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Database Systems – 5COSC020W

Course Work 01

Part A+ B

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Date of submission	: 02/12/2024
Student ID	: w2051819 / 20231068
First Name	: Dulani
Last Name	: Kamkanamge
Tutorial Group	: CS Group 22

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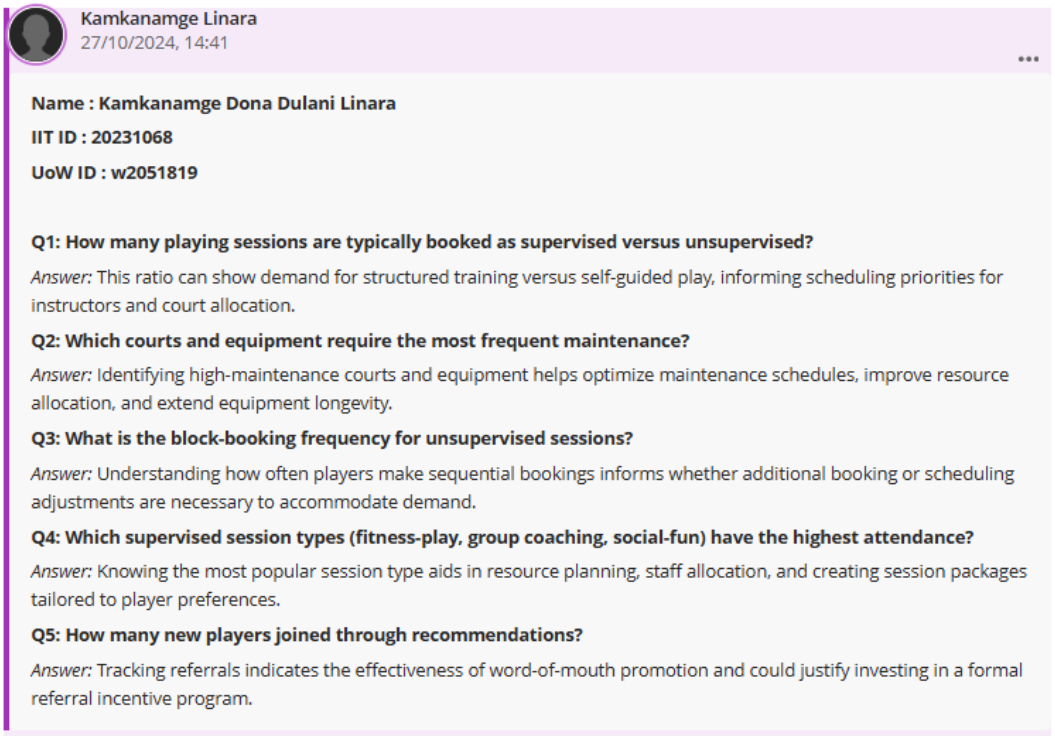
Coursework Part A: Conceptual EERD

Questions & Answers Forum (Q&A Forum) on Blackboard



Kamkanamge Linara
27/10/2024, 14:41

Name : Kamkanamge Dona Dulani Linara

IIT ID : 20231068

UoW ID : w2051819

Q1: How many playing sessions are typically booked as supervised versus unsupervised?

Answer: This ratio can show demand for structured training versus self-guided play, informing scheduling priorities for instructors and court allocation.

Q2: Which courts and equipment require the most frequent maintenance?

Answer: Identifying high-maintenance courts and equipment helps optimize maintenance schedules, improve resource allocation, and extend equipment longevity.

Q3: What is the block-booking frequency for unsupervised sessions?

Answer: Understanding how often players make sequential bookings informs whether additional booking or scheduling adjustments are necessary to accommodate demand.

Q4: Which supervised session types (fitness-play, group coaching, social-fun) have the highest attendance?

Answer: Knowing the most popular session type aids in resource planning, staff allocation, and creating session packages tailored to player preferences.

