Project 2 deliverable

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Abstract

This a document that will describe all the business rules and display definitions for each of the entities identified in our business, a gym. firstly, we will discuss the upper most important entities, display tables about them and talk about their sub classes and how they enhance the data model as a whole. afterwards, I will discuss the high level knowledge of the business and how these entites came about. Models of the data will be strewn across the document to enhance the understanding. For detailed and summarized revision history, please see: https://github.com/adedomin/csc341-project/commits/master

Contents

1. Introduction

The problem domain we seek to solve is organizing our knowledge of our gym business into a clear, concise data model. This data model should represent the core parts of our business, to enhance the experience of out customers

and to get insights into what we, the gym, need to do to make it better.

1.1. Example Use Cases[1]

- The sales and retention team want to know all the phone numbers and names of inactive users
- How many machines are available for the upcoming spin class (cycle machines)?
- Check to see if a classes conflicts with personal trainer sessions.
- Check to ensure that personal trainer sessions do not conflict.
- Get total expected monthly amount from each customer, apply birthday discount for people with birthdays this month.
- Use above to derive total expected amount for this month.
- The database should show employees what machines they are responsible for.
- The database should allow us to track broken down machines and to make sure they have maintenance scheduled.
- The database should help us to make equipment purchasing decisions based on number of these equipments; for instance: make sure there are at least 10 plates to one weightlifting bar.
- The database should help us to find parts for broken machines, by finding them and returning a serial number to look up.
- The database should retain personal information for billing, handing out promotional offerings, etc.

1.2. Business Rules

Like all gyms and places of business, there are people. People can be a variety of things; customers, employees and trainers. People have full names comprised of first names and last names. People are assigned their starting date (as member_since) into their record.

A person can be a customer. A customer shares the same id as a person record. The customer can be active or inactive if they paid their membership. The customer record should keep track of their last payment.

A person can also be an employee. An employee has a wage and a role.

A person can also be a trainer. A trainer record has no specific–special, attribute.

1.2.1. Customer Interactions

A customer enrolls to services of the gym (a fee, see 3.1.). An example of a service would be general gym membership. This general service would have a unique code, some type of identifying string for what it is and a base cost that the enrolled customer would be responsible for. Other services, like one-on-one personal trainer services, will have a trainer associated with it.

Fees can have many customers and customers can have many Fees associated to them (see 3.2.). Customers can also use equipment, however this interaction can't be precise.

1.2.2. Trainer Interactions

Trainers are special employees that teach classes and can provide personal services for customers.

1.2.3. Inventory Management

A gym has a large amount of high value equipment. It is important to keep track of it for accounting reasons, but also to ensure products are being properly maintained.

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[1]please see ./sql/gym-questions.sql for implementations of qustions and their answers using test data.

There is a general equipment definition with basic information like the brand and name of the product. The equipment has an inventory value. The equipment also has a date, which indicates when it was bought and made available at the gym. For simplicity, it may be helpful to include a character that identifies what type of equipment it is.

An equipment can be a weightlifting equipment. Such equipment is special in that it is much more simpler and will likely be discarded if it were to break. The equipment also has a special property of weight and diameter. The weight is its weight in pounds. The diameter is a special attribute that indicates what type plates can fit on what type of bar; for instance an Olympic bar can only take Olympic plates (2 inches).

An equipment can be a machine. A machine is much more expensive to purchase so it is pivotal that they be maintained and in working order. So a machine record should contain a date since it was last maintained and when the next maintenance should be done. A machine will likely have parts or lubricants; to find these, the product serial number should be held on record so they can be found.

1.2.4. Sessions and Classes

A session is a one-on-one personal training service for one customer to one personal trainer. Such services will add an additional charge for each one.

Personal trainers can teach classes. Classes have a fixed time and days it is ran; however, they are a free service to the members.

1.2.5. Data retention and Integrity Policies

Data is assumed to be incrementally backed up. Thus it is safe to assume cascading deletes are fine. Future database designs can take into account versioning mechanisms to ensure data integrity.

Cascading deletes are specified because it's assumed when a user leaves and wants to be removed from our person's list, their data should not be persisted. It is more likely customer or employee entries would be removed before a person entity is. Thus cascading deletes should not apply in many cases.

