# CSC 370

# Database Systems

## Assignment 3

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**Part A - E/R Diagram**

Our designed E/R diagram consists of 8 entities, and 8 relationships, including three *Is A* relationships. Figure 1 is the E/R diagram.

**Entities:**

- ***Persons***: This indicates a person in our database. It has three attributes *address, name* and *phone*. *Name* of a person alongside their *address* can define a unique *person*, i.e. they are the keys of this entity.

- ***Members***: This indicate a member of the gym. They are obviously a *person* and they do have two extra attributes; *ID* which addresses their membership ID in our database, and *status* for their membership status. For example, CARSA uses *student, student(non-assessed), staff, alumni* and *community* for members *status*.

- ***Instructors***: This entity shows the instructors for camps. Similar to *Members*, they are a person. They do have an extra attribute *SIN* to store their SIN which is used to pay their salary. Noted that, a person can be an *Instructor*, can be a *Member* or both.

- ***Memberships***: This entity consists of different types of membership types. Its attributes are *type* to shows the membership type, and *availability* to store the times of the year that a type of membership is available for members. For example, membership types can be *Fit, Fit_plus, Gold, Swimming, Outdoor fields, etc.* and the *Outdoor fields* is just available from April to te end of September, i.e. in *summer*.

- ***Services***: This entity stores the services and facilities that the Gym has. Each facility has a *Name* and the hours of day that it is available for the members which are indicated by *start_hour*, *finish_hour* and *days*. For example, service *Weight room* is available from 06:00 to 23:00 daily, or service *Swimming Pool* is available from 10:00 to 17:00 weekdays.

- ***Camps***: A *camp* is a special type of service that the gym provides. On top of the attributes of *Services*, it has two more attributes; *type* to indicate the type of the camp, *duration* to show the duration of that camp. For example, *Run 10K* (service name) is a *10 weeks* camp that is available on Tuesdays at 7:00 to 8:30 and it is a *Running* type of camp. Another example can be a *Marathon*(service name) camp which is a *25 weeks* camp that is available daily from 10:00 to 14:00 and it is a *Running* type of camp as well.

- ***Merchandise***: This entity stores the items that are available at the front desk to purchase. Each *Merchandise* has a unique *bar-code*, a *category* and definitely a *price*. For example, *Vikes cap* worth

15$ and it is categorized as clothes.

- ***Transactions***: They store each transaction which is made at the front desk, either for buying a merchandise or getting a membership. Each transaction has a unique *trans-ID*, a transaction type (Debit, Credit, Cash, Gift Card) and the total *amount* of that transaction.

Now we define each relationship in details with their constraints.
**Relationships**:

- ***Owns***: A *member* can own *memberships* for a specific number of passes. Each membership gets purchased with a single *transaction* and starts on a specific day. Each member can get multiple memberships, but each transaction for getting a membership is associated to just one membership purchase. This allows us to extract the price of certain membership with its associated pass. For example, member "John Doe" can own a *Fit* membership for 4 months starting 02/02/2020 and *Swimming* membership for 2 month starting 03/03/2020. He got these memberships with transaction IDs 12345 and 12349, respectively.

- ***Access***: Each membership type allows *access* to certain type of services. For example, membership type *Fit* allows access to *Weight room*, *Fit*$^+$ allows access to *Weight room* and *Squash courts*, and *Swimming* allows access to *Swimming pool*.

- ***Teaches***: Each instructor can *teach* many camps and each camp can be taught by multiple instructors.

- ***Joins***: A member can *join* different camps and each camp can have multiple attendees. A member must pay for a camp that he is willing to attend, and if a member attends in different camps, they should pay for each of them separately. This allows us to extract the price of certain camp.

- ***Buy***: Merchandises gets *bought* using transactions. Multiple items can gets bought in a single transaction.