Q5: How many new players joined through recommendations?

Answer: Tracking referrals indicates the effectiveness of word-of-mouth promotion and could justify investing in a formal referral incentive program.

Figure 1 Questions & Answers Forum (Q&A Forum)

QUESTION 1: Critical Evaluation & Reflective Commentary

Critical Evaluation of the Basic and Erroneous EERD (Document A.2)

The EERD in Document A.2 has several conceptual, structural, and semantic problems that impair its accuracy, comprehensiveness, and capacity to meet the goals of the Racketminster project. An overview of the main issues is provided below:

1. Inaccurate Relationship Representation:

- Relationships That Are Not Aligned: Real-world relationships, such those between courts and equipment, are either missing or depicted incorrectly. The equipment assigned to each court cannot be properly tracked because of this error.
- Booking Problems: The design ignores a basic project need by not clearly differentiating between single and block bookings.
- Oversight of Maintenance: There are significant accountability gaps due to the absence of relationships necessary for keeping track of maintenance logs for courts and equipment.

2. Missing or Inaccurate Entities:

- Important Entities Missing: Important entities like block reservations, maintenance logs, and session classifications are either missing or not clearly stated.
- Neglect of specialization: The diagram loses important characteristics and connections unique to each type of session since it fails to distinguish between supervised and unsupervised sessions using specialization.

3. Abuse of Multiplicities:

- Cardinalities that are inconsistent: The multiplicities in a number of connections do not accurately represent practical limitations. Examples include: Although the diagram does not enforce this requirement, courts always need related equipment.
- Although the concept permits sessions to operate independently, sessions ought to be contingent upon reservations.
- Relationships like caretaker ↔ courts fail to reflect the requirement for at least one caretaker per court.

4. Lack of Specializations:

- Generalized Entities: The diagram does not use specialization to represent various equipment kinds (e.g., fixed vs. mobile) or session types (e.g., personal training vs. group sessions).
- Loss of Specificity: This reduces the model's capacity to satisfy the specific project requirements by producing a generic model that ignores the unique characteristics and behaviors of these specialized entities.

5. Incorrect Use of Primary Keys and Attribute Location:

- Attribute Misallocation: There is ambiguity and redundancy when maintenance details (such as date, time, and status) are not allocated to a specific maintenance log entity.
- Uncertain Primary Keys: The model's capacity to guarantee data integrity and uniqueness is compromised by inconsistently defined primary keys.

Reflective Commentary

I created a thorough conceptual EERD with the following enhancements to overcome the problems in the original EERD and satisfy the Racketminster project's requirements:

1.Entity

I started by determining the essential components required for the project:

- Park, Court, Equipment, Player, Caretaker, Session, and Booking are examples of core entities.
- To manage particular behaviors and properties, specialized entities were added, including BlockBooking, FixedEquipment, MovableEquipment, SupervisedSession, and UnsupervisedSession.
- To handle player referral systems and maintenance tracking, several entities were introduced, including MaintenanceRecord and referral.

Every entity was given a primary key and pertinent properties. For instance:

- Each player is uniquely identified by their playerId (PK), playerName, and playerContact.
- To differentiate itself, a court uses its location, courtType, and courtId (PK).

2. Use of Specialization

In order to increase adaptability and clarity:

- The entity known as the Session was focused on:
  - Supervised Sessions are further divided into two categories: Individual Sessions (like fitness play) and Group Sessions (like social fun, group coaching).
- To represent real-world situations, unsupervised sessions are divided into two-player and four-player categories.

The Equipment entity had a focus on:

- FixedEquipment: Things like nets that are fixed in place.
- Movable Equipment: Things that are portable, such balls and rackets.

This guarantees that the distinctive qualities of various sessions and equipment kinds are recorded.

