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IT-214-005

Happy Learning Database Design Report

This is a small database of a private kindergarten aiming to manage a few operational tasks efficiently. These tasks include assigning teachers and students to specific classrooms and securely storing and managing individuals' personal information.



<https://unsplash.com/photos/gsRi9cWCIB0>

Conceptual Analysis

Main Entities:

Based on the given description, I identified that there would be 4 entities involved in this database. The entities are STUDENT, CARETAKER, CLASS, and TEACHER.

Main Relationships:

In this private kindergarten, a parent can enroll one or multiple children, and a student can have one or more parents. As a result, the relationship between STUDENT and CARETAKER (or parent) is a many-to-many relationship, which requires the inclusion of a bridge.

A class may have many students, and a student can only be enrolled in one class. Therefore, the relationship between CLASS and STUDENT would be a one-to-many relationship.

Lastly, a teacher can be assigned to multiple classes, while each class will have only one teacher. Hence, the relationship between TEACHER and CLASS is also a one-to-many relationship.

About the STUDENT and CARETAKER relationship:

When dealing with a many-to-many relationship, it is necessary to establish a bridging entity connecting the two entities involved. In this case, the bridging entity is named "GUARDIANSHIP" to signify that a student is being looked after or "guarded by" their caretaker, and conversely, the caretaker is "guarding" the student. This relationship is represented by having two one-to-many relationships that are connected to the same bridging entity.

Entities Analysis

Name:

STUDENT

Description:

Certainly, in the context of a private kindergarten, it is expected that we will have an entity within the database dedicated to storing student records. This entity will primarily store their personal information, including their legal name and address, along with details regarding the specific class they are enrolled in.

Attributes:

Name:	Domain & Size	Simple/ Composite	Single/ Multi-Value	Required/ Optional	Unique/ Duplicated
ID	INT	Simple	Single	Required	Unique
FIRST_NAME	VARCHAR(22)	Simple	Single	Required	Duplicated
MIDDLE_NAME	VARCHAR(22)	Simple	Single	Optional	Duplicated
LAST_NAME	VARCHAR(22)	Simple	Single	Required	Duplicated
NICKNAME	VARCHAR(20)	Simple	Single	Optional	Duplicated
DATE_OF_BIRTH	DATE	Simple	Single	Required	Duplicated
CITY	VARCHAR(15)	Simple	Single	Required	Duplicated
STATE	CHAR(2)	Simple	Single	Required	Duplicated
ZIP CODE	CHAR(5)	Simple	Single	Required	Duplicated
STREET	VARCHAR(35)	Composite	Single	Required	Duplicated
CLASS_ID (Foreign Key)	CHAR(2)	Simple	Single	Required	Duplicated

For this entity, I provided a simple primary key ID because none of the given attributes are a good candidate for a unique primary key.

For the foreign keys used in this setup, the entity contains a class ID, which identifies a specific class within the kindergarten since each student is enrolled in just one class. Additionally, within the "GUARDIANSHIP" bridge entity, the primary key of the caretaker is included.

Name:

CARETAKER

Description:

A caretaker can take the form of a parent, a sibling, or any legal guardian of the student. Hence, I chose to name the entity "CARETAKER" to encompass this broader definition, acknowledging that not all caretakers are parents. Within this entity, we store the caretaker's details, including a unique ID, their legal name, phone numbers, email address, and the specific relationship they share with the child.

Attributes:

Name:	Domain & Size	Simple/ Composite	Single/ Multi-Value	Required/ Optional	Unique/ Duplicated
ID	INT	Simple	Single-Value	Required	Unique
FIRST_NAME	VARCHAR(22)	Simple	Single-Value	Required	Duplicated
MIDDLE_NAME	VARCHAR(22)	Simple	Single-Value	Optional	Duplicated
LAST_NAME	VARCHAR(22)	Simple	Single-Value	Required	Duplicated
PHONE	CHAR(14)	Composite	Multi-Value	Required	Duplicated
EMAIL	VARCHAR(30)	Composite	Multi-Value	Optional	Duplicated
RELATIONSHIP	VARCHAR(25)	Simple	Single-Value	Required	Duplicated

Similar to students, each caretaker will also contain a simple primary key, as none of the attributes in this entity are good candidates for a unique primary key.

