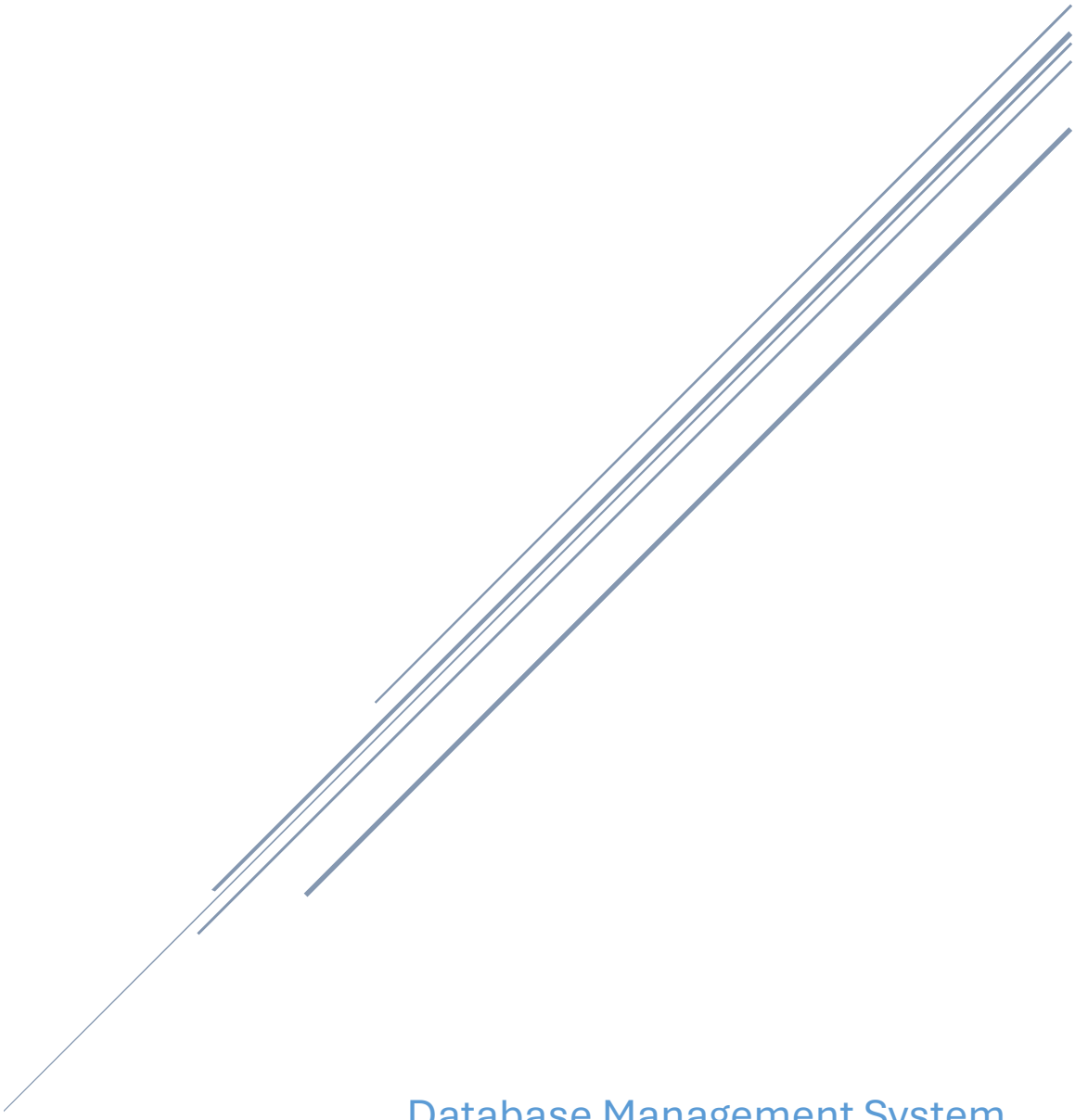
STUDENT HEALTH & FITNESS MONITORING SYSTEM

RELATIONAL DATA MODEL AND NORMALIZATION



Database Management System

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Relational Data Model

A relational data model organizes data into tables (relations) with rows (tuples) and columns (attributes) to store information in a structured way. Relationships between tables are established through common values, like a primary key in one table matching a foreign key in another, which links related data points logically. This model is foundational to relational databases and prioritizes data integrity and consistency.