3. Relationships and Multiplicities

The enhanced connections meet the needs of the real world:

- Park ↔ Court (1..1 : 1..*): There are one or more courts in every park, and each court is specific to that park.
- Every court has at least one piece of equipment, which guarantees accountability for equipment management (1..1 : 0..*).

- Player ↔ Booking (1..1 : 0..*): Although a player may make more than one reservation, each reservation is associated with a single player.
- MaintenanceRecord (1.. : 1..)**: Every caretaker oversees several maintenance records, guaranteeing thorough documentation of maintenance duties.

Among the specialized relationships are:

- SupervisedSession ↔ Instructor (1..1: 0..2): Up to two instructors oversee each supervised session.
- UnsupervisedSession ↔ BlockBooking (0.. : 0..)**: Block reservations are available for several unattended sessions.

4. Multiplicity Justifications

Real-world limitations are enforced by the multiplicities:

- While some courts can be put up without equipment, all courts eventually need to have the necessary equipment.
- To guarantee precise scheduling, a session must always be a part of a booking.
- Every park is guaranteed to have a dedicated caretaker thanks to ParkCaretaker ↔ Park (1..1 : 1..1).

5. Attribute Placement and Keys

- The distribution of attributes made sense. For instance:
  - The MaintenanceRecord entity contains maintenance-specific characteristics (maintenanceDate, maintenanceDetails).
  - The Session entity and its specializations store session-specific characteristics (sessionType,sessionCategory).
- To guarantee uniqueness, primary keys were established for every entity.

QUESTION 2: Entities

Entity Name	Brief Explanation
w2051819_player	Represents participants in the Racketminster program.
w2051819_booking	Records player reservations for particular playing sessions.
w2051819_session	Represents planned, supervised or unsupervised racket sports sessions.
w2051819_court	Explains the actual courts that are used for pickleball, tennis, or both.
w2051819_equipment	Represents court-assigned equipment such as nets, rackets, and balls.
w2051819_instructor	Represents trained personnel in charge of supervised play sessions.
w2051819_park	Represents the parks that house and care for the courts.
w2051819_maintenanceRecord	Records court and equipment maintenance actions.
w2051819_caretaker	Represents those in charge of keeping parks and courts immaculate.
w2051819_discount	Represents the savings given to players as a result of their recommendations or involvement.
w2051819_recommendation	Records information about a player referring another participant to the scheme.

Table 1 Entities

QUESTION 3: Specializations

General Entity	Specialized Entity	Brief Explanation
w2051819_court	w2051819_tennisCourt	Represents tennis courts that are exclusively used for play.
	w2051819_pickleballCourt	Represents pickleball courts that are exclusively used for play.
w2051819_caretaker	w2051819_courtCaretaker	Represents those in charge of pickingleball and tennis court maintenance and upkeep.
	w2051819_parkCaretaker	Represents those in charge of the general repair and maintenance of the parks where the courts are situated.
w2051819_equipment	w2051819_movebleEquipment	Represents transportable equipment, including balls, rackets, and other objects.
	w2051819_fixedEquipment	Represents fixtures on the courts that are permanently erected, such as nets, posts, and other equipment.

w2051819_maintenanceRerord	w2051819_courtRec	Maintains records of court-specific maintenance actions.
	w2051819_equipmentRec	Keeps track of equipment maintenance tasks for things like nets, balls, and rackets.
w2051819_session	w2051819_unsupervisedSession	Represents play sessions in which participants engage on their own without the guidance of an instructor.
	w2051819_supervisedSession	Represents activities like group coaching or personal training that are led by certified instructors.
w2051819_booking	w2051819_singleBooking	Represents a one-time reservation for a single performance.
	w2051819_blockBooking	Represents a reservation for several unattended sessions at once.

