**Gym Database Application**

**- Schemas -**

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**Introduction:**

In this document, the database schemas are presented. Some underwent decomposition from the initial schema due to functional dependencies. Consequently, all schemas now comply with BCNF.

**Part 1: Schemas Already in BCNF**

1. **Membership** (membership\_id: SMALLINT UNSIGNED, number\_person\_involved: SMALLINT UNSIGNED, duration: SMALLINT UNSIGNED)
2. **Subscribed** (payment\_id: SMALLINT UNSIGNED, customer\_id: SMALLINT UNSIGNED, type\_of\_payment: ENUM ("cash"," credit card"," debit card", "check"), date\_of\_payment: DATE, membership\_id: SMALLINT UNSIGNED) FK: membership\_id references Membership(membership\_id), customer\_id references Customer(customer\_id)
3. **Customer** (customer\_id: SMALLINT UNSIGNED, c\_name: VARCHAR, registration\_date: DATE, birth\_date: DATE, contact: VARCHAR)
4. **Employee** (employee\_id: SMALLINT UNSIGNED, e\_name: VARCHAR, salary: INT UNSIGNED, contact: VARCHAR, first\_day\_work: DATE)
5. **Training\_space** (space\_id: SMALLINT UNSIGNED) FK: space\_id references Space(space\_id)
6. **Lounge** (space\_id: SMALLINT UNSIGNED) FK: space\_id references Space(space\_id)
7. **Office** (space\_id: SMALLINT UNSIGNED, number\_staff: SMALLINT UNSIGNED, office\_start\_time: TIME, office\_end\_time: TIME) FK: space\_id references Space (space\_id)
8. **Space** (space\_id: SMALLINT UNSIGNED, state\_of\_space: SMALLINT UNSIGNED, last\_check\_date: DATE, capacity: SMALLINT UNSIGNED)
9. **Technician** (employee\_id: SMALLINT UNSIGNED) FK: employee\_id references Employee(employee\_id)
10. **Trainer** (employee\_id: SMALLINT UNSIGNED) FK: employee\_id references Employee(employee\_id)
11. **E\_admin** (employee\_id: SMALLINT UNSIGNED, space\_id: SMALLINT UNSIGNED) FK: employee\_id references Employee (employee\_id), space\_id references Office (space\_id)
12. **Experts\_in** (employee\_id: SMALLINT UNSIGNED, discipline\_id: SMALLINT UNSIGNED) FK: employee\_id references Trainer (employee\_id), discipline\_id references Discipline (discipline\_id)
13. **Feedback** (feedback\_id: SMALLINT UNSIGNED, f\_title: VARCHAR, f\_text: TEXT, customer\_id: SMALLINT UNSIGNED, admin\_id: SMALLINT UNISIGNED) FK: admin\_id references E\_admin (employee\_id), customer\_id references Customer (customer\_id)
14. **Rents** (locker\_id: SMALLINT UNSIGNED, space\_id: SMALLINT UNSIGNED, customer\_id: SMALLINT UNSIGNED) FK: space\_id references Space(space\_id), customer\_id references Customer (customer\_id)
15. **Checks** (technician\_id: SMALLINT UNSIGNED, space\_id: UNSIGNED SMALLINT) FK: technician\_id references Technician (employee\_id), space\_id references Space(space\_id)
16. **Maintains** (technician\_id: SMALLINT UNSIGNED, equipment\_id: INT, barcode: INT) FK: technician\_id references Technician (employee\_id), equipment\_id references Equipment\_details (barcode, equipment\_id)
17. **Has** (discipline\_id: SMALLINT UNSIGNED, membership\_id: SMALLINT UNSIGNED) FK: discipline\_id references Discipline (discipline\_id), membership\_id references Membership (membership\_id)

**Part 2: Decomposed Schemas Achieving BCNF**

Originally:

Locker\_room (space\_id: UNSIGNED SMALLINT, total\_rentable\_lockers: UNSIGNED SMALLINT, lockers\_available\_for\_rent: UNSIGNED SMALLINT, rent\_price: UNSIGNED SMALLINT)

Decomposed due to the functional dependency:

lockers\_available\_for\_rent --> rent\_price

After decomposition:

**Pricefounder** (lockers\_available\_for\_rent: SMALLINT UNSIGNED, rent\_price: SMALLINT UNSIGNED)

**Locker\_room** (space\_id: SMALLINT UNSIGNED, total\_rentable\_lockers: SMALLINT UNSIGNED, lockers\_available\_for\_rent: SMALLINT UNSIGNED) FK: lockers\_available\_for\_rent references Pricefounder (lockers\_available\_for\_rent), space\_id references Space(space\_id)

Improvement:

Initially, the Locker\_room table had multiple attributes, but the minimal cover revealed dependencies that prompted a decomposition. The resulting schema introduces a new table, Pricefounder, focusing, specifically on the rental details. The Locker\_room table now retains its core attributes while establishing a foreign key relationship with Pricefounder to ensure data integrity.

Originally:

S\_session (session\_id: UNSIGNED SMALLINT, start\_time: TIME, end\_time: TIME, s\_day: STRING)

Decomposed due to the functional dependency:

s\_day, start\_time --> end\_time

After decomposition:

**End\_time\_founder** (start\_time: TIME, s\_day: VARCHAR, end\_time: TIME)

**S\_session** (session\_id: SMALLINT UNSIGNED, start\_time: TIME, s\_day: VARCHAR, discipline\_id: SMALLINT UNSIGNED, space\_id: SMALLINT UNSIGNED) FK: (start\_time,s\_day) references End\_ time\_ founder(start\_time,s\_day) , discipline\_id references Discipline (discipline\_id) , space\_id references Trainning\_space(space\_id)

Improvement:

Initially, the S\_session table included multiple attributes, but recognizing dependencies through the minimal cover, we decided to decompose the schema. The new structure introduces the End\_time\_founder table, focusing specifically on the founder's availability. The Session table now retains its core attributes and establishes foreign key relationships with End\_time\_founder for start\_time and day to ensure data integrity.

Originally:

Discipline (discipline\_id: UNSIGNED SMALLINT, price: UNSIGNED SMALLINT, d\_name: STRING, minimum\_age: UNSIGNED SMALLINT)

Decomposed due to the functional dependency:

name --> minimum\_age

After decomposition:

**Min\_age\_founder** (d\_name: VARCHAR, minimum\_age: SMALLINT UNSIGNED)

**Discipline** (discipline\_id: SMALLINT UNSIGNED, price: SMALLINT UNSIGNED, d\_name: VARCHAR) FK: d\_name references Min\_age\_founder (d\_name)

Improvement:

Initially, the Discipline table included attributes related to both discipline details and the minimum age founder. Recognizing dependencies through the minimal cover, we opted for decomposition. The new Min\_age\_founder table focuses solely on the discipline's name and associated minimum age. The Discipline table now retains its core attributes and establishes a foreign key relationship with Min\_age\_founder for the discipline's name.

Originally:

Equipment (barcode: VARCHAR, equipment\_id: INT, e\_type: VARCHAR, brand: VARCHAR, check\_interval\_days: INT, last\_check\_date: DATE)

Decomposed due to the functional dependencies:

{barcode --> brand;

barcode --> e\_type;

e\_type, brand --> check\_interval\_days}

After decomposition:

**Equipment\_type\_brand** (e\_type: VARCHAR, brand: VARCHAR, check\_interval\_days: INT UNSIGNED)

**Equipment\_barcode** (barcode: VARCHAR, e\_type: VARCHAR, brand: VARCHAR) FK: (e\_type, brand) references Equipment\_type\_brand(e\_type, brand)

**Equipment\_details** (barcode: VARCHAR, equipment\_id: INT, last\_check\_date: DATE) FK: barcode references Equipment\_barcode(barcode)

Improvement:

Initially, the Equipment table included attributes related to all tables, but recognizing dependencies through the minimal cover, we decided to decompose the schema. The new Equipment\_type\_brand table isolates the type and brand attributes, reducing redundancy. Equipment\_barcode maintains the barcode and establishes foreign key relationships with Equipment\_type\_brand. Meanwhile, Equipment\_details focuses on barcode, equipment\_id, and last\_check\_date.