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5COSC020C.1

Database Systems

**UNIVERSITY OF WESTMINSTER**

**INFORMATICS INSTITUTE OF TECHNOLOGY**

Module Leader: Ragu Sivaraman

Coursework: Part A + Part B

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# Coursework Part A: Conceptual EERD

## QUESTION 1: CRITICAL EVALUATION & REFLECTIVE COMMENTARY

### Critical Evaluation

The initial EERD in Document A.2 had several critical semantic and structural flaws that rendered it unsuitable for meeting the project’s requirements. Below are the key issues.

1. Limited Representation of Court-Specific Characteristics

* The original model treated courts generically without accounting for specific court types (e.g., tennis, pickleball, or dual-purpose). This omission prevented accurate differentiation in court usage, equipment management, and maintenance.

2. Poorly Defined Relationships

* The relationship between caretakers and parks/courts was overly simplistic. It failed to incorporate dynamic caretaker rotation or mechanisms for maintaining consistent quality standards across parks.

3. Omission of Important Attributes

* Essential attributes, such as maintenance logs, session categories, and equipment-specific details (e.g., fixed vs. movable), were missing or misplaced. This limited the model's ability to represent and manage real-world scenarios effectively.

4. Ambiguity in Multiplicity Constraints

* The cardinalities of key relationships (e.g., courts to equipment or players to sessions) were absent or unclear, leaving critical data relationships undefined and open to misinterpretation.

5. Inadequate Support for Session Types and Bookings

* The initial model failed to distinguish between supervised and unsupervised sessions or block versus single bookings, both of which are crucial for accurately representing Racketminster’s operational requirements.

### 1.2. Reflective Commentary

The revised EERD addresses the shortcomings of the original model by implementing a structured and detailed design approach. Here are the key improvements and design choices made.

1. Entity Specialization

* Introduced specific entities for court types (Tennis, Pickleball) and specialized equipment (Fixed, Movable). This ensures clarity in resource allocation and enables detailed tracking of court characteristics and equipment.

2. Comprehensive Relationships and Multiplicities

Defined clear relationships with appropriate multiplicities, such as:

* A court can host multiple sessions but only one session at a specific time.
* A caretaker can manage multiple parks and courts while maintaining distinct maintenance records.
* Relationships like allocate (for equipment) and recommend (for players) were added to capture real-world interactions.

3. Detailed Attribute Assignment

* Added attributes such as Maintenance Status for equipment, Session Category for session types (e.g., group or personal), and Recommendation Details for tracking player referrals. This ensures each entity comprehensively represents its real-world counterpart.

4. Support for Dynamic Operations

* Integrated entities and relationships to handle caretaker rotation (Caretaker Assignment) and dynamic booking types (e.g., block or single bookings), allowing flexibility in management and reporting.

5. Scalable and Flexible Design

* Designed the EERD to accommodate future expansions, such as adding more session types or integrating additional player-related incentives. The use of hierarchies (e.g., Supervised and Unsupervised sessions) enables scalability without complicating the base structure.

By addressing the deficiencies in the original EERD and focusing on practical, real-world operations, the revised design delivers a robust conceptual model tailored to Racketminster’s needs. This approach ensures the model is not only accurate but also adaptable for future requirements.

### 1.3 Screenshot of the questions provided

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## QUESTION 2: ENTITIES

|  |  |
| --- | --- |
| **Entity Name** | **Brief Explanation** |
| w2052209\_Park | This General w2052209\_Park entity describes all the parks contain in the small town called Ovestminster in UK. |
| w2052209\_Court | This General w2052209\_Court entity describe all the Courts contain in a dedicate park for racket sport. |
| w2052209\_Caretacker | This General w2052209\_Caretacker entity describes all Racketminster caretakers who are responsible for their preservation. |
| w2052209\_Equipment | This General w2052209\_Equipment entity describes all the movable or fixed equipment allocated to respective court |
| w2052209\_Maintaince\_Record | This General w2052209\_Maintaince\_Record entity describes all the maintenance records of each court and equipment |
| w2052209\_Player | This General w2052209\_Player entity represents all player who participate in racket-based sports |
| w2052209\_Session | This General w2052209\_Session entity describes all the sessions like Supervised and Unsupervised to run on specific court |
| w2052209\_Instructor | This General w2052209\_Instructor entity describes all Instructors who assign in to Supervised sessions. |
| w2052209\_Booking | This General w2052209\_Booking entity describes all the Booking sessions who book by a specific player. It can be either Block booking or Single booking. |