Table 2 Specializations

QUESTION 4: Relationships & Multiplicities

Entity Name	Multiplicity	Relationship	Multiplicity	Entity Name	Brief justifications for the multiplicity (4 statements for each relationship)
w2051819_court	0..*	has	1..*	w2051819_equipment	At least one piece of equipment, like nets or balls, is needed for each court to operate.
					To accommodate various players or game needs, a court may feature a variety of equipment.
					There may be 0..* on the court side if some equipment, such as moveable things, is not permanently assigned to a court.
					Since they are essential to the gameplay, equipment must always belong to at least one court.
w2051819_court	1..1	has	1..*	w2051819_maintenanceRecord	For openness and accountability, maintenance records are required in every court.
					Because maintenance is done on a regular basis, a court may have several maintenance records.
					1..1 on the court side is necessary since maintenance records cannot exist separately without being connected to a court.
					Court maintenance is a continuous procedure that results in 1..* records.
w2051819_park	1..1	has	1..*	w2051819_court	The Racketminster concept requires that every park have a minimum of one court.
					Depending on its size and available space, a park may feature several courts.

					The 1..1 link is necessary for courts to exist outside of the park context.
					The 1..* multiplicity is justified by the fact that a park cannot be included in the plan if it lacks courts.
w2051819_session	0..*	conducts	1..*	w2051819_court	To guarantee location monitoring, sessions need to be linked to certain courts.
					Courts may have several sessions in a single day.
					0..* on the session side may be justified by the fact that some courts do not always have planned sessions.
					Games must be played on at least one court during a session, resulting in 1..* on the court side.
w2051819_caretaker	1..*	maintains	1..*	w2051819_court	A caretaker is necessary for the upkeep and repair of every court.
					Several courts may be maintained by a single caretaker, contingent on their workload.
					The 1..* on the caretaker side is due to the fact that courts cannot be neglected.
					There are always 1..* on both sides because caretaker are allocated to at least one court.
w2051819_session	0..*	supervises	0..2	w2051819_instructor	Unsupervised sessions, for example, might not need supervision, which would result in 0..* on the session side.
					Up to two instructors may be present during a session for group coaching or training.

					A session may not always be supervised by instructors, which explains the 0..2 multiplicity.
					At least one instructor is required to supervise or provide guidance during supervised sessions.
w2051819_booking	1..1	can have	1..*	w2051819_session	To guarantee a clear goal, a reservation must be associated with at least one session.
					Block bookings for ongoing games are one example of a booking that involves numerous sessions.
					On the booking side, 1..1 is required since sessions must always be a part of at least one booking.
					It is impossible for a player to schedule a session without first creating a booking.
w2051819_player	1..1	can make	1..*	w2051819_booking	To take part in any session, a player needs to make a reservation.
					Depending on how interested they are in the concept, players may make more than one reservation.
					Bookings require 1..1 on the player side and cannot exist without the player initiating them.
					During their involvement, each participant is expected to interact with at least one booking.
w2051819_caretaker	1..*	looks after	1..*	w2051819_park	To guarantee appropriate maintenance, caretakers must be assigned to each park.
					Depending on their workload, a single caretaker may oversee several parks.

					Parks need 1..* on both sides to be maintained; they cannot survive without it.
					At least one park is always maintained by caretakers, who are essential to the plan.
w2051819_parkCaretaker	1..1	takes care	1..1	w2051819_park	A designated park caretaker must oversee the upkeep of each park.
					A park caretaker ensures meticulous attention by concentrating just on one park.
					Since Parks cannot be neglected, the connection is 1.
					Park caretakers are committed to upholding the standards of quality in the park they are responsible for.
w2051819_courtCaretaker	1..1	takes care	1..1	w2051819_court	For specialized maintenance, each court has its own court caretaker.
					For quality control, a court caretaker only concentrates on one court.
					Without adequate upkeep, courts cannot operate, necessitating the 1..1 connection.
					In order to keep the court in perfect shape, court caretakers are essential.
w2051819_blockBooking	0..*	books	*..*	w2051819_unsupervisedSession	Players can reserve numerous unsupervised sessions with block bookings, which results in 0..* on the booking side.
					Multiple block bookings can include unsupervised sessions, which justifies the term "multiplicity."
					Block bookings may not be chosen by all participants, giving 0..* flexibility.