Here I am going to show Relational Data Model for all 12 entities in Student Health and Fitness Model:

User

USERID	USERNAME	PASSWORDHASH	EMAIL	ROLE

Note: Role= ('STUDENT', 'COACH', 'NURSE', 'ADMIN')

Student

STUDENT ID	FIRST NAME	LAST NAME	DATEOFBIRTH	GENDER	EMERGENCY CONTACT PHONE	USER ID

Correction: 1:1 with student and user is correct, but STUDENTID should not also be USERID.

Coach

COACHID	FIRST NAME	LAST NAME	CERTIFICATION	CONTACTPHONE	USERID

Nurse

NURSEID	FIRSTNAME	LASTNAME	LICENSENUMBER	USERID

Health Profile

PROFILEID	HEIGHT	BLOOD TYPE	ALLERGIES	CHRONIC CONDITIONS	STUDENTID

Correction: We need Unique (STUDENTID) to enforce 1:1.

Fitness Log

LOG ID	ACTIVITY TYPE	DURATION MINUTES	CALORIES BURNED	DISTANCE	LOG DATE	STUDENTID

Medical Record

RECORD ID	VISIT DATE	DIAGNOSIS	PRESCRIPTION	NOTES	NURSE ID	STUDENT ID

Goal

GOAL ID	GOAL TYPE	TARGET VALUE	START DATE	ENDDATE	ISARCHIEVED	STUDENTID

Appointment

APPOINTMENT ID	APPOINTMENT DATE	APPOINTMENT TIME	REASON	STATUS	STUDENT ID	NURSE ID

Training Plan

PLANID	PLANNAME	DESCRIPTION	STARTDATE	ENDDATE	COACHID

Plan Details

DETAILID	DAYOFWEEK	EXERCISENAME	SETS	REPS	PLANID

Coach Fitness Review (Junction Table)

REVIEWID	REVIEWDATE	REVIEWNOTES	COACHID	LOGID

Normalization for all Tables (UNF→ 3NF)

Normalization is a multi-faceted term that can refer to the process of structuring data in a database to reduce redundancy and improve integrity. In the context of databases, it's a key design technique that involves breaking down large tables into smaller, linked tables to avoid data anomalies. **Each table is normalized separately because each table already represents a single entity:**

User Table

USERID	USERNAME	PASSWORDHASH	EMAIL	ROLE

1NF:

- All values atomic
- No repeating groups

User Table (**USERID (Primary Key),** USERNAME, PASSWORDHASH, EMAIL, ROLE)

2NF:

- Primary Key is single (USERID) → No partial dependencies
- Already in 2NF

3NF:

- No non-key attribute depends on another non-key attribute.
- Already in 3NF

Student Table

STUDENT ID	FIRST NAME	LAST NAME	DATEOFBIRTH	GENDER	EMERGENCY CONTACT PHONE	USER ID

1NF:

- Student (**StudentID (Primary Key**), Firstname, Lastname, Dateofbirth, Gender, Emergencycontactphone, **UserID (Foreign Key)**)

2NF:

- Single PK→ no partial dependency
- Already in 2NF

3NF:

- All attributes depend directly on STUDENTID
- No non-key attribute depends on another non-key attribute
- Already in 3NF

Coach Table

COACHID	FIRST NAME	LAST NAME	CERTIFICATION	CONTACTPHONE	USERID

1NF:

- Coach (**CoachID (Primary Key)**, FirstName, LastName, Certification, ContactPhone, **UserID (Foreign Key)**)

2NF:

- Single Primary Key→ already 2NF

3NF:

