

# Database Management and Database Design - Group 1

## P2. Database Design, Conceptual ERD

### Sports Injury Management System

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#### Introduction

The Sports Injury Management System (SIMS) includes key entities such as Athletes, Injuries, Treatments, and Medical Personnel. Each athlete is linked to their injuries and treatments, with business rules ensuring no overlapping injury records and clearances granted only after proper treatment. This structured approach facilitates effective tracking and management of athlete health data.

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#### Key features and Business Problems

1. User Roles and Access Control:
    - Different user roles (e.g., medical staff, coaches, athletic trainers) with specific access levels.
    - Secure login and user authentication to protect sensitive data.
  2. Injury Tracking:
    - Detailed input forms for recording injuries, treatment plans, and recovery timelines.
    - Status updates on rehabilitation and progress tracking.
  3. Health Monitoring:
    - Regular updates on vital signs and other health metrics.
    - Alerts and notifications for follow-up assessments.
  4. Reporting Dashboard:
    - Comprehensive reports on individual athletes and overall team health.
    - Visual analytics to identify trends in injuries and recovery times.
  5. Clearance Management:
    - Workflow for documenting and managing clearances from health professionals.
    - Centralized storage of assessment documents and notes.
  6. Data Security and Compliance:
    - Implementation of encryption and secure storage practices for sensitive information.
    - Adherence to relevant data protection regulations
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#### Entities

##### 1. Athlete

- Attributes: AthleteID, Name, DateOfBirth, Gender, ContactInfo, MedicalHistory

- Description: Represents individual athletes in the system, including their personal details, contact information, and a reference to their medical history.

## 2. Injury

- Attributes: InjuryID, InjuryType, InjuryDate, Severity, TreatmentPlan, RecoveryStatus
- Description: Captures details about injuries sustained by athletes, including the type of injury, date, severity, treatment plan, and current recovery status.

## 3. Treatment

- Attributes: TreatmentID, TreatmentDate, TreatmentType, Notes
- Description: Records the treatments provided to athletes for specific injuries, detailing the treatment type, date, and additional notes regarding the athlete's response.

## 4. Physician

- Attributes: PhysicianID , Name, Specialty, ContactInfo, Availability
- Description: Represents physicians involved in diagnosing and treating athletes, including their specialty and contact details.

## 5. Physiotherapist

- Attributes: PhysiotherapistID , Name, Specialty, ContactInfo, Availability
- Description: Represents physiotherapists responsible for providing rehabilitation and physical therapy to athletes recovering from injuries.

## 6. Athletic Trainer

- Attributes: TrainerID , Name, ContactInfo
- Description: Represents athletic trainers who provide day-to-day care and support to athletes, focusing on conditioning, injury prevention, and rehabilitation.

## 7. Coach

- Attributes: CoachID , Name, Team, ContactInfo
- Description: Represents coaches responsible for overseeing the training and performance of athletes. Each coach may be associated with a team or a group of athletes.

## 8. Health Report

- Attributes: ReportID, ReportDate, VitalSigns, HealthNotes
- Description: Represents periodic health reports for athletes, detailing vital signs and other health assessments, providing an overview of the athlete's current physical condition.

## 9. Clearance

- Attributes: ClearanceID , ClearanceDate, ClearanceStatus, Notes
- Description: Documents the clearance status of athletes, which determines if they are fit to participate in training or competition after an injury.

## 10. Drug Prescription

- Attributes: PrescriptionID , DrugName, Dosage, Frequency, StartDate, EndDate, Notes
- Description: Tracks medications prescribed to athletes, documenting the drug name, dosage, frequency, and duration of the prescription.

## 11. Medical History

- Attributes: HistoryID, Condition, DiagnosisDate, Treatment, Notes
- Description: Represents the medical history of athletes, detailing past medical conditions, diagnosis dates, treatments received, and other relevant notes.

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## Relationships

### 1. ATHLETE and INJURY – one to many

An athlete can sustain multiple injuries over time, but each injury is associated with only one athlete.

### 2. ATHLETE and TREATMENT – one to many

An athlete can undergo multiple treatments for injuries, and each treatment can involve one or more athletes.

### 3. ATHLETE and HEALTHREPORT – one to many

An athlete can have multiple health reports generated over time, each capturing different aspects of their health status.

### 4. ATHLETE and CLEARANCE – one to many (through associative entity AthleteClearance)

An athlete may receive multiple clearances from different healthcare providers (e.g., physicians, physiotherapists) related to their ability to participate in training or competition.

(Clearance of different types)

5. INJURY and TREATMENT – one to many (through associative entity InjuryTreatment)

An injury can be treated with multiple treatments, and each treatment can apply to different injuries.

6. PHYSICIAN and ATHLETE – one to many

A physician can treat multiple athletes, while each athlete may consult multiple physicians for their care.

7. PHYSICIAN and CLEARANCE – one to many

A physician can issue clearances for multiple athletes, while each clearance may pertain to a specific athlete.

8. PHYSICIAN and TREATMENT – one to many

A physician can prescribe multiple treatments, and each treatment may involve one or more physicians.

9. ATHLETICTRAINER and ATHLETE – one to many

An athletic trainer can provide care to multiple athletes, while each athlete can work with multiple trainers.

10. COACH and ATHLETE – one to many

A coach can oversee multiple athletes, while each athlete typically has one primary coach.

11. COACH and PHYSICIAN – many to many (through associative entity CoachPhysicianCommunication)

Coaches may need to communicate with multiple physicians regarding athlete health and injuries, and physicians may consult with multiple coaches.

12. PHYSIOTHERAPIST and TREATMENT – one to many

A physiotherapist can provide multiple treatments for different injuries.

13. ATHLETE and DRUGPRESCRIPTION – one to many

An athlete can have multiple drug prescriptions over time, but each prescription is linked to one specific athlete.

14. ATHLETE and MEDICALHISTORY – one to many

An athlete can have multiple entries in their medical history, documenting various conditions and treatments over time.

15. DRUGPRESCRIPTION and TREATMENT - one to many

A specific drug prescription can be linked to multiple treatments, particularly if a drug is used as part of different treatment protocols.

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## Business Rules

1. An Athlete can have multiple Injuries.
  - Each injury is recorded separately and linked to the Athlete.
2. Each Injury requires one or more Treatments.
  - The Athlete's injuries may require different types of treatments over time, handled by different professionals.
3. A Physician diagnoses each Injury.
  - Every injury must be evaluated and diagnosed by a qualified physician.
4. A Physician oversees the Treatment of an Injury.
  - All treatments administered to an injury are supervised by a physician, ensuring proper care.
5. A Physiotherapist or Trainer may handle the Treatment of an Injury.
  - Either a physiotherapist or a trainer, or both, may be involved in treating the athlete's injury under the physician's supervision.
6. A Physician may issue Drug Prescriptions as part of Treatment.
  - If required, a physician will prescribe drugs to aid the athlete's recovery during treatment.
7. A Physician provides Clearance for the Athlete to return to play.
  - After successful treatment, the physician must clear the athlete, stating they are fit to resume activities.
8. Clearance must be linked to a specific Athlete.
  - Only an athlete who has been cleared by the physician can return to play or training.
9. A Health Report is generated for each Injury and Treatment.
  - The athlete's health status is updated in the Health Report after every injury and treatment, providing a comprehensive record of their condition.
10. An Athlete has a Medical History which includes all past Injuries, Treatments, and Clearances.
  - All medical data regarding the athlete is stored in their Medical History, which serves as a complete record for future reference.

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## E-R Diagram