## QUESTION 3: SPECIALISATIONS

|  |  |  |
| --- | --- | --- |
| **General Entity** | **Specialized Entity** | **Brief Explanation** |
| w2052209\_Court | w2052209\_Tennis | Courts dedicated to tennis, used exclusively for tennis matches and sessions. |
| w2052209\_Pickleballo | Courts dedicated to pickleball, used exclusively for pickleball matches and sessions. |
| w2052209\_Maintaince\_Record | w2052209\_Court\_Record | Maintenance records specifically for courts to track upkeep and ensure courts are in proper condition. |
| w2052209\_Equipment\_Record | Maintenance records specifically for equipment to ensure all items are well-maintained and functional. |
| w2052209\_Equipment | w2052209\_Fixed | Fixed equipment such as nets, which are permanently installed and allocated to specific courts. |
| w2052209\_Moveble | Movable equipment such as rackets and balls, which can be used across different courts as needed. |
| w2052209\_Booking | w2052209\_BlockBooking | Bookings that allow players to reserve multiple unsupervised sessions in advance, often with follow-up sessions. |
| w2052209\_SingleBooking | Standard bookings for individual sessions, allowing players to reserve a single session for their chosen activity. |
| w2052209\_Session | w2052209\_Supervised | Sessions supervised by qualified instructors, either for individual or group guidance. |
| w2052209\_Unsupervised | Sessions where players participate independently, without instructor oversight. |
| w2052209\_Unsupervised | w2052209\_Single | Unsupervised sessions for two players, typically organized for single player matches. |
| w2052209\_Double | Unsupervised sessions for four players, allowing for doubles matches. |
| w2052209\_Supervised | w2052209\_Personal | One-on-one supervised sessions with an instructor, allowing personalized guidance and training. |
| w2052209\_Group | Supervised group sessions where multiple players participate under the supervision of up to two instructors. |
| w2052209\_Group | w2052209\_Fitness | Group sessions focused on fitness, combining exercise and racket sports practice under instructor supervision. |
| w2052209\_GroupCoaching | Structured group coaching sessions aimed at improving skills at various levels under the guidance of an instructor. |
| w2052209\_SocialFun | Relaxed, social group sessions for players to socialize and enjoy playing sports, with an instructor providing oversight. |

