Racketminster Database Design Project

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BSC Data Science and Analytics

5COSC020W Database Systems

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Tuesday CLG.42 2-4pm Lecture with Stephen Sean Roberts

Coursework Part A: Conceptual EERD

1. There are several major problems with the basic AI generated EERD given. Firstly, the relationship labels between entities could be labelled clearer and more specifically to avoid confusion, and they have no directional arrows which doesn't make it clear the flow of which entity links to which, this leaves uncertainty in the relationships. It also creates confusion on where foreign keys are stored. To fix this I added directional arrows in my EERD. The diagram is also incorrect as a key entity is missing. Without the entity 'equipment' there is incomplete representation so the system can't record information on equipment maintenance or any information on a piece of equipment, which is required in the project brief.
   This diagram also lacks specialisations which are essential for understanding the relationships in the Racketminster scheme- it is important as it shows the different subtypes of entities, for example, a session has two different types, supervised and unsupervised which as to be shown in the diagram as per the project brief. These specialised entities have different attributes and properties that we need to show in the system.
   When creating my conceptual EERD for Racketminster, I first read the project brief in detail, made notes and highlighted the important entities and relationships. I had several questions, some of which I asked in the BQs forum and some that were already asked and answered. I began by identifying the most essential entities based upon the project requirements which are player, booking, session, park, court, equipment, session, caretaker and maintenance. These are the core entities because the information must be recorded in order to create the system required. I then identified a unique irreducible primary key for each entity, something that can be easily referenced in other parts of the database system.
   Next, I added my attributes that record important information for each entity. For example, the entity 'court' I added attributes like courtAvailablility, which kept track of whether the court was available for a booking or was already booked, courtLocation, which kept track of which park in Ovestminster the court was in, and courtSportType, which determined if the court was for either tennis, pickleball or multi-use.
   I next decided to focus on specialisations which allow the system to differentiate between different types of subcategories to enforce the rule from the project brief. I quickly recapped my knowledge on specialisations and the four constraints and then identified several entities which required specialisations. The first most obvious example to me was for the 'session' entity, which could either be supervisedSession or unsupervisedSession. I applied the {mandatory,or} constraint because each session could be one or the other, but it couldn't be both. I then went on and found the other specialised relationships and implemented them in my diagram, which I explained in Q3.

While doing these steps I filled in the data dictionary tables to avoid confusion and have all my information written down.

Lastly, I focused on relationships. The AI generated diagram shows a relationship between 'caretaker' maintaining 'park' but this relationship isn't needed as the project brief states the maintenance of the park does not need to be recorded. Several of the multiplicities were incorrect also. Multiplicities are important as they show how these entities interact with real world scenarios.

After mapping these out I checked over my diagram to check it is consistent, met the project brief and that I hadn't left out any important information that needed to be recorded in the system.

2.

Entity name	Brief explanation
W1971684_park	This entity shows the parks in Ovestminster which represents where the courts are and where the sessions take place
W1971684_player	This entity represents players who are registered in the Racketminster scheme. Players can book sessions, play different games using equipment and make recommendations to other players for a possible incentive system
W1971684_court	This entity represents the different courts in the park that can either be specific to tennis, specific to pickleball or for both
W1971684_equipment	Equipment is associated with each court, and is tracked to which court and its condition (Nets, rackets, balls)
W1971684_booking	This entity records reservations made by players for sessions, either a single blocking or block bookings. It also keeps a record of all bookings.
W1971684_session	This entity represents the different types of sessions at Racketminster. There are two types of sessions unsupervised, single or doubles, and supervised sessions where there is a qualified instructor present. There are three types of supervised group sessions: fitness play session, structured learning group coaching sessions and social fun sessions.
W1971684_caretaker	Caretakers maintain the courts (eg duties including fixing the net or replacing equipment)
W1971684_instructor	This entity represents qualified instructors who lead the supervised sessions, either personal one on one training, or supervised group sessions (up to two instructors)

W1971684_maintenance	This entity holds a record of maintenance on each court and equiptment.
W1971684_staff	This entity hold a record of all staff under the racketminster scheme

3.

