Problem 3 - Python Stack Traces

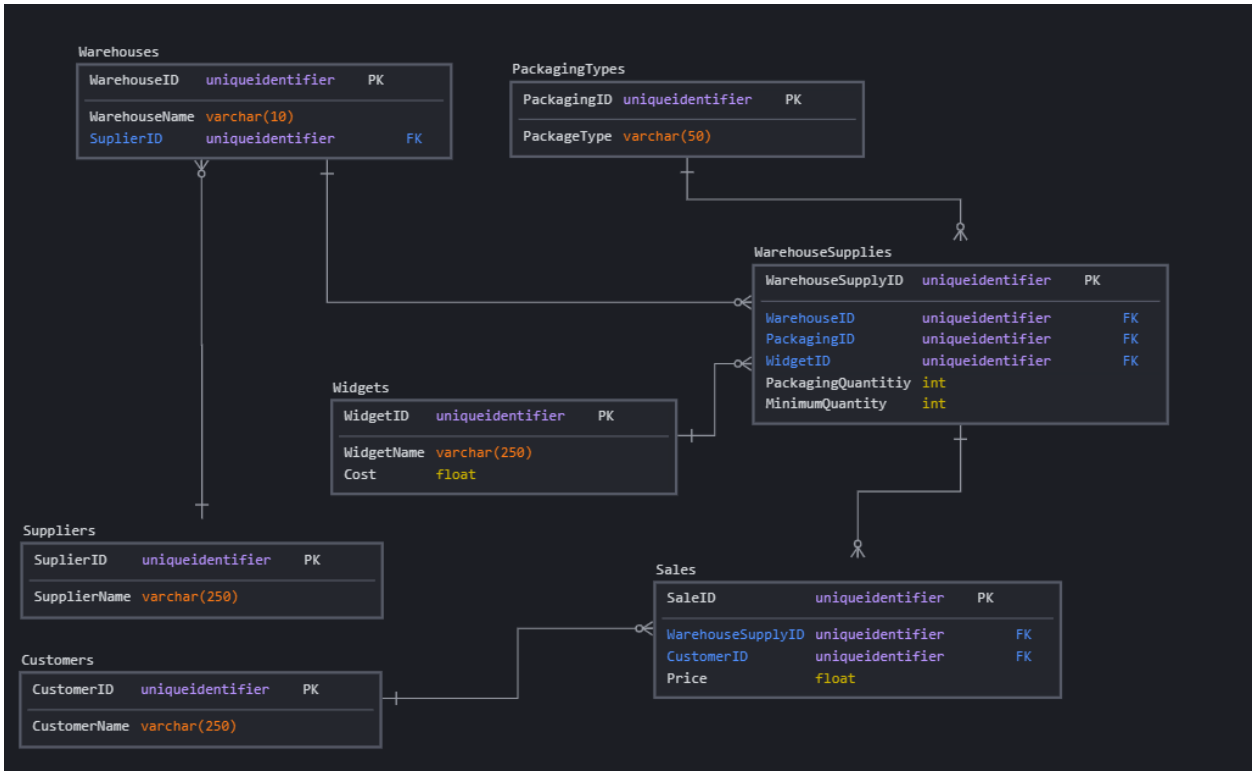
Challenge: Widgets Create a basic system description and document a normalized schema from the attached widgets (widgets.tsv) text file. Include 1) what you think this system would do 2) what you feel would be a reasonable database structure for the data and a reasonable architecture for the system 3) any questions or concerns you have regarding this dataset/system that might need to be answered before establishing an ideal database/solution for such a system. It's a very open-ended problem.

I include a readable version below for documentation / readability purposes.

widget	packaging	customer	price	supplier	cost	warehouse	qty	min_qty
Ant Trap	bag of 10	Home Place	$9	Little Traps	$0.50	AUS	112	50
Ant Trap	bag of 5	Home Place	$5	Little Traps	$0.50	AUS	112	50
Ant Trap	bag of 10	Bug Store	$10	Little Traps	$0.50	AUS	112	50
Ant Trap	bag of 5	Bug Store	$6	Little Traps	$0.50	AUS	112	50
Mouse Trap	box of 2	Home Place	$5	Little Traps	$1	ATL	200	50
Mouse Trap	box of 1	Home Place	$3	Little Traps	$1	ATL	200	50
Mouse Trap	bag of 10	Home Place	$20	Little Traps	$1	ATL	200	50
Mouse Trap	bag of 5	Bug Store	$15	Little Traps	$1	ATL	200	50
Bear Trap	box of 1	Home Place	$50	Big Traps	$40	MSP	10	10
Bear Trap	box of 5	Home Place	$220	Big Traps	$40	MSP	10	10
Bear Trap	box of 1	No Bears R Us	$60	Big Traps	$40	MSP	10	10
Moose Trap	box of 1	Home Place	$75	Big Traps	$50	MSP	5	5
Moose Trap	box of 1	No Bears R Us	$80	Big Traps	$50	MSP	5	5
Elephant Trap	crate of 1	Home Place	$100	Raytheon	$90	MSP	3	5
Elephant Trap	crate of 1	No Bears R Us	$110	Raytheon	$90	MSP	3	5

1) Suggested Purpose:
I think this table could represent the sales for a “widget” company. The company holds “widgets” in warehouses, some widgets are larger and others are smaller and thus they require different types of warehouses or setups. In the described plan below I suggest a very normalized form trying to design a system that would allow for growth. The main table containing widget information is the WarehouseSupplies table, containing information linking to Warehouses, Widgets, Packaging types and quantities. This model assumes that widgets are stored in warehouses which are supplied by suppliers, but the suppliers could very much be tied to the widgets themselves.
Finally there is a Sales table that ties an “order” from a supply warehouse to a customer and a price. Additionally I am assuming here that min_qty is the minimum number of widgets of a type that need to remain at a given warehouse to remain operational which is why I include them in the WarehouseSupplies table.

2) Suggested Design:



In terms of system design I think it is very important to understand the scale of the system. I think a monolithic structure would be best for a small company.
Backend:
The traditional design would be to hold the data in a traditional relational database server (eg: postgres). If resources are available I would prioritize redundancy next.

Frontend:
This is entirely dependent on what the company does, perhaps it serves an API that allows other companies to sell their widgets in physical and web stores. If that was the case the focus should be in availability of the system as well data integrity (assuring that as transactions grow integrity is maintained).

However the case could be that the company sells their products directly in which case there should be an effort to make not only the resources available but also to allow frontend to be reachable and available wherever we need our services to be reached.

As the system grows the company could transition into a more distributed system design, maybe focusing on something like microservice architecture, siloing the different systems. Especially with warehouses divided across locations, the system would lend itself well to be distributed. I am not an expert on distributed systems, and would look at the type of design a company like Amazon has in place for a distributed system like this one.

3) I think the way in which I approached the problem is just one way of addressing this. Understanding the relation between Warehouses, Widgets and Suppliers would be very helpful for this exercise. The matter of Cost and Price is also very interesting, I am assuming that cost is the value incurred by our business on holding/owning the widgets while Price is the amount we ask to sell them to a Customer.
The tables I present also just deal with the variables described in the tab separated but there are plenty of other variables that could be of interest.