Within this entity, there are no foreign keys used except in the bridge entity "GUARDIANSHIP," where the primary key of the student entity is included.

Name:

GUARDIANSHIP (Bridge Entity)

Description:

Given that a student may have multiple caretakers and a caretaker may be responsible for multiple students, it was necessary to create a bridge entity to establish this connection. This bridge entity, named "GUARDIANSHIP," contains the primary keys of both the student and the caretaker to facilitate this relationship.

Attributes:

Name:	Domain & Size	Simple/ Composite	Single/ Multi-Value	Required/ Optional	Unique/ Duplicated
STUDENT_ID	INT	Simple	Multi-Value	Required	Duplicated
CARETAKER_ID	INT	Simple	Multi-Value	Required	Duplicated

Name:

CLASS

Description:

In our kindergarten, we organize students into three age groups: Turtles, Foxes, and Monkeys. Within each age group, we have three classes, which we differentiate by colors: Red, Blue, and Green. To ensure clarity and uniqueness, we've created distinct class codes, which are formed by combining the initial letters of the color and age group (e.g., BM for Blue Monkeys, RF for Red Foxes).

While these specific codes are unique, we've assigned a separate unique ID to each class as a precautionary measure in case any changes are ever made to the class codes. Furthermore, each class entity will contain unique room numbers and phone numbers, and for some classes, there will be directions to their respective classrooms within the building.

Attributes:

Name:	Domain & Size	Simple/ Composite	Single/ Multi-Value	Required/ Optional	Unique/ Duplicated
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ID	INT	Simple	Single-Value	Required	Unique
CODE	CHAR(2)	Simple	Single-Value	Required	Unique
ROOM_NUMBER	INT	Simple	Single-Value	Required	Unique
PHONE	CHAR(14)	Composite	Single-Value	Required	Unique
DIRECTIONS	VARCHAR(130)	Simple	Single-Value	Optional	Duplicated
TEACHER_ID (Foreign Key)	INT	Simple	Single-Value	Required	Duplicated

This entity was assigned a surrogate primary key ID with the intention of enhancing its resilience against potential future data anomalies.

This entity also includes a foreign key that references the unique ID of a teacher. This association is established because each class is linked to a specific teacher.

Name:

TEACHER

Description:

This marks the last entity in the Happy Learning database. In addition to the teacher's name and phone number, this entity also includes details about their work email and personal email, along with information regarding the colleges they attended, their degrees, and their respective areas of study.

Attributes:

Name:	Domain & Size	Simple/ Composite	Single/ Multi-Value	Required/ Optional	Unique/ Duplicated
ID	INT	Simple	Single-Value	Required	Unique
FIRST_NAME	VARCHAR(22)	Simple	Single-Value	Required	Duplicated
MIDDLE_NAME	VARCHAR(22)	Simple	Single-Value	Optional	Duplicated
LAST_NAME	VARCHAR(22)	Simple	Single-Value	Required	Duplicated

PHONE	CHAR(14)	Composite	Multi-Value	Required	Duplicated
WORK_EMAIL	VARCHAR(30)	Composite	Single-Value	Required	Unique
PERSONAL_EMAIL	VARCHAR(30)	Composite	Multi-Value	Optional	Duplicated
COLLEGE	VARCHAR(55)	Simple	Multi-Value	Required	Duplicated
DEGREE	VARCHAR(5)	Simple	Multi-Value	Required	Duplicated
DEGREE_AREA	VARCHAR(25)	Simple	Multi-Value	Required	Duplicated

The teacher entity was given a simple primary key as an added measure to, once again, prevent potential data anomalies.

This entity does not feature any foreign keys.

