# • Problem

Krusty Kookies is a bakery which specializes in cookies, and they need a database to keep track of their production and deliveries. Exactly what parts of their system you have to implement is explained under **Program requirements**   below.

The company sells different kinds of cookies, each with its own recipe – the recipes may change over time, and each year, depending on sales statistics, some recipes are added and some are removed. The following table shows the ingredients needed for producing 100 cookies of each cookie.

Nut ring	Flour	450 g
	Butter	450 g
	Icing sugar	190 g
	Roasted, chopped nuts	225 g
Nut cookie	Fine-ground nuts	750 g
	Ground, roasted nuts	625 g
	Bread crumbs	125 g
	Sugar	375 g
	Egg whites	3,5 dl
	Chocolate	50 g
Amneris	Marzipan	750 g
	Butter	250 g
	Eggs	250 g
	Potato starch	25 g
	Wheat flour	25 g
Tango	Butter	200 g
	Sugar	250 g
	Flour	300 g
	Sodium bicarbonate	4 g
	Vanilla	2 g
Almond delight	Butter	400 g
	Sugar	270 g
	Chopped almonds	279 g
	Flour	400 g
	Cinnamon	10 g
Berliner	Flour	350 g
	Butter	250 g
	Icing sugar	100 g
	Eggs	50 g
	Vanilla sugar	5 g
	Chocolate	50 g

The company has a raw materials warehouse in which all ingredients used in their production are stored.

The cookies are baked in large quantities, and then quickly frozen and packaged in bags with 15 cookies in each bag. The bags are put into boxes, with 10 bags per box. Finally, the boxes are stacked on pallets, where each pallet contains 36 boxes, all containing the same product. This is a sketch depicting the production process, and storage and delivery:
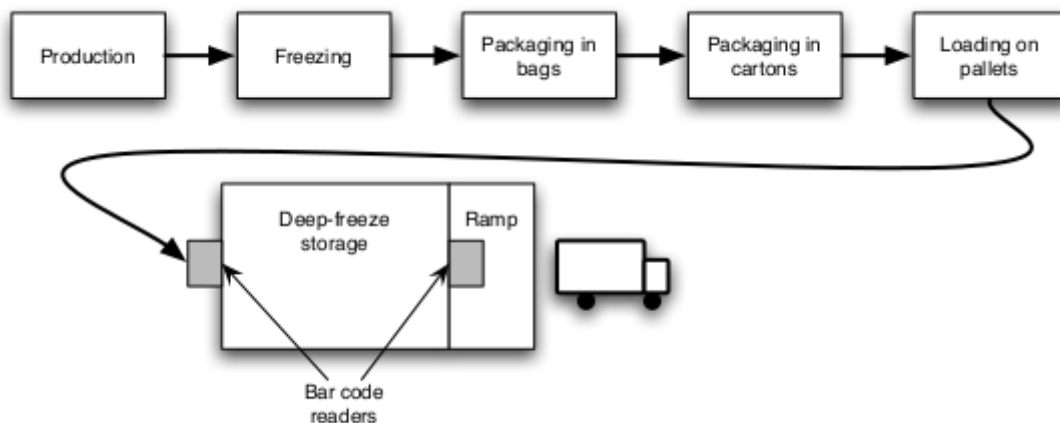
When a pallet is produced and labeled, it is transported to the deep-freeze storeroom – once the pallet reaches the storeroom, the pallet label is read by a bar code reader.

The company only delivers to to **wholesale**   customers, and a typical order looks like "send 10 pallets of Tango cookies, and 6 pallets of Berliners to Kalaskakor AB" – pallets are the unit of all orders (i.e., you can't break up a pallet in an order). Customers place their orders through a web form or by telephone, and all customers must be registered in the database – the current customers are:

On delivery, pallets are transported from the deep-freeze storeroom via a loading ramp to the freezer trucks – each truck loads 60 pallets. The entry to the loading ramp contains a bar code reader which reads the pallet label. Pallets must be loaded in production date order.

Customer	Address
Finkakor AB	Helsingborg
Småbröd AB	Malmö
Kaffebröd AB	Landskrona
Bjudkakor AB	Ystad
Kalaskakor AB	Trelleborg
Partykakor AB	Kristianstad
Gästkakor AB	Hässleholm
Skånekakor AB	Perstorp

When the truck is fully loaded, the driver receives a loading bill containing customer names, addresses, and the number of pallets of each product that is to be delivered to each customer. A transport may contain deliveries intended for different customers.

The company continuously take random samples among the products, and the samples are analyzed in their laboratory. If a sample doesn't meet their quality standards, all pallets containing that product which have been produced during a specific time interval are blocked. A blocked pallet may not be delivered to customers.

A pallet is considered to be produced when the pallet label is read at the entrance to the deep-freeze storage. The pallet number, product name, and date and time of production are registered in the database. The pallet number is unique.

At any time, the company must be able to check how many pallets of a product have been produced during a specific time.

When a pallet is produced, the raw materials storage must be updated, and the company must be able to check the amount in store of each ingredient, and to see when, and how much of, an ingredient was last delivered into storage.

All pallets must be traceable, for instance, the company needs to be able to see all information about a pallet with a given number (the contents of the pallet, the location of the pallet, if the pallet is delivered and in that case to whom, etc.). They must also be able to see which pallets contain a certain product and which pallets have been produced during a certain time interval.

Blocked products are of special interest. The company needs to find out which products are blocked, and also which pallets contain a certain blocked product.

Finally, they must be able to check which pallets have been delivered to a given customer, and the date and time of delivery.

Orders must be registered in the database, and, for production planning purposes, the company must be able to see all orders which are to be delivered during a specific time period.

When the loading bill has been printed, the data regarding delivered pallets must be updated with customer data and date of delivery.

The company must be able to test the system without connecting it to the factory. For instance, they do not have access to the bar code readers which inform them about pallet production or pallet delivery. Instead, they want one screen in the user interface where they can simulate pallet production, and another screen where they can simulate pallet delivery (these screens would be removed from the production version of the system, but will be an important part of this project).

The production version of the system will have several programs, each used by different departments, but all using the same database:

1. One program which handles everything concerning production, blocking and searching of pallets – the test version of this program will incorporate the screen where pallet production is simulated (see above).

2. One program which handles everything concerning orders and deliveries.

3. One program which handles everything concerning raw materials and recipes.

Your task is to implement a REST API which will be used by the first of these programs – when we test the program, we make sure that the database contains relevant data so we can demonstrate all of the functionality. Below you can see exactly what we will test.