					Tracking repeating unsupervised sessions is made simpler with block bookings.
w2051819_singleBooking	1..1	books	1..2	w2051819_supervisedSession	Every single reservation needs to be connected to a minimum of one supervised session.
					Up to two supervised sessions, such as consecutive classes, may be included in a single reservation.
					1..1 is justified because players are unable to schedule a monitored session without making a single booking.
					One or two consecutive single bookings are frequently accommodated by supervised sessions.
w2051819_player	1..*	recommends	0..*	w2051819_player	To entice other players to join, each player may suggest the plan to one or more of them.
					Since anyone can join without a referral, a player might not get any recommendations.
					Recommendations can only be made by active players.
					Since recommendations are voluntary, not all players will offer or get them.

Table 3 Relationships & Multiplicities

QUESTION 5: Attributes & Primary Keys

Entity name	Attributes for each entity (include PK)	Brief explanation
w2051819_court	w2051819_courtID{PK}	Each court's unique identification number.
	w2051819_courtType	Property indicates the kind of court (e.g., pickleball, tennis, or both).
	w2051819_location	Provides the court's actual address.
w2051819_park	w2051819_parkID {PK}	Each park's unique identification number.
	w2051819_parkName	The park's name where the court is situated.
	w2051819_location	Indicates the location of the park.
	w2051819_description	A brief description of the park, including its characteristics and amenities.
w2051819_caretaker	w2051819_caretakerID {PK}	Each caretaker's unique identification number.
	w2051819_caretakerName	Name of the caretaker.
	w2051819_caretakercContact	The caretaker's contact details.
w2051819_equipment	w2051819_equipmentId {PK}	Every piece of equipment has a unique identification number.
	w2051819_type	Indicates the kind of apparatus (e.g., racket, net).
	w2051819_condition	Shows whether the device is in good or damaged condition.
w2051819_maintenanceRecord	w2051819_maintenanceRec {PK}	Maintenance records' unique identification.
	w2051819_maintenanceDate	The maintenance activity's date.
w2051819_instructor	w2051819_instructorID {PK}	A distinct identity for every teacher.
	w2051819_instructorName	The instructor's name.
	w2051819_instructorContact	The instructor's contact details.
w2051819_session	w2051819_sessionID {PK}	A distinct number assigned to every session.

	w2051819_sessionType	Indicates if the session is under supervision or not.
	w2051819_sesstionCategory	The session's category (e.g., coaching, fitness play).
	w2051819_duration	The session's length.
w2051819_booking	w2051819_bookingID {PK}	A special number assigned to every reservation.
	w2051819_bookingDate	The day the reservation was made.
	w2051819_bookingTime	The reservation time.
w2051819_player	w2051819_playerID {PK}	Each player's unique ID.
	w2051819_playerName	The player's name.
	w2051819_playerContact	The player's contact details.
w2051819_discount	w2051819_discountID {PK}	A special number assigned to every discount.
	w2051819_discountDetails	An explanation of the terms or the discount.
w2051819_recommendation	w2051819_recommendationId {PK}	A special number assigned to every suggestion.
	w2051819_recommenderPlayerID	The player's ID who is recommending the game.
	w2051819_recommendedPlayerID	The player's ID that is being suggested.
	w2051819_recommendationDate	The recommendation was made on this date.

