1. Retailer database (e.g., Walmart)

The enterprise is a retailer, such as a department store, discount store, supermarket, convenience store, etc.; each of you will choose a specific retailer (either use a real one as your model or a made-up one). To keep the project within bounds, we'll ignore issues of employees, corporate finance, etc., and focus on the retail sales activities.

Your retailer sells a large variety of products at multiple stores. Not all products are at all stores. Pricing may be different at different stores. Each store has its own inventory of products and needs to decide when to reorder and in what quantity. Customers may identify themselves by joining your frequent-shopper program. Others may remain anonymous. Your retailer has a Website that accepts orders. From a database perspective, it is just a special store that has no physical location and has no anonymous customers.

The database tracks inventory at each store, customer purchases (by market basket and by customer, where possible), sales history by store, etc. Various user interfaces and applications access the database to record sales, initiate reorders, process new orders that arrive, etc.

- **Enterprise:** You may pick the enterprise that you will model. I'd like to see a wide variety chosen, so here is a list to serve as starting point to give you ideas, but other choices are welcome, indeed encouraged: Walmart, Target, J.C. Penny, Sears, Costco, BJ's, Best Buy, American Eagle, Nordstrom, Safeway, Aldi, Albertsons, Acme, HEB, Food Lion, Piggly Wiggly, Wegmans, Walgreens, Rite Aid, CVS, Longs, Superfresh, Carrefour, Tengelmann, Hankyu, Dillards, Wawa, Sheetz, Modells, Petsmart, Radio Shack. I've included some non-US enterprises on this list and encourage you to consider them, or other non-US retailers.
- **Products:** Products come in a variety of sizes or means of packaging. Each product has its own UPC code (the bar code that is scanned at the checkout).
- **Brands:** A variety of products may be sold under the same brand (e.g. Pepsi and diet Pepsi). For such applications as reorder, specific products and sizes matter. For other applications, data may be aggregated by brand.
- **Product types:** A particular type of product may be sold in a variety of sizes and a variety of brands. For example, cola is sold under such brands as Pepsi and Coke. Product types form an specialization/generalization hierarchy. For example, cola is a type of soda, which is a type of beverage, which is a type of food. Some products fit into multiple categories. For example, baking soda is a cleaner, a food (since it is used for baking), and a drug (since it may be used as an antacid), but it is not a type of soda.
- **Vendors:** Products are sold to stores by vendors. A vendor may sell many brands (e.g. Pepsico sells Pepsi, Tropicana, Aquafina, Gatorade, Lay's, Doritos, Quaker, and others).
- **Stores:** Stores sell certain products, each of which has a certain inventory amount at any point in time. Stores have locations (addresses), hours at which they are open, etc.
- **Customers:** Customers who join a frequent-shopper program provide some personal information based on what the enterprise requests. They may refuse to provide some information. Customers come into a store (or go online) to buy a market basket of goods.

Not only must this data be stored, but also the system must be able to handle multiple customers buying goods at the same time.

2. Automobile sales database (e.g., GM, Ford)

The application is an automobile company, such as General Motors, Ford, Toyota, or Volkswagen. In our hypothetical company, it has been decided to redesign a major part of the database that underlies company operations. Unfortunately, the manager assigned to solicit database design proposals is not very computer literate and is unable to provide a very detailed specification at the technical level. Fortunately, you are able to do that.

The company needs to keep quite a bit of data, but we shall focus on the following aspects of corporate operations.