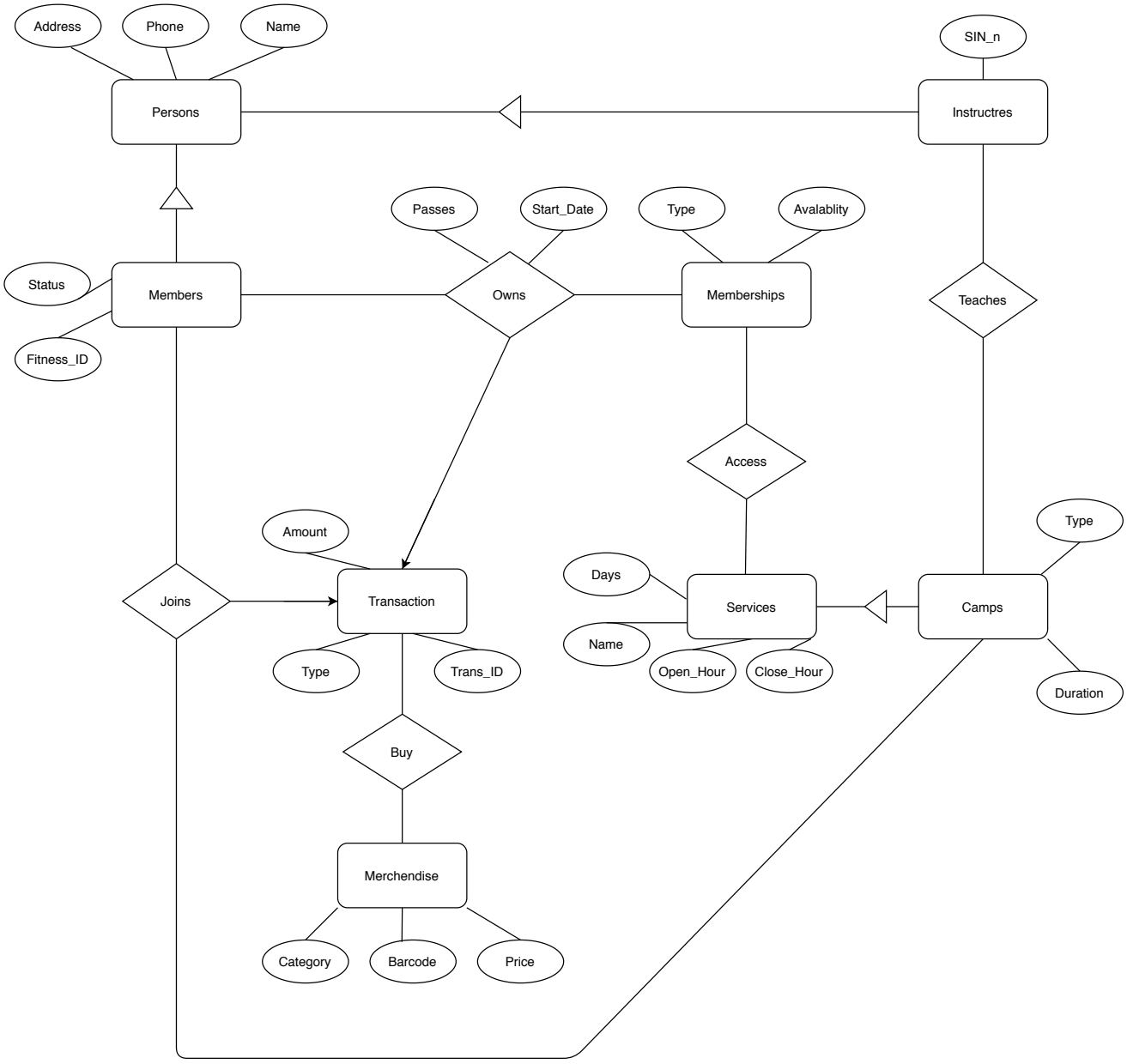


Figure 1: E/R diagram for the Gym Database

**Part B - Relations**

- persons(<u>name</u>,<u>address</u> , phone)
- instructors(<u>name</u>, <u>address</u>, SIN)
- members(<u>name</u>, <u>address</u>, status, fitnessID)
- memberships(<u>Type</u> , availability) – not unique

- services (name, start_hour, finish_hour) – not unique
- camps(service's name , camp's type , duration)
- Transactions(ID , amount , type)
- merchandise(Barcode , category , price)
- owns(member's name , member's address , passes , start data , membership's type)
- teaches(camp's name , SIN)
- access(membership's type , service's name)
- joins(member's name, member's address , camp's name, Trans-ID)
- buy(merchandise barcode , transaction ID)

**Part D - Queries**

1. Members that are (probably) from Victoria, i.e. their phone number area-code is 250 or 778.
2. Total number of distinct items in the front-desk with category “clothes”.
3. The largest transaction(s) and their details
4. Members that registered for a “Running” camp and has membership “Fit”.
5. Instructors whom teaching “10 weeks” camps.
6. Average “cash” merchandise transaction amounts.
7. Members who just carry a membership types that has access to just one service.
8. Members who paid more than 100.00$ for their membership pass(es).
9. Services that “John Doe” has access between 13:00 and 15:00.
10. Price of an annual Gold membership.