Table 4 Attributes & Primary Keys

QUESTION 6: Conceptual EERD Quality & Notations

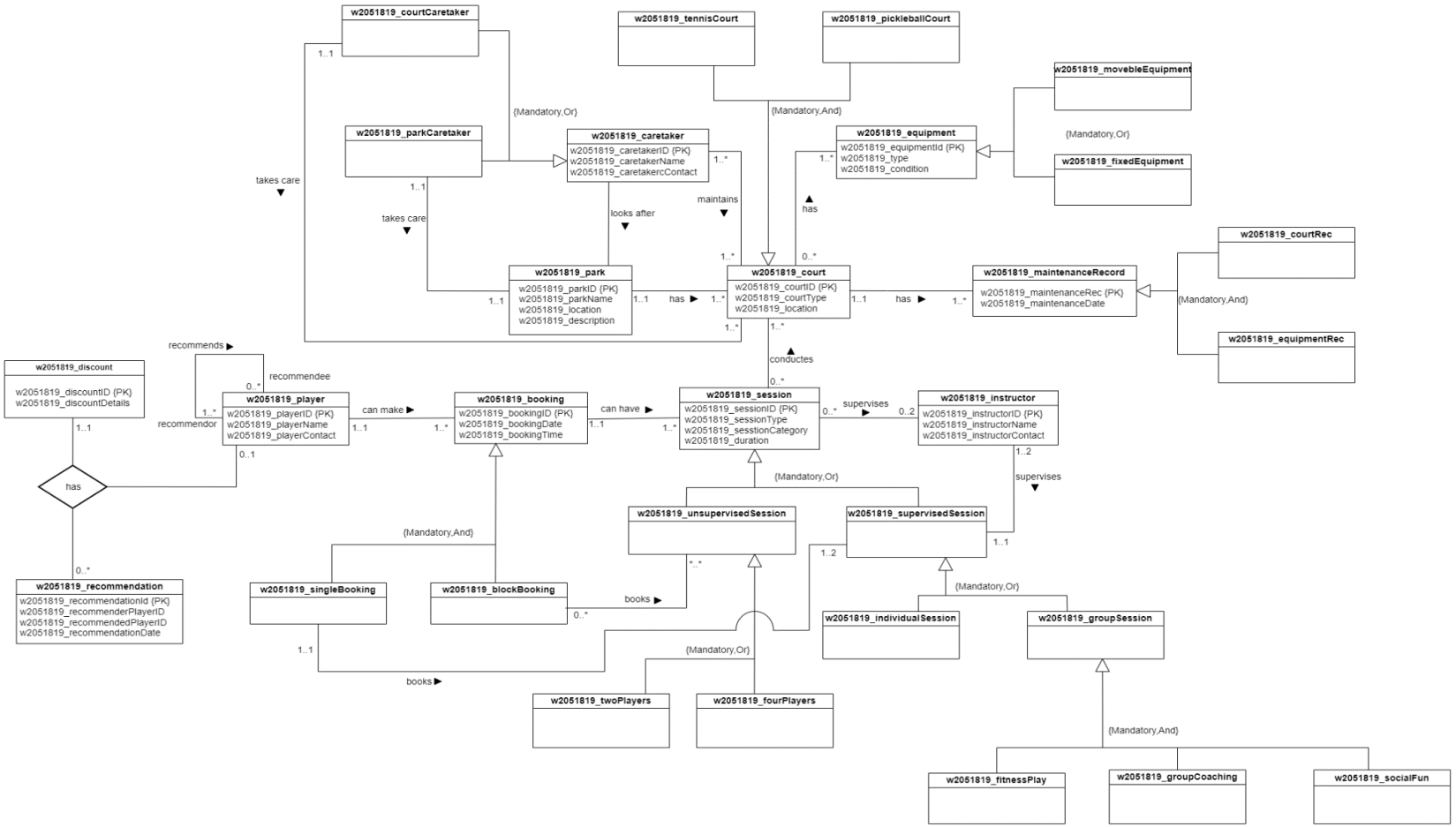


Figure 2 Conceptual EERD

