Backend System for a Disaster Site Resources Locator:
Entity-Relationship Model

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Spring Semester 2020

1 - Introduction

The Backend System for a Disaster Site Resources Locator holds information about the storage of products intended for disaster relief efforts, as well as their suppliers and clients requesting them. This system holds information about the location of said products, intending to facilitate the process of getting the products to the clients. Features such as adding, requesting, and reserving/buying products are supported. Furthermore, the system allows users to see the location of the products through the use of Google Maps.

The proposed Entity-Relationship (E-R) model for this system is described in detail in the following section. Also, the diagram of the model is shown in Appendix A.

2 - Discussion

2.1 - Users

The User entity holds basic information about all the users in the system, such as username, password, and phone number. User has three sub-types related through ISA relationships: Admin, Customer, and Supplier.

Admin is a user type with special privileges. Any user registered in the system as an administrator will have permission to alter information about other users, and products. This includes adding/removing

users, adding/removing products, and other administrative operations.

The Customer entity holds information about a customer, such as their name and city. Customers also have a location associated with them. This is accomplished through the Has relationship with the Location entity, which is a 1-to-1 relationship given that each location record will be unique for each customer, even if they happen to be at the same location. This entity stores the latitude and longitude of a location, which can later be used to locate customers, suppliers, or products through Google Maps. Customers can carry out the following operations: order, reserve, or request a product, each of these having a corresponding entity, which is described in the following sub-section.

Customers are related to the Credit Card entity through the Own relationship. This relationship is 1-to-N with the Many-side on Credit Card because a customer can have multiple credit cards in the system. Credit Card holds basic information about a customer's credit card and is required to pay for the orders made by the customer.

Supplier is an entity intended to hold information about a supplier, such as their name and city. Similarly to customers, suppliers have a location related to them through the Has 1-to-1 relationship with the Location entity. Furthermore, Supplier is related to the Product entity through the Supplies relationship, which holds information about which

products are supplied by each supplier. This relationship is N-to-M since a supplier can supply multiple products and the same product can be supplied by multiple suppliers.

2.2 - Access to Products

Customers have access to products through three modalities: an order, a reservation, or a request.

First, the Order entity is used when a customer wants to purchase a product and stores the total of the order, as well as the number of products being ordered. Order is related to Customer through the 1-to-N relationship Submits, with the Many-side on Order since a customer can submit multiple orders. This entity is also related to Product through Buys, a 1-to-N relationship with the Many-side on Order because multiple orders can request the same product, but each order can request only one product. Furthermore, Order is related to the Credit Card entity through the Pays relationship, which is 1-to-N with the Many-side on Order since one credit card can pay for multiple orders.

Second, the Reservation entity is used when a customer wants to obtain a product that is being donated and holds information about the number of products being reserved. This entity is related to Customer through the 1-to-N relationship Makes, with the Many-side on Reservation since a customer can submit multiple reservations. Reservation is also related to Product through Reserves, a 1-to-N relationship with the Many-side on Reservation since multiple reservations can request the same product.

Third, the Request entity is used to indicate suppliers about the products customers are interested in obtaining. It is intended to function as a log so that suppliers have guidance as to what products they should be supplying and holds the number of products being requested. This entity is related to Customers through the 1-to-N Puts relationship, with the Many-side on Request since a customer can submit multiple requests to the

system. Request is also related to Product through the Requests 1-to-N relationship, with the Many-side on Request since the same product can be the subject of multiple requests.

2.3 - Products

The Product entity is used to hold all resources in the system. It has information about their names, quantity, price, category, as well as their description. Product has 13 categories related to it via ISA, each having its entity. These categories hold information specific to the said category, an extension of the information already held in Product. These categories are Water, Canned Food, Baby Food, Dry Food, Ice, Medications, Medical Device, Tool, Fuel, Heavy Equipment, Power Generator, Battery, and Clothing.

3 - Conclusion

The presented E-R model proposes a relational approach to the implementation of the Backend System for a Disaster Site Resources Locator. Three important sections of the system are addressed by the model: users, products, and the way products are accessed. The necessary entities and relationships are provided to support the operations required by the system. In particular, two entities are of utter importance: *User* and *Product*, as well as the entities that derive from these through ISA relationships. Given that the purpose of the system is to facilitate the access of relief products to users, the model is built around the two aforementioned entities.

Appendix A

Disaster Relief Resources Database E-R