On fields likes CustomerFees, it's generally assumed if a customer is removed, then it should automatically remove all traces of payment from the system, thus the cascading delete policy.

Equipment that is thrown away should automatically clean up its subclass tables, thus cascading deletes. These tables shouldn't even be touched directly.

2. Key Entities

Before going into the data, please keep in mind these virtual types. They must equal the values in the constraint column.

name	actual	constraints
BOOL	CHAR(1)	'Y' OR 'Y'
PTYPE	CHAR(1)	'R' OR 'E'
ETYPE	CHAR(1)	'W' OR 'M'
TIME	NUMERIC(4,0)	$2400 > TIME > 0$

There are two major entities in our model, "People" and "Equipment." From these, most of our data model is derived.

2.1. People

As a gym we "have" many people. People can be many things, employees, customers and personal trainers. Below is a simple table outlining all the properties these people have in common.

Table 2: Person entity

column name	type	typeof key	description
person_id	NUMERIC(10)	PK	The primary identifier of a person.
first_name	VARCHAR(30)	n/a	The person's first name, UTF8.
last_name	VARCHAR(30)	n/a	The person's last name, UTF8.
phone	CHAR(11)	n/a	the full phone number.
address	VARCHAR(69)	n/a	The address line.
state	CHAR(2)	n/a	The state. Assumed 'CT' if left out
city	VARCHAR(20)	n/a	The city.
person_type	PTYPE	n/a	A char that determines if the user is an employee or customer.
member_since	Date	n/a	A date describing when they were a member of the gym.
birth_date	Date	n/a	DOB of a user can provide which can be used to offer specials.

2.1.1. Customer

A customer entity is a person who pays to consume servies offered by the gym. Below is the definition of a customer.

Table 3: Customer entity

column name	type	typeof key	description
customer_id	NUMERIC(10)	PK/FK	The primary identifier of a customer, from person.
last_paymet	Date	n/a	Indicates if this customer is up to date with their membership fees.
is_active	BOOL	n/a	Programmatically indicates if customer is up to date with payment Determined by since field in parent and last_pay date. Customers newly enrolled should be assumed to be Active on creation unless specified

2.1.2. Employee

An employee entity is someone we pay to maintain and provid services to the customers through the gym. Below is the entity.

Table 4: Employee entity

column name	type	typeof key	description
employee_id	NUMERIC(10)	PK/FK	The primary identifier of a customer, from person.
wage	NUMERIC(5,2)	n/a	amount paid per hour.

column name	type	typeof key	description
is_trainer	BOOL	n/a	Determines if the user is a generic employee or a physical therapist or trainer. should be false by default.

2.1.3. Trainer

A trainer is an employee that is responsible for running classes at the gym or offering one on one consulting for customers.

Table 5: Trainer entity

column name	type	typeof key	description
trainer_id	NUMERIC(10)	PK/FK	The primary identifier of a

2.1.4. Rules

At the end, there are people associated with the gym. They can be divided into customers and employees. Customers have active or inactive memberships and are expected to pay their fees on time. Employees are people of a gym that provide services to the gym; employees, as a benefit of their employment are provided basic membership for free. Trainers are a subset of employees which can teach classes or do individual training sessions with customers. For unique constraints, a trainer has a code which is used in other entites to ensure that only trainers are added to classes and services.

2.2. Equipment

A gym has numerous amounts of workout related equipment. Below is an entity used to identify this equipment at a high level.

Table 6: Gym Equipment

column name	type	typeof key	description
equip_id	NUMERIC(10)	PK	The primary identifier of the gear.
name	VARCHAR(30)	n/a	name of the gear.
brand	VARCHAR(30)	n/a	brand name of the gear.
equip_type	ETYPE	n/a	A char that determines if the equipment is a machine of if it is A free weight or a weightlifting component
value	NUMERIC(7,2)	n/a	A number describing its current estimated value to the business.
purchased_at	Date	n/a	A date describing when the gear was added to the gym.

2.2.1. Weightlifting Equipment[2]

This is a subtype of equipment which describes simpler equipment involved mostly with weight training. Examples: plates, dumbdells, 2" olympic bars.

