris, F105:Paris-Oslo	9A, 13A	Credit Card

❖ **Case 4: Hotel System – UNF Table**

ReservationID	GuestName	RoomNumbers	ServicesUsed	CheckInDate	StaffAssigned
R001	Nasser	101, 102	Spa, Breakfast	2025-05-01	Mariam Al-Raisi
R002	Hind	103	Breakfast	2025-05-02	Saleh Al-Balushi
R003	Ahmed	104, 105	Spa, Dinner, Laundry	2025-05-03	Mariam Al-Raisi

❖ **Case 5: Bank System – UNF Table**

CustomerID	CustomerName	Accounts	Branch	RelationshipManager
C001	Latifa	A001:Savings, A002:Credit	Seeb	Mr. Jamal
C002	Khalid	A003:Current	Mutrah	Ms. Huda
C003	Rania	A004:Savings, A005:Loan, A006:Card	Seeb	Mr. Jamal

❖ **Case 6: Freelancing System – UNF Table**

FreelancerID	FreelancerName	Skills	Projects	ClientName	PaymentMode
F001	Yousuf	Web Dev, UI Design	P201:Website, P202:Landing Page	SamTech	Bank Transfer
F002	Mariam	Data Entry	P203:Survey, P204:Form Upload	QuickData	PayPal
F003	Khalfan	Web Dev, SEO, Marketing	P202:Landing Page, P205:SEO Report	SamTech, WebGo	Credit Card

❖ **Case 7: Payment System – UNF Table**

TransactionID	CustomerName	PaymentMethods	PurchaseItems	BillingAddress	PaymentDetails
T001	Aisha	Credit Card, Wallet	P001:Phone, P002:Charger	Seeb, Oman	PM001:$300:2025-05-01, PM002:$20:2025-05-01
T002	Salim	Bank Transfer	P003:Laptop	Bousher, Oman	PM003:$900:2025-05-02
T003	Reem	Credit Card, Cash	P004:Tablet, P005:Stylus, P006:Cover	Mutrah, Oman	PM004:$400:2025-05-03, PM005:$50:2025-05-03, PM006:$30:2025-05-03

❖ **Deliverable Format (Example)**

Each trainee will submit a Normalization Report for one or more systems including:

1. UNF Table (Given)
2. 1NF Table(s)
3. 2NF Table(s)
4. 3NF Table(s)
5. Explanation at each step
6. 2–3 Sample rows of data per table

❖ **Team Activity:**

Assign each group one system. After completion, each team will present:

- Their step-by-step normalization
- Justifications for restructuring
- Benefits of the final design