Coursework Part B: Logical ERD

QUESTION 7: Mapping Conceptual EERD to Logical ERD

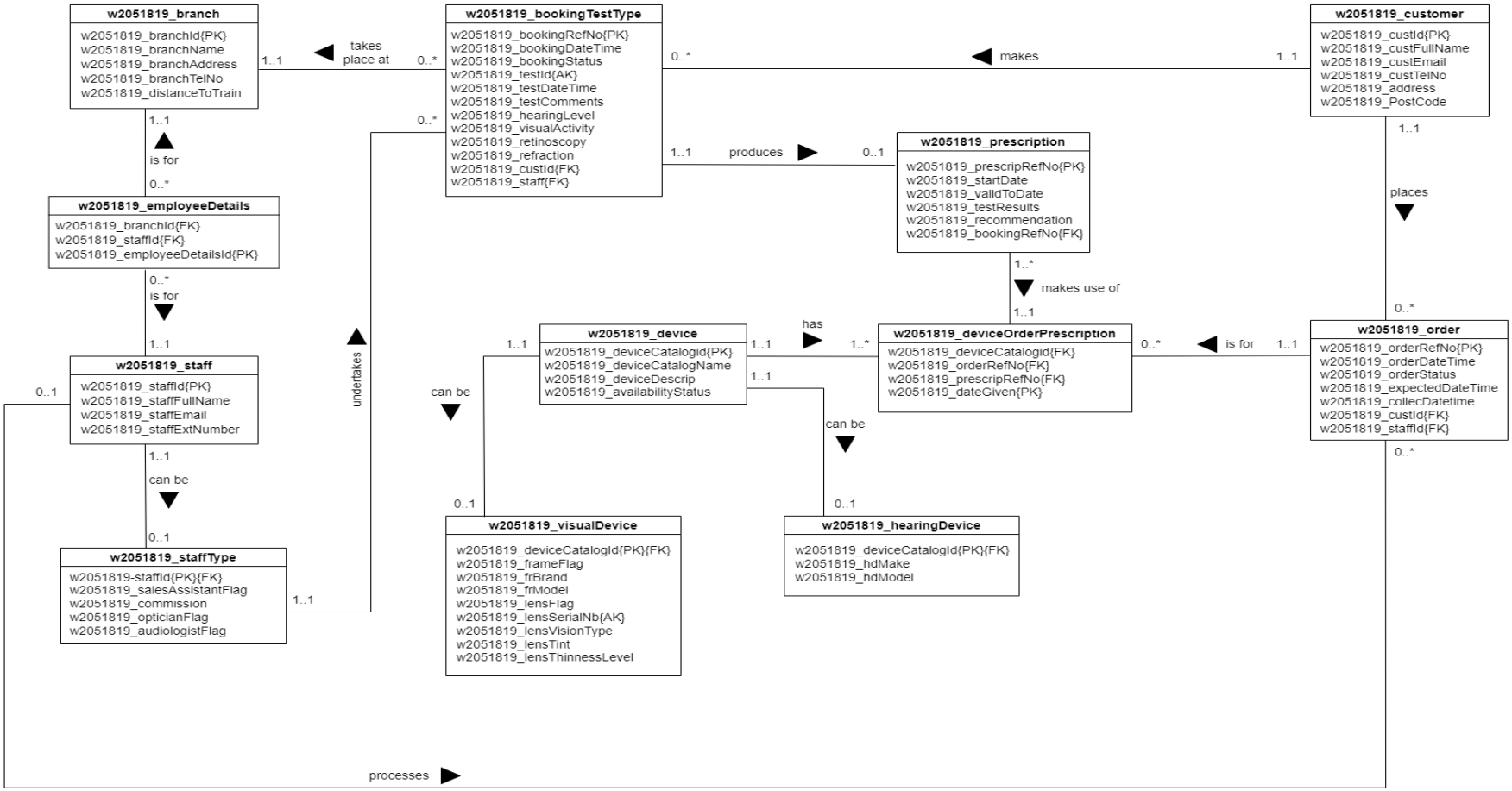


Figure 3 Logical ERD