

João Almeida's Fair Trade Coffee

João Almeida is a Canadian entrepreneur who wants to set up a fair trade coffee business, bringing fair-trade single-estate Brazilian coffee to Southern Ontario's independent coffee shops. João wants to build a system that would serve three objectives:

1. João will be able to keep track of his business: to ensure he brings the right amount of coffee from each estate, sends the right amount to each coffee shop, pays his suppliers on time, and knows when his Canadian customers owe him money.
2. Coffee house owners will be able to use João's website to place orders for coffee, selecting not just from what happens to be available in the local warehouse, but from all of João's suppliers.
3. Coffee drinkers will be able to learn more about the coffee they are drinking. In particular, they will be able to know which estate their coffee came from, learn about the working conditions on that estate, and read illustrated stories about the estates and the coffee made there. They should also be able to browse the estates and then learn which coffee houses in Ontario have coffee from this estate.

Assumptions and out-of-scope items:

- João has a warehouse in Toronto and another one in São Paulo, Brazil. Several local shipping companies are used to bring coffee from the farms to the São Paulo warehouse and from the Toronto warehouse to the coffee houses. A third company is responsible for shipping coffee from the São Paulo warehouse to the Toronto warehouse. João does not need to be concerned with the details of transportation issues, though he does need to know what he has in each warehouse and what coffee is currently in transit and with which shipping company.
- Shipping times vary and João makes no guarantees about when the coffee will arrive. He does need to be able to tell his customers how long it *usually* takes to get coffee from each estate.
- At the end of each month, João pays his suppliers for all the coffee that he ordered from them that month and sends an invoice to each of his Ontario customers for all coffee he shipped to them during this month from his Ontario warehouse.
- Suppliers set their coffee prices in US dollars. João has a fixed formula for calculating the price for his Ontario customers, which involves shipping charges, taxes, a profit margin, and the conversion rate from the US dollar to the Canadian dollar. We do not need to worry right now what this formula is. We can assume, though, that the formula is fixed, so when the suppliers update their prices (in US dollars), the cost to Ontario customers (in Canadian dollars) is automatically updated. Suppliers inform João every day about available quantities of each kind of coffee. João only accepts orders from his customers if the necessary quantity is available.
- João's website will have at most one story about each estate, stored as HTML. The photos will be stored outside the database.

We are asked to do the following:

1. Build an ER model of João's database.
2. Convert it to a relational form.
3. Check that it is normalized.
4. Implement it using SQL.