Relationship Analysis

Relationship Name:

STUDENT is guarded by CARETAKER or CARETAKER guards STUDENT

Relationship Type:

This relationship is classified as a many-to-many relationship because it allows for the possibility that a student can have multiple caretakers, and likewise, a caretaker can be responsible for multiple students enrolled in the kindergarten. As previously mentioned, since this is a many-to-many relationship, a bridge entity will be established to facilitate the connection between the two one-to-many relationships. (This many-to-many relationship is defined as the student entity is connected to the bridge entity "GUARDIANSHIP" as a one-to-many relationship, and the caretaker entity is connected to the guardianship entity also as a one-to-many relationship.)

Relationship Strength:

All many-to-many relationships will be strong relationships because the primary keys of both entities are featured in their bridge entity.

Entities Participation:

Both the participation of the student entity and the caretaker entity are mandatory because a student cannot be enrolled without their caretaker, and a caretaker cannot enroll with 0 students.

Special Cardinality:

There are no special cardinalities to be reported.

Foreign Keys:

The student ID and the caretaker ID are used in the bridge entity.

Relationship Name:

CLASS is taken by STUDENT

Relationship Type:

This relationship is a one-to-many relationship because one class will contain many students, and a student will be enrolled in one class.

Relationship Strength:

The strength of this relationship is weak because the primary key of the student entity is not the primary key of the class entity.

Entities Participation:

Both entities are required to participate in this relationship because students must be enrolled in a class when they are registered in the kindergarten, and conversely, a class cannot exist without having students enrolled in it.

Special Cardinality:

The cardinality of the student entity in this relationship with the class entity is (1,25-29). The explanation for this is that the description specifies that each class is limited to accommodating a maximum of 25 to 29 students.

Foreign Keys:

The primary key of the class entity is a foreign key of the student entity because, according to the description, a student must have information about what class they are enrolled in.

Relationship Name:

TEACHER teaches CLASS

Relationship Type:

This is a one-to-many relationship because a teacher is assigned to one or more classes, and a class can only have one teacher. I believe a class can only have one teacher because the prompt explicitly mentions, "Each class has a teacher assigned," indicating that there is only one teacher assigned to each class.

Relationship Strength:

The strength of this relationship is also a weak relationship because the primary key of the teacher entity is not the primary key of the student entity.

Entities Participation:

In this relationship, the participation of the class entity is mandatory because a teacher will always be assigned to "one or more classes." As for the teacher, their entity is likely mandatory as well because a class cannot be run without a teacher.

Special Cardinality:

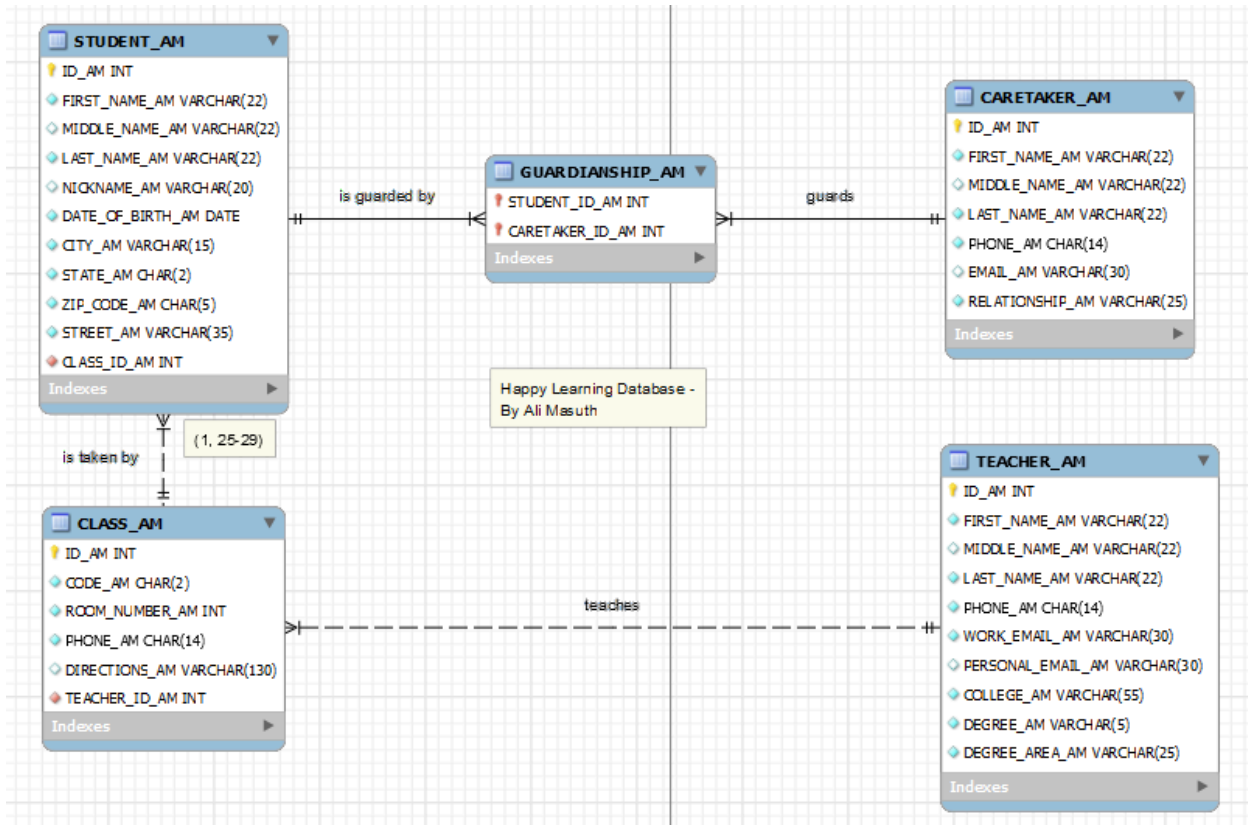
There are no special cardinalities to be reported.