- **Vehicles:** Each vehicle as a vehicle identification number (VIN).
- Brands: Each company may have several brands (for example, GM has Chevrolet, Pontiac, Buick, Cadillac, GMC, Saturn, Hummer, Saab, Daewoo, Holden, Vauxhall, and Opel and Volkswagen has Volkswagen, Audi, Lamborghini, Bentley, Bugatti, Skoda, and SEAT)
- **Models:** Each brand offers several models (for example, Buick's models are the Enclave, LaCrosse, and Lucerne, and Mercury's models are the Mariner, Milan, Sable, and Grand Marquis). Each model may come in a variety of body styles (4-door, wagon, etc.)
- **Options:** We'll stick to color, and maybe engine and transmission.
- **Dealers and customers:** dealers buy vehicles from the manufacturer and sell them to customers. We'll keep track of sales by date, brand, model, and color; and also by dealer. Note that a dealer may not sell some of the car company's brands. Some vehicles are already sold, but the dealer still keeps track of that fact.
- **Suppliers:** suppliers supply certain parts for certain models
- **Company-owned manufacturing plants:** Some plants supply certain parts for certain models; others do final assembly of actual cars.
- **Customers:** In reality, lots of demographic data are gathered. We'll stick to name, address, phone, gender, and annual income for individual buyers. The customer may also be a company (e.g. Hertz, Avis, or other companies that maintain corporate fleets, but we'll skip that).
- We'll skip data on corporate finance, pending bailouts, bankruptcy status etc. Note that these data are unimportant, but we need to keep the project within bounds.

3. Electronic vendor database (e.g., Best Buy)

The application is an electronics vendor that operates both a Website and a chain of many physical stores. Examples include Best Buy and Circuit City. To find out more about this application, think about any experiences you may have had making purchases both online and in-store, and browse their Web sites.

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Here are a few points to consider:

- There are many different products, grouped into a variety of (possibly overlapping) categories. Groupings can by type of product (cameras, phones, etc.), by manufacturer (Sony, Apple, etc.), or by other means (for example, a Gateway PC might be packaged with a Sony monitor and an HP printer and marketed as a package).
- Some customers have a contract with the company and bill their purchases to an account number. They are billed monthly. Other customers are infrequent customers and pay with a credit or debit card. Card information may be stored for online customers, but not for in-store customers.
- Online sales must be sent to a shipper. The company needs to store the tracking number for the shipping company so it can respond to customer inquiries.
- Inventory must be accurate both in stores and in warehouses used to replenish stores and to ship to online customers. When inventory is low, a reorder should be sent to the manufacturer and listed in the database. When goods arrive, inventory should be updated and reorders marked as having been filled.
- Sales data are important for corporate planning. Marketers may want to look at sales data by time period, product, product grouping, season, region (for stores), etc.

4. Package delivery database (e.g., FedEx, UPS)

The application is a package delivery company (similar to FedEx, UPS, DHL, the USPS, etc.). The company needs to keep track of packages shipped and their customers. To find out more about this application, think about any experiences you may have had shipping packages and receiving packages, and browse shippers' websites.

In our hypothetical company, the manager assigned to solicit database design proposals is not very computer literate and is unable to provide a very detailed specification.

Here are a few points to consider:

- There are different kinds of service possibly based upon the type of package (flat envelope, small box, larger boxes, etc.), the weight of the package, and the timeliness of delivery (overnight, second day, or longer).
- Some customers have a contract with the shipper and bill their shipments to an account number. They are billed monthly. Other customers are infrequent customers and pay with a credit card. Certain shipments are prepaid, as is might be the case of someone is returning something that was purchased by phone or Internet (e.g. returning clothes that don't fit, or returning malfunctioning electronics).
- For the most part, the shipping company does not care what is being shipped. However, there are cases where it matters. Some examples include
    - hazardous materials
    - international shipments, for which a customs declaration stating the contents and their value is needed
- The company needs to track packages from the time the customer drops it off (or it is picked up by the company) until the time it is delivered and signed for. Take a look at the online tracking offered by various shipping companies to get an idea of how this service works. If you are having something shipped to you, you'll find you can get every little detail of where the package is, where it has been, and to where it is currently headed. Beyond what the customer sees, the company itself needs to know on which truck or plane or warehouse the package is at any point in time.
- Tracking is not just an "in the present" issue. The company may want to look back in time and find out where the package was yesterday, for example. It may also want to look at data from the standpoint of a truck or warehouse.
- There are other aspects to the operation of the company besides package tracking such as the routing of trucks and planes, the assignment of staff to them, etc. For this assignment, we'll consider only the package handling and billing aspects of the database.

5. Real estate database (e.g., Zillow, Redfin)

Agents, buyers, sellers, properties on the market, and recently sold properties.

6. Or any other ideas