## QUESTION 4: RELATIONSHIPS & MULTIPLICITIES

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Entity Name** | **Multiplicity** | **Relationship** | **Multiplicity** | **Entity Name** | **Brief justifications for the multiplicity** |
| **w2052209\_Park** |  |  |  | **w2052209\_Court** | Each park must contain at least one court for players |
|  | 1..1 | contain | 1..\* |  | A park can contain multiple courts for different racket sports |
|  |  |  |  |  | A court cannot exist without being part of a park |
|  |  |  |  |  | One specific court can be only that one park |
| **w2052209\_Court** | 1..1 | allocate | 1..\* | **w2052209\_Equipment** | Each court is allocated equipment necessary for racket sports |
|  |  |  |  |  | A court may have multiple equipment items, like nets and balls |
|  |  |  |  |  | Equipment is designated to a specific court to ensure availability and maintenance |
|  |  |  |  |  | Courts must have at least one piece of equipment allocated to them |
|  |  |  |  |  | Courts are maintained by caretakers assigned specifically to them. |
| **w2052209\_Court** | 0..1 | maintain | 1..\* | **w2052209\_Caretacker** | A court can be without a caretaker, but typically at least one caretaker is responsible for its upkeep |
|  |  |  |  |  | Multiple caretakers may be involved to handle different aspects of court maintenance |
|  |  |  |  |  | Caretakers are dedicated to ensuring courts are playable and safe |
| **w2052209\_Caretacker** | 1..\* | maintain | 0..\* | **w2052209\_Equipment** | Caretakers are responsible for maintaining all assigned equipment |
|  |  |  |  |  | Each piece of equipment may have one or more caretakers responsible for its condition |
|  |  |  |  |  | Some equipment might not need immediate maintenance, hence the 0 multiplicity |
|  |  |  |  |  | Maintenance involves regular checks, repairs, and replacement if necessary |
|  |  |  |  |  | Each maintenance record is managed by a caretaker for tracking purposes |
| **w2052209\_Caretacker** | 1..1 | manage | 0..\* | **w2052209\_Maintaince\_Record** | There can be multiple records managed by a caretaker, based on maintenance needs. |
|  |  |  |  |  | A record might not always exist if no maintenance is required at that time |
|  |  |  |  |  | Records ensure accountability and proper upkeep of equipment and courts |
|  |  |  |  |  | Each session is held on a specific court booked for that purpose |
| **w2052209\_Session** | 0..1 | book | 1..1 | **w2052209\_Court** | A court must be booked for a session to occur |
|  |  |  |  |  | Sessions may sometimes not be booked, allowing flexibility in court use |
|  |  |  |  |  | Booked courts allow players to have dedicated time for their activities |
|  |  |  |  |  | Each booking is tied to a specific session |
| **w2052209\_Booking** | 1..1 | book | 1..1 | **w2052209\_Session** | Both booking and session must exist for players to attend |
|  |  |  |  |  | Bookings ensure organization and that sessions are scheduled appropriately |
|  |  |  |  |  | Players must book to reserve their spot in a session |
|  |  |  |  |  | A player may not recommend another player |
| **w2052209\_Player** | 1..\* | recommend | 0..\* | **w2052209\_Player** | A player can recommend many players |
|  |  |  |  |  | One player is no player May not be recommended |
|  |  |  |  |  | One player can be recommended by many players |
|  |  |  |  |  | A player can be without make a booking |
| **w2052209\_Player** | 1..\* | book | 0..\* | **w2052209\_Booking** | A player can have multiple bookings based on their preferences |
|  |  |  |  |  | A booking must have at least one player |
|  |  |  |  |  | A booking can have multiple players |
|  |  |  |  |  | A Block booking must have a one Unsupervised session |
| **w2052209\_BlockBooking** | 0..1 | book | 1..1 | **w2052209\_Unsupervised** | In specific time duration a block booking has only one Unsupervised session |
|  |  |  |  |  | Unsupervised session can be without making a booking |
|  |  |  |  |  |  |
|  |  |  |  |  | Each supervised session must guide by at least one instructor |
| **w2052209\_Instructor** | 1..2 | coach | 0..\* | **w2052209\_Supervised** | Each supervised session can have maximum two instructors |
|  |  |  |  |  | Instructor can exist without any Supervised sessions |
|  |  |  |  |  | Instructor can have many Supervised sessions |