- No transitive dependencies
- Already in 3NF

Nurse Table

NURSEID	FIRSTNAME	LASTNAME	LICENSENUMBER	USERID

1NF:

- Nurse (**NurseID (Primary Key),** Firstname, Lastname, LicenseNumber, **UserID (Foreign Key)**)

2NF:

- No composite key → already in 2NF

3NF:

- All non-key values depend on NurseID
- Already in 3NF

Health Profile Table

PROFILEID	HEIGHT	BLOOD TYPE	ALLERGIES	CHRONIC CONDITIONS	STUDENTID

1NF:

- HealthProfile (**ProfileID (Primary Key),** Height, BloodType, Allergies, ChronicConditions, **StudentID (Foreign Key)**)

2NF:

- Single PK → no partial dependency
- Already in 2NF

3NF:

- No non-key depends on another non-key
- Already in 3NF

Fitness Log Table

LOGID	ACTIVITY TYPE	DURATION MINUTES	CALORIES BURNED	DISTANCE	LOG DATE	STUDENT ID

1NF:

- FitnessLog (**LogID (Primary Key),** ActivityType, DurationMinutes, CaloriesBurned, Distance, LogDate, **StudentID (Foreign Key)**)

2NF:

- Already in 2NF

3NF:

- All attributes directly depend on LogID
- Already in 3NF

Medical Record Table

RECORD ID	VISIT DATE	DIAGNOSIS	PRESCRIPTION	NOTES	NURSE ID	STUDENT ID

1NF:

- MedicalRecord (**RecordID (Primary Key)**, VisitDate, Diagnosis, Prescription, Notes, **NurseID (Foreign Key), StudentID (Foreign Key)**)

2NF:

- No composite key → 2NF
- Already in 2NF

3NF:

- No transitive dependencies
- Already in 3NF

Goal Table

GOAL ID	GOAL TYPE	TARGET VALUE	START DATE	END DATE	ISARCHIEVED	STUDENTID

1NF:

- Goal (**GoalID (Primary Key)**, GoalType, TargetValue, StartDate, EndDate, IsAchieved, **StudentID (Foreign Key)**)

2NF:

- Already in 2NF

3NF:

- No non-key attributes depend on another non-key attribute.
- Already in 3NF

Appointment Table

APPOINTMENT ID	APPOINTMENT DATE	APPOINTMENT TIME	REASON	STATUS	STUDENT ID	NURSE ID

1NF:

- Appointment (**AppointmentID (Primary Key)**, AppointmentDate, AppointmentTime, Reason, Status, **StudentID (Foreign Key), NurseID (Foreign Key)**)

2NF:

- Single PK → no partial dependency
- Already in 2NF

3NF:

- No transitive dependency
- Already in 3NF

Training Plan Table

PLANID	PLANNAME	DESCRIPTION	STARTDATE	ENDDATE	COACHID

1NF:

- TrainingPlan (**PlanID (Primary Key)**, PlanName, Description, StartDate, EndDate, **CoachID (Foreign Key)**)

2NF:

- Single PK → 2NF
- Already in 2NF

3NF:

- No non-key depends on non-key
- Already in 3NF

Plan Detail Table

DETAILID	DAYOFWEEK	EXERCISENAME	SETS	REPS	PLANID

1NF:

- PlanDetail (**DetailID (Primary Key)**, DayOfWeek, ExerciseName, Sets, Reps, **PlanID (Foreign Key)**)

2NF:

- Single PK → no partial dependency
- Already in 2NF

3NF:

- No attribute depends on another attribute
- Already in 3NF

Coach Fitness Review Table

REVIEWID	REVIEWDATE	REVIEWNOTES	COACHID	LOGID

1NF:

- CoachFitnessReview(**ReviewID (Primary Key)**, ReviewDate, ReviewNotes, **CoachID (Foreign Key), LogID (Foreign Key)**)

2NF:

- No composite key → no partial dependencies
- Already in 2NF

3NF:

- Non-key attributes depend only on ReviewID
- Already in 3NF