

ER Modeling of Pokemon TCG

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1 ER Model

This is a possible database (DB) Entity Relation (ER) modelling of the Pokemon Trading Card Game (TCG).

2 Entities

The following entities were considered:

- Player Account
- Deck
- Pokemon Card

- Attack
- Type
- Trainer Card

2.1 Player Account

The player account is the main table that the DB should be concerned with. It is responsible for giving players access to the game and keeps record of all things that concern the player and differentiate them from other players.

It has the following attributes:

- username VARCHAR(17): used for login and identification.
- password VARCHAR(50): used for login authentication.
- country ENUM: country of residence.
- birthdate DATE: used for age verification.
- e_mail VARCHAR(50): used as contact information.
- screen-name VARCHAR(15): displayed in-game for other players to see.
- coins SMALLINT UNSIGNED: type of currency used in-game.
- crystals SMALLINT UNSIGNED: type of currency used in-game.
- credits SMALLINT UNSIGNED: type of currency used in-game.

2.2 Deck

A deck is the fundamental entity that a player needs to begin a match. It is important to keep track of the different decks a player has created as this is what the game needs to start a match, and can be customized by the player before every match according to their strategy.

It has the following attributes:

- deck_id TINYINT UNSIGNED: used for identification.
- username VARCHAR(17): player to which the deck belongs.
- name VARCHAR(25): displayed name for easier identification.

2.3 Pokemon Card

A single pokemon card which can be added to a deck. At least one is required in order to build a deck since one of the game's win-conditions is the removal of all active pokemon from the opponent's active spot and bench.

It has the following attributes:

- name VARCHAR(25): the name of the pokemon. Serves as unique identifier.
- type ENUM: the pokemon type, which is important for many game mechanics.
- weakness ENUM: increases damage received from certain pokemon types.
- evolution_phase ENUM: determines playability and is important for game mechanics.
- ps TINYINT UNSIGNED: pokemon's resistance to attacks before being knocked out.

2.4 Attack

An attack is part of a pokemon card's composition and determines the game mechanics for a given pokemon to attack, but has its own attributes that must be considered:

- name VARCHAR(25): name of the attack. Serves as unique identifier.
- pokemon_name VARCHAR(25): name of the pokemon who has that attack.
- text TINYTEXT: text description of what the attack does. To be displayed in the card.
- damage TINYINT: the amount of damage the attack will inflict on opposing pokemon.

2.5 Type

This is a recurring element that is shared accross various entities and could at some point be linked to the energy cards, which constitute the second card class a deck can be built with, it was decided to assume it as an entity on its own, even if its only attribute is:

- name ENUM: the name of the type.

2.6 Trainer Card

The complementary card class along with pokemon and energy cards which allows for player actions beyond pure combat. These are a crucial part of deckbuilding since they can shape a deck's strategy and the player's ability to execute it.

It has the following attributes:

- name VARCHAR(25): name of the card. Serves as unique identifier.
- category ENUM: determines which game mechanics it affects.
- text TINYTEXT: describe the effect the card has. To be displayed in the card.

3 Relations

The following relations were modeled:

- Player-Deck
- Player-Card
- Deck-Card
- Pokemon-Attack
- Pokemon-Type
- Attack-Type

3.1 Player Deck

The relationship between a Player and a Deck was modeled as 1 to n, where a player doesn't necessarily have to have more than 1 deck, but a deck must belong to a player. With this relation, no intermediary table is required and a foreign key in the deck table referencing the player table is enough.

It could be argued that, since there exist only a finite number of decks that could be created by the players with the cards in the game, and one could model the player-deck relation to be n to n by storing all possible decks and then relating each player with each deck, it was decided that it is best to have overlap and duplicated information where two identical decks are stored twice if they belong to two different players for easier arrangement of the database and without the need to compute and store all different deck possibilities as most would never be built by players.

3.2 Player Card

The relationship between Player and a Pokemon Card or a Trainer Card is n to n because, unlike decks, all players could have access to all cards. And hence intermediary tables are created which relate each player with the cards they own and have access to to build their decks.

Two distinct intermediary tables are required because a foreign key can only reference a single table. Hence since pokemon and trainer cards are different entities, they effectively have independent relations with the player entity. But were put together in this section for brevity.

3.3 Deck Card

The relationship between a Deck and the Pokemon Cards and Trainer Cards that make it up is n to n , given by intermediary tables which link a player's deck to the intermediary tables that link a player with the available cards in-game. This ensures that the decks a player owns are built referencing only cards that the player owns, without forbidding the player from using the same card as part of different decks. This is allowed because a player can only use a single deck in any given match.

As with the Player Card relation, two distinct intermediary tables are required due to pokemon and trainer cards being distinct entities with distinct intermediary tables relating them to players.

Additionally, it must be mentioned that there is a relation between a Deck and a Type in the form of an energy card, which is n to n as multiple decks can have multiple energy cards of the same type. Which was not deemed important enough to warrant being modeled as an entity. It could be if card graphics were considered, but at this stage, they are ignored.

3.4 Pokemon Attack

The relationship between a Pokemon Card and an Attack is 1 to n , which is achieved by referencing the pokemon an attack belongs to given that a single pokemon can have multiple attacks, but one attack can't belong to multiple pokemon.

3.5 Pokemon Type

The relationship between a Pokemon Card and a Type is 1 to n , because multiple pokemon can be of the same type. Similarly, the relationship between a pokemon's weakness can be shared with other pokemon, so foreign keys are employed to reference type from the pokemon table.

3.6 Attack Type

The relationship between an Attack and a Type is n to n , since a single attack can require multiple energy types, and the same energy types can be required

by multiple different attacks.