DATABASE SYSTEM EXAM

A.Y 2021/2022

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Intro

In this section we go throw all the possible operations of the system.

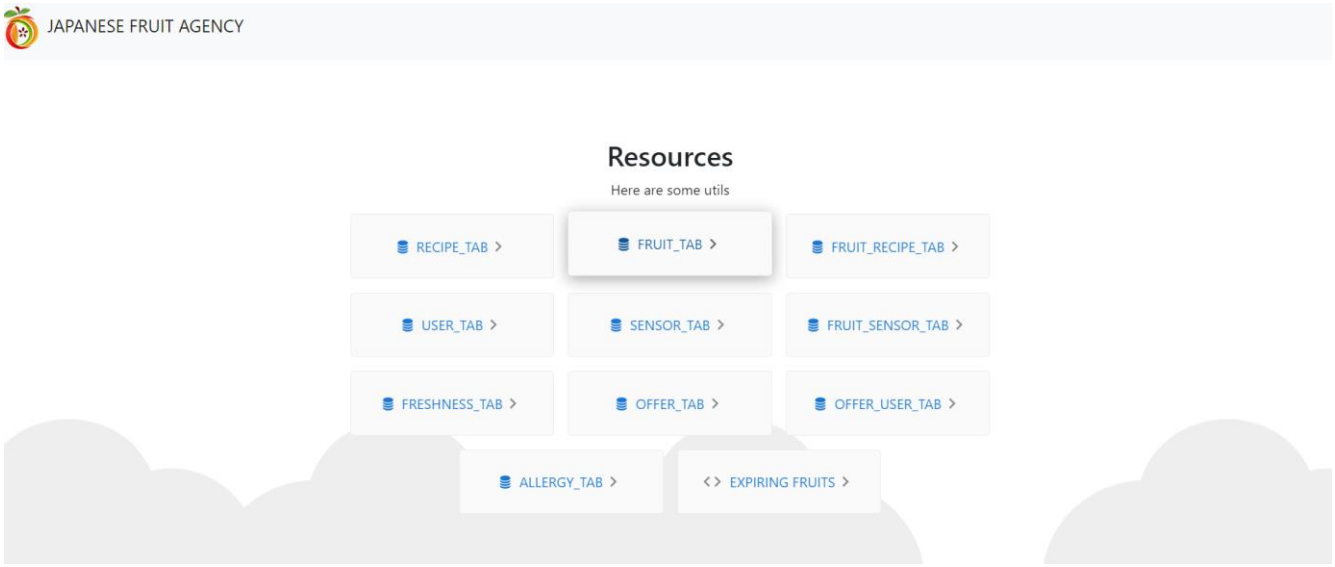
TABLE NAME	OPERATIONS
RECIPE_TAB	○ Insert Recipe ○ Update Recipe info ○ Delete Recipe ○ Read Recipes Info ○ Reset Form ○ Get info about one recipe
FRUIT_TAB	○