General entity	Specialised entity	Brief explanation
W1971684_court	W1971684_tennisCourt	This court can only be used for tennis. The relationship is {mandatory, and}
W1971684_court	W1971684_pickleballCourt	This court can only be used for pickleball
W1971684_session	W1971684_supervisedSession	This session is led by an instructor. They are either personal one on one training, or supervised group sessions. The relationship of entity 'session' to 'supervised session' and 'unsupervised session' is {mandatory,or} as every instance of the general entity must be associated with a specialised entity. This means an instance can only belong to one specialised entity, not both nor neither.
W1971684_supervisedSession	W1971684_groupSession	There are three types of supervised group session categories: fitness play session, structured learning group coaching sessions and social fun sessions; identified as categoryID
W1971684_supervisedSession	W1971684_personalTrainingSession	This session is a supervised single one-on-one session. The relationship of 'supervisedSession' to the specialised 'groupSession' and 'personalTrainingSession' is {mandatory,or} as every instance of the general entity must be associated with a specialised entity. This means an instance has to only belong to one specialised entity.
W1971684_session	W1971684_unsupervisedSession	This is a session where players free play either tennis or pickleball, without an instructor, either in singles (2 players) or doubles (4 players)

W1971684_ unsupervisedSession	W1971684_blockBooking	This entity records information on the block bookings made by a player who booked an unsupervised session. The specialisation is {optional,or] as the general entity (booking) can choose to not participate in a specialised entity, a unsupervised session doesn't have to be block-booked but it is a possible scenario.
W1971684_player	W1971684_recommendation	This entity holds information on player to player recommendations, which will be used in the future for potential discount incentives. The specialisation is {optional,or] as a recommendation can be made by a player but it isn't in all scenarios as the general entity can choose not to participate in any specialised entity
W1971684_maintenance	W1971684_courtMaintenance	This holds records of the maintenance logs for the court
W1971684_maintenance	W1971684_equiptmentMaintenance	This holds records of the maintenance logs for the equipment

4.

Entity name	Multiplicity	Relationship	Multiplicity	Entity name	Brief justification
W1971684_player	1..1	Makes	0..*	W1971684_booking	-One player may have no bookings yet (Participation is 0) -One player may have several bookings booked (Cardinality is *) -One booking is associated with only one player (Participation is 1) -One booking is made by one player (Cardinality is 1)
W1971684_booking	1..1	creates	1..*	W1971684_session	-One booking creates at least one session (Participation is 1)

					-One booking can be for several sessions (Cardinality is *) -A session is created with one booking (Participation is 1) (Cardinality is 1)
W1971684_session	0..*	Takes place on a	1..1	W1971684_court	-One session takes place on one court. (Participation is 1) -A session cannot take place on two courts at once (Cardinality is 1) -A court may not be booked for a session (Participation is 1) -One court can have several sessions happening at one time on a court(Cardinality is *)
W1971684_caretaker	1..*	maintains	0..*	W1971684_court	-A caretaker could have maintain 0 courts, for example they maybe have not been involved in a court maintenance task yet as they are new, or have only done equipment related maintenance (Participation is 0) -A caretaker can maintain several courts (Cardinality is *) -A court has to have at least one caretaker (Participation is 1) -A court can have several caretakers maintaining the court (Cardinality is *)
W1971684_court	1..1	contains	1..*	W1971684_equipment	-A court must have one piece of equipment (Participation is 1) -A court can have several pieces of equipment (Cardinality is *)

					-A piece of equipment can only belong to one court (Participation is 1)
W1971684_park	1..1	Contains	0..*	W1971684_court	-A park may have no courts. (Participation is 0) -A park can contain multiple courts (Cardinality is *) -A court is in one park as it can't be in two parks at once (Participation is 1)
W1971684_caretaker	1..*	maintains	0..*	W1971684_equiptment	-A caretaker maybe has not maintained a piece of equipment yet eg. they could be new or have only done court related maintenance (Participation is 0) -A caretaker can maintain many pieces of equipment (Cardinality is *) -Equipment has to have at least one caretaker maintaining it (Participation is 1) -Equipment can have several caretakers maintaining and looking after the equipment (Cardinality is *)
W1971684_instructor	1..3	supervises	1..1	W1971684_supervisedSession	-One instructor supervises one session at a time (Participation is 1) -One instructor cannot supervise more than one session at a time hence the (Cardinality is 1) -A supervised session must have at least one instructor for it to be a supervised session (Participation is 1) -the maximum number of instructors a session can have is 3 (in the group play category)