## QUESTION 5: ATTRIBUTES & PRIMARY KEYS

|  |  |  |
| --- | --- | --- |
| Entity Name | Attributes for each entity (include PK) | Brief explanation |
| **w2052209\_Park** | w2052209\_parkId {PK} | Unique identifier for each park in Ovestminster. |
| w2052209\_parkName | Name of the park (e.g., Green Park, Riverside Park). |
| w2052209\_location | Physical location of the park, including address or description. |
| w2052209\_condition | Current state or quality of the park (e.g., excellent, good, fair). |
| **w2052209\_Caretacker** | w2052209\_caretackerId {PK} | Unique identifier for each caretaker responsible for park maintenance. |
| w2052209\_caretackerName | Name of the caretaker. |
| w2052209\_trainingLevel | Level of training the caretaker has received (e.g., basic, advanced |
| **w2052209\_Maintaince\_Record** | w2052209\_maintenanceId{PK} | Unique identifier for each maintenance record associated with parks or courts. |
| w2052209\_date | Date when the maintenance was conducted |
| w2052209\_time | Time of day the maintenance took place |
| w2052209\_status | Status of the maintenance (e.g., completed, in-progress) |
| w2052209\_log | Detailed notes or log about the maintenance performed |
| **w2052209\_Court\_Record** | w2052209\_netCondition | Current condition of the net on the court |
| w2052209\_surfaceCondition | Description of the court’s surface condition |
| **w2052209\_Equipment\_Record** | w2052209\_equipmentType | Type of equipment associated with a court (e.g., rackets, balls) |
| w2052209\_repairRequired | Indicates if repair is needed for the equipment (yes/no) |
| **w2052209\_Court** | w2052209\_courtId {PK} | Unique identifier for each court |
| w2052209\_condition | Overall condition of the court (e.g., playable, under repair) |
| w2052209\_type | Specifies the type of court (e.g., tennis, pickleball, multi-purpose) |
| **w2052209\_Tennis** | w2052209\_surfaceSpeed | Speed rating of the court surface, affecting tennis play |
| **w2052209\_Pickleball** | w2052209\_paddleStorage | Availability of storage specifically for pickleball paddles |
| **w2052209\_Equipment** | w2052209\_equipmentID{PK} | Unique identifier for each piece of equipment |
| w2052209\_condition | Current condition of the equipment (e.g., good, needs repair) |
| w2052209\_name | Name or label of the equipment (e.g., tennis racket, net) |
| w2052209\_type | Specifies whether the equipment is fixed or movable |
| **w2052209\_Fixed** | w2052209\_installedDate | Date when the fixed equipment was installed |
| **w2052209\_Moveble** | w2052209\_weight | Weight of the movable equipment, important for portability |
| **w2052209\_Player** | w2052209\_playerId{PK} | Unique identifier for each player registered in the scheme |
| w2052209\_name | Name of the player |
| w2052209\_level | Player's skill level (e.g., beginner, intermediate, advanced) |
| **w2052209\_Booking** | w2052209\_bookingID{PK} | Unique identifier for each booking made for a session |
| w2052209\_date | Date of the booked session. |
| w2052209\_time | Time of the booked session |
| w2052209\_bookingType | Type of booking (e.g., single session, block booking) |
| **w2052209\_BlockBooking** | w2052209\_bookingCount | Number of sessions included in a block booking. |
| **w2052209\_SingleBooking** | w2052209\_status | Status of the single booking (e.g., confirmed, canceled) |
| **w2052209\_Instructor** | w2052209\_InstructorId{PK} | Unique identifier for each instructor |
| w2052209\_name | Name of the instructor. |
| w2052209\_contactNumber | Contact number of the instructor for communication |
| w2052209\_email | Email address of the instructor |
| w2052209\_expertiseLevel | Level of expertise or specialization of the instructor (e.g., beginner, advanced) |
| **w2052209\_Session** | w2052209\_sessionId{PK} | Unique identifier for each session offered in Racketminster. |
| w2052209\_startTime | Start time of the session |
| w2052209\_endTime | End time of the session |
| w2052209\_type | Type of session (e.g., supervised, unsupervised) |
| **w2052209\_Supervised** | w2052209\_type | Specifies supervised session category (e.g., fitness-play, group coaching) |
| w2052209\_equipmentNeeded | Equipment required for the session (e.g., rackets, balls) |
| w2052209\_level | Level requirement for participation in the supervised session |
| **w2052209\_Personal** | w2052209\_focusArea | Specific areas of focus in a personal training session |
| w2052209\_instructorNote | Notes made by the instructor for personalized training guidance |
| **w2052209\_Group** | w2052209\_sessionType | Group session category, such as social-fun or group coaching |
| w2052209\_size | Maximum number of participants in a group session |
| **w2052209\_Fitness** | w2052209\_exerciseType | Type of exercise performed during a fitness-play session |
| w2052209\_fitnessLevel | Fitness level required for participants in the fitness-play session |
| **w2052209\_GroupCoaching** | w2052209\_coachingLevel | Level of coaching provided in the group coaching session |
| **w2052209\_SocialFun** | w2052209\_activities | List of activities conducted in a social-fun session, such as games and social exercises |
| **w2052209\_Unsupervised** | w2052209\_sessionFormat | Format of the unsupervised session (e.g., singles or doubles) |
| w2052209\_sessionType | Category of the unsupervised session, such as open play |
| w2052209\_duration | Duration of the unsupervised session |
| **w2052209\_Single** |  |  |
| **w2052209\_Double** |  |  |

## QUESTION 6: CONCEPTUAL EERD QUALITY & NOTATIONS

A diagram of a computer

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# Coursework Part B: Logical ERD