Foreign Keys:

The teacher's ID is included as a foreign key in the class entity because it is essential to have information about the assigned teacher for a specific class.

Entity Relationship Diagram

Main Screenshot:



Entity Screenshots:

Column Name	Datatype	PK	NN	UQ
ID_AM	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FIRST_NAME_AM	VARCHAR(22)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
MIDDLE_NAME_AM	VARCHAR(22)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LAST_NAME_AM	VARCHAR(22)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
NICKNAME_AM	VARCHAR(20)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DATE_OF_BIRTH_AM	DATE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
CITY_AM	VARCHAR(15)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
STATE_AM	CHAR(2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
ZIP_CODE_AM	CHAR(5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
STREET_AM	VARCHAR(35)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
CLASS_ID_AM	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>



Table Name: CARETAKER_AM

Column Name	Datatype	PK	NN	UQ
ID_AM	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FIRST_NAME_AM	VARCHAR(22)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
MIDDLE_NAME_AM	VARCHAR(22)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LAST_NAME_AM	VARCHAR(22)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
PHONE_AM	CHAR(14)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
EMAIL_AM	VARCHAR(30)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RELATIONSHIP_AM	VARCHAR(25)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Table Name: GUARDIANSHIP_AM

Column Name	Datatype	PK	NN	UQ
STUDENT_ID_AM	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
CARETAKER_ID_AM	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>













Table Name: CLASS_AM

Column Name	Datatype	PK	NN	UQ
ID_AM	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
CODE_AM	CHAR(2)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
ROOM_NUMBER_AM	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
PHONE_AM	CHAR(14)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
DIRECTIONS_AM	VARCHAR(130)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TEACHER_ID_AM	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Table Name:

TEACHER_AM

Column Name	Datatype	PK	NN	UQ
 ID_AM	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
 FIRST_NAME_AM	VARCHAR(22)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
 MIDDLE_NAME_AM	VARCHAR(22)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
 LAST_NAME_AM	VARCHAR(22)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
 PHONE_AM	CHAR(14)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
 WORK_EMAIL_AM	VARCHAR(30)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
 PERSONAL_EMAIL_AM	VARCHAR(30)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
 COLLEGE_AM	VARCHAR(55)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
 DEGREE_AM	VARCHAR(5)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
 DEGREE_AREA_AM	VARCHAR(25)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>