W1971684_caretaker	1..*	records	0..*	W1971684_maintenance	-A caretaker may have not performed maintenance yet as they could be new (Participation is 0) - A caretaker performs and therefore logs several different maintenance tasks (Cardinality is *) -A maintenance task is done and recorded by at least one caretaker, it can't get done by itself (Participation is 1) -A maintenance task could be performed and recorded with several caretakers working on a task eg several caretakers fixing a net on the court (Cardinality is *)

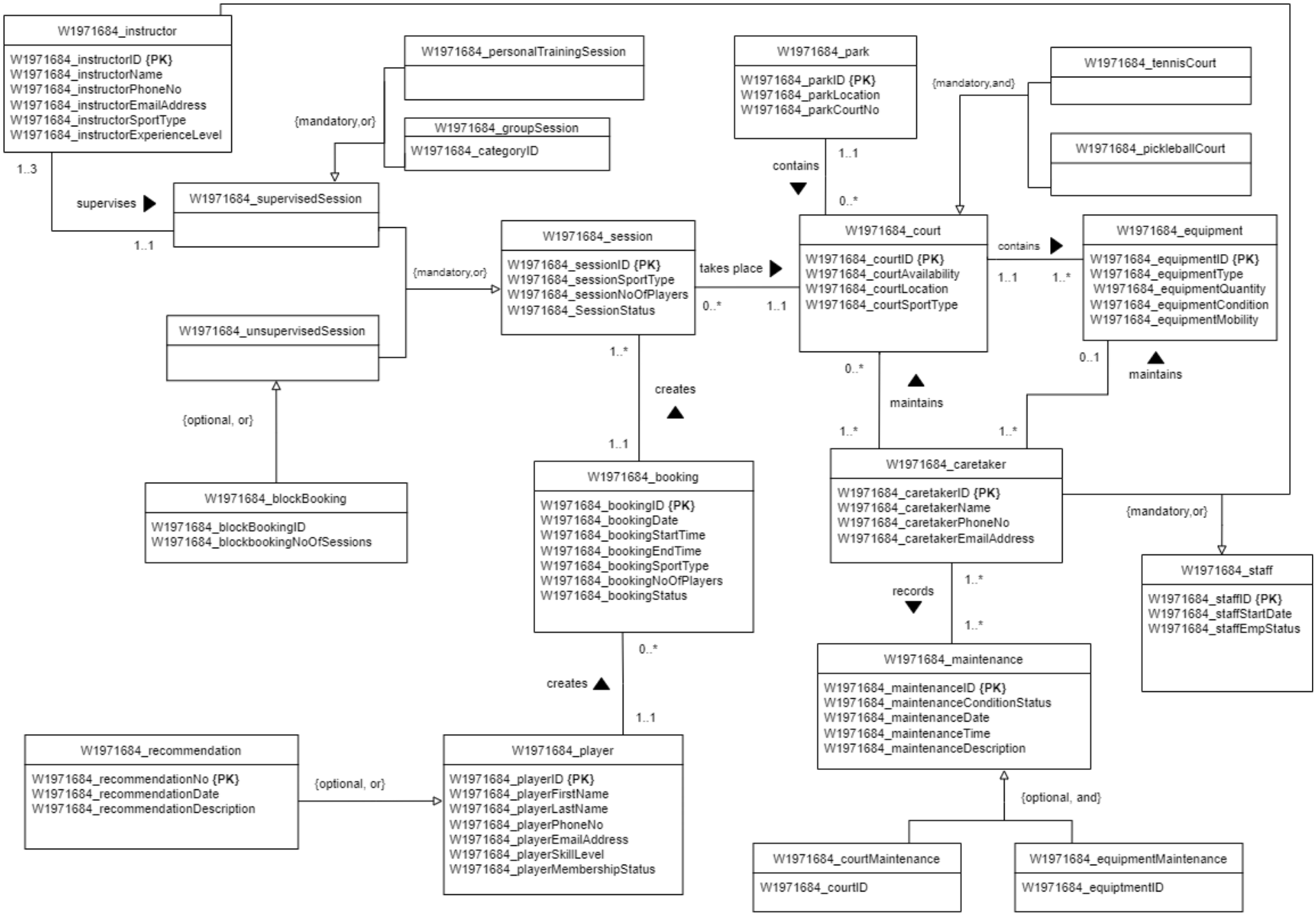
5.

