Task 4 (Combined ERD and Mapping)

System 1: Hotel Management System

📘 Scenario:

A hotel chain wants to develop a database system to manage its bookings, rooms, customers, and staff across multiple branches.

📝 Requirements:

1. The hotel chain operates in multiple **branches**, each identified by a branch ID, name, and location.
2. Each **branch** has multiple **rooms**, each identified by a room number, type, and nightly rate.
3. A **customer** can book one or more rooms, and each **booking** includes a check-in and check-out date.
4. A **booking** is linked to a customer and can include multiple rooms.
5. Each **customer** has a unique ID, name, phone, and email.
6. **Staff** are assigned to a specific branch and are identified by ID, name, job title, and salary.
7. A staff member can check in or check out customers (many-to-many with role attribute like "check-in", "check-out").
8. The system should track the availability of each room based on bookings.

🛠️ Tasks:

1. **ERD Creation:**
    - Identify all entities, attributes (simple, derived, multivalued), and relationships (with participation and cardinality).
    - Clearly identify weak entities if any.
    - Use relationship attributes (e.g., for many-to-many actions like check-in records).
    - Include primary and foreign keys visually.
2. **Relational Mapping:**
    - Convert the ERD into tables.
    - Define PKs, FKs, data types, and constraints.
    - Include mapping for multivalued or derived attributes if applicable.
    - Create a linking table for any many-to-many relationships.

System 2: Banking System

📘 Scenario:

A bank needs a system to manage customer accounts, employees, loans, and transactions.

📜 Requirements:

1. The bank operates multiple **branches**, each with a branch ID, address, and phone number.
2. **Customers** can have multiple **accounts**, but each account belongs to only one customer.
3. Customers are identified by a customer ID, name, address, phone number, and date of birth.
4. Each **account** has an account number, balance, type (savings/checking), and date of creation.
5. Each **account** can have multiple **transactions** (withdrawals, deposits, transfers), each with a unique transaction ID, date, amount, and type.
6. **Loans** are provided to customers, with each loan having an ID, type, amount, and issue date.
7. A customer can have multiple loans, but each loan is handled by a specific **employee**.
8. Employees are identified by employee ID, name, position, and branch ID (they work in one branch).
9. Employees may assist customers in opening accounts or processing loans (relationship attribute: action_type).

🛠️ Tasks:

1. **ERD Creation:**
    - Identify all entities, weak entities (e.g., transactions), attributes, relationships, and keys.
    - Include multivalued or derived attributes if needed.
    - Use role-based attributes on many-to-many relationships (e.g., employee-customer interactions).
2. **Relational Mapping:**
    - Transform your ERD into database tables.
    - Include mapping for:
        - Strong & weak entities
        - 1:N and M:N relationships
        - Relationship attributes
    - Indicate any NOT NULL constraints due to total participation.