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[2]note that the table name is WeightEquip in the DB

Table 7: Weightlifting Equipment Entity

column name	type	typeof key	description
equip_id	NUMERIC(10)	PK	The primary identifier of the gear.
weight	NUMERIC(3)	n/a	The weight of the weight equipment. Weight is in Imperial lbs.
weight_type	VARCHAR(20)	n/a	The type of weight product this is. e.g. plate, bar, dumbbell, etc.
diameter	NUMERIC(2)	n/a	For bars and plates; This describes the diameter of the hole that the plate has in its center and what plates will fit on a bar. generally should only be 2 inches. This is null for dumbbells or other.

2.2.2. Machine Equipment[3]

A subtype of equipment which describes products like treadmills and other "machine" training devices. This also describes things like powercages and squat racks which might have more use in weightlifting. This is a subtype because unlike weightlifting gear, machines can go "out of order," generally must be maintained frequently, can have replacement parts and various other information.

Table 8: Machine Equipment Entity

column name	type	typeof key	description
equip_id	NUMERIC(10)	PK	The primary identifier of the gear.
machine_type	VARCHAR(20)	n/a	The type of machine this is. e.g. treadmill, powercage, bench…
in_order	BOOL	n/a	If the machine is functioning as expected. Assumed true on entry, unless specified otherwise.
maintained	Date	n/a	Last maintained at this date.
serial	VARCHAR(30)	n/a	Machine serial number or other identifier to find parts for this machine.

2.2.3. Maintenance Schedule

This table indicates which employee is expected to maintain which machine at what date. Many machines can have many maintainers and likewise.

Table 9: Maintenance Schedule Entity

column name	type	typeof key	description
equip_id	NUMERIC(10)	PK/FK	A machine being maintained.
employee_id	NUMERIC(10)	PK/FK	The employee maintaining this.
needs_work	VARCHAR(50)	n/a	What is being worked on.
work_date	Date	n/a	When the maintenance is going to take place.

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[3]note that the table name is MachineEquip

2.2.4. Rules

A gym has equipment which allows it to provide services. The gym has two major types of equipment: weightlifting and machine equipment. Weightlifting equipment can be discarded if it breaks due to their simplistic design, low price, and construction. However machine components are much more valuable and have more working parts which may need to be maintained and fixed, thus a much more complex entity.

3. Other Entities

These are the other entities of the business. This Describes activities and services the gym provides.

3.1 Fees

This is an entity that contains a cost to a customer (or discount) and a short description describing what it's for.

So, for instance, consider a promotional gym membership discount, one would indicate that it is a promotional and set a negative value for the fee.

column name	type	typeof key	description
fee_id	NUMERIC(10)	PK	An id referring to this fee.
fee_amount	NUMERIC(5,2)	n/a	The cost or discount for this fee
fee_desc	VARCHAR(50)	n/a	A short description of the fee e.g. "General Membership"

3.2. CustomerFees

A junction table which links fees to customers.

column name	type	typeof key	description
fee_id	NUMERIC(10)	PK/FK	The fee
customer_id	NUMERIC(10)	PK/FK	The customer

3.3. Personal Sessions

Sessions that a customer has with a personal trainer, or base membership if trainer is not set.

Table 12: Session Entity

column name	type	typeof key	description
customer_id	NUMERIC(10)	PK/FK	The primary identifier of the customer
trainer_id	NUMERIC(10)	PK/FK	The trainer that provides this service, if null, no trainer.
fee_id	NUMERIC(10)	FK	The fee attached tot his service.
time	TIME	n/a	Time this session occurs
days[4]	VARCHAR(7)	n/a	The days this service occurs (M)on (T)ue (W)ed Thu(r) (F)ri (S)a

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[4]note this is a composite value, however because of the simplicity of the structure, it was left as such. This was decided because it made more sense than having 6 new columns with a name of each day or a new table of days (this doesn't make much sense). Note the day can be retrieve using *days LIKE '%{day char}%'*.

3.4. Classes

Optional classes taught by trainers at a given time and on the day(s) shown.

Table 13: Class entity

column name	type	typeof key	description
trainer_id	NUMERIC(10)	PK/FK	The trainer that leads this class.
class_name	VARCHAR(25)	PK	The class that is being taught.
time	TIME	n/a	The time this class is taught at.
days	CHAR(7)	n/a	string of days the class is taught on. e.g. for every day of the week: mtwrf (r = thursday)