These below are some rules I used when I design the ER diagram. Some general rules I didn’t mention in the document, like the customer entity has a unique SSN as a primary key. This entity also should collect a customer’s age, sex…etc.

After drawing the first design draft to the ER diagram, I have a feeling that it is really important to figure out how many tables it will reach. Basically, after reading the “loyalty program” article, I drew the rectangles and named them ---> entity. Then, I thought about what attributes should the entity has. Then, I needed to think about the primary keys and foreign keys. After that the important things are about the relationship between entities. It also required me to think about the question (1, M), which means if the relationship is one to many, many to one, one to one, or exactly one. Recall the knowledge from the previous lecture: single line is 0 or more, double line is 1 or more, line with arrow means maximum of 1.

For the final draft, the computer tool I used is from the piazza. <https://app.diagrams.net> And I export it as a pdf version.

Since there is no double line with arrow in the tool, and there are few double lines situation in the diagram, so I used double line instead of double line with arrow to represent (1, inf).

1. **Customers & families Info**

* Not every customer will join the loyalty program. Therefore, there is one attribute of customer named “is member”.
* Not all customers are willing fill in “family’s info”.
* Not every customer’s family will join the loyalty program. Even the customer’s family joins the loyalty program, he may not join the “family accumulation groups”.
* For the attribute of a customer’s family, I add one more attribute which is “family mailing address” in order to make sure the company can send gifts to the customer’s family even though they neither join the loyalty program.

1. **Products:**

* Each product entity has a unique product ID.
* Each product should mark its production factory, date, etc.
* If the customer joins the loyalty program, the customer can choose to buy products or not buy anything.

1. **Branches**

* The loyalty card can shop in different branches, so the branches should be a separate entity.
* The branches may or may not have events. If a branch has an event, the event should have a unique date and mark which branches have this event.
* Not every branch can redeem product.
* A branch should have its unique branch ID and mark its address.

1. **Transactions**

* The customer has access to check his transactions from loyal card.
* Each transaction has a unique transaction ID.
* The transaction has several properties: transaction date, transaction product name. transaction amount, etc.

1. **Redemption**

* The customer can redeem the product with loyalty card.
* The redeemable product should have a separate entity with properties, like product ID, product name, product redeemable points, redeemable branch ID… etc.
* Each redemption has its own redemption ID.
* The redemption entity should have the redeemable product info, redeemable branches info, and redemption history.