Entity name	Attributes and primary key	Brief explanation
W1971684_park	**W1971684_parkID (PK),** W1971684_parkLocation, W1971684_parkCourtNo,	courtNo: it states which courts are in which park
W1971684_player	**W1971684_ playerID (PK),** W1971684_ playerfirstName, W1971684_ playerLastName, W1971684_ playerPhoneNo, W1971684_ playerEmailAddress, W1971684_ playerSkillLevel, W1971684_ playerMembershipStatus	This PK uniquely identifies the player and is irreducible. W1971684_ playerSkillLevel: hold information of the players skill level, which would be useful when matching them with an instructor if that's the session they want to book.
W1971684_court	**W1971684_courtID(PK),** W1971684_courtAvailability, W1971684_courtLocation, W1971684_courtSportType	W1971684_ courtSportType: clarifies which sport can be played on the court (tennis or pickleball) or if it's multi use
W1971684_equipment	**W1971684_equipmentID(PK),** W1971684_equipmentType, W1971684_equipmentConditionStatus, W1971684_equipmentQuantity W1971684_equipmentMobility	W1971684_ equipmentType: this attribute is to show what piece of equipment it is (eg tennis racket, ball) W1971684_ equipmentConditionStatus:

		the current condition of the equipment W1971684_ equipmentMobility: this attribute holds information on whether the equipment item is fixed to the court or movable
W1971684_booking	**W1971784_bookingID(PK),** W1971684_bookingDate, W1971684_bookingStartTime, W1971684_booking EndTime, W1971684_bookingSportType, W1971684_bookingNoOfPlayers W1971684_bookingStatus	W1971684_bookingSportType: which sport the booking is for W1971684_bookingNoOfPlayers: number of participants
W1971684_session	**W1971684_sessionID(PK),** W1971684_sessionSportType, W1971684_sessionNoOfPlayers	W1971684_sessionID:identifies type of session, supervised or unsupervised sportType: whether it is tennis or pickleball
W1971684_caretaker	**W1971684_caretakerID(PK),** W1971684_caretakerName, W1971684_caretakerPhoneNo, W1971684_caretakerEmailAddress	These attributes include information about the caretaker and how to contact them
W1971684_instructor	**W1971684_instructorID(PK),** W1971684_instructorName, W1971684_instructorPhoneNo, W1971684_instructorEmailAddress, W1971684_instructorSportType	These attributes record information on the instructor, contact details and their sport type specialisation.
W1971684_maintenance	**W1971684_maintenanceID(PK),** W1971684_maintenanceDate, W1971684_maintenanceConditionStatus W1971684_maintenanceDescription W1971684_maintenanceTime	These attributes hold logs of information for maintenance, including when it was done, the current condition of the item maintained and a description of the tasks done.
W1971684_recommendation	**W1971684_recommendationNo (PK),** W1971684_recommendationDate, W1971684_recommendationDescription	These attributes hold information of the recommendation made by a player, a short description and when it was made.
W1971684_blockBooking	W1971684_blockBookingID W1971684_blockBookingNoOfSessions	W1971684_blockBookingNoOfSession shows the amount of block bookings that a player has booked

W1971684_staff	W1971684_staffID **{PK}** W1971684_staffStartDate W1971684_staffEmpStatus	The attribute W1971684_staffEmpStatus hold information on the current employment status of the staff
W1971684_groupSession	W1971684_categoryID	This attribute shows which category of group session is played; fitness play sessions, group coaching sessions or social fun sessions.

6. I have attached my updated conceptual EERD on the next page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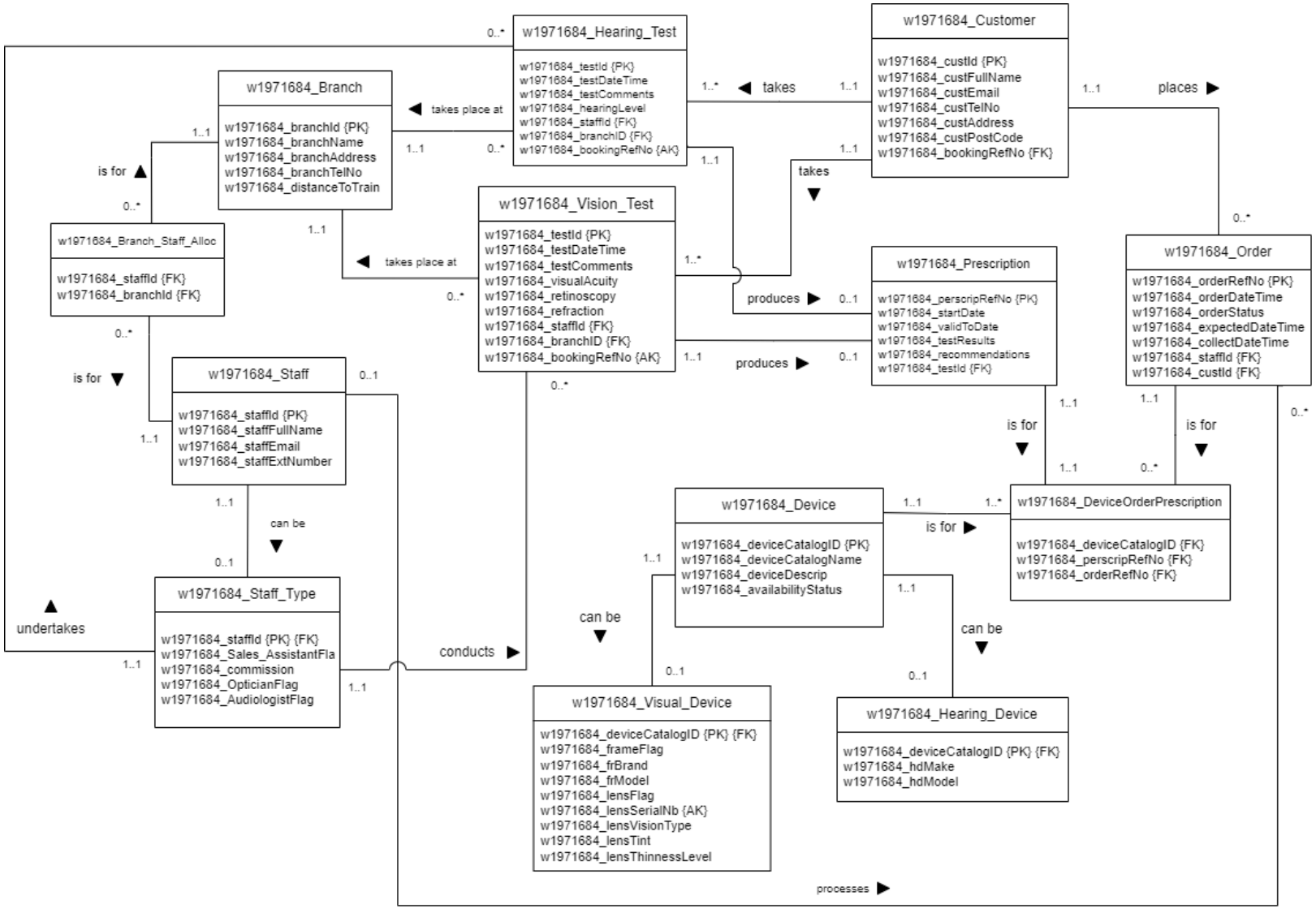
Coursework Part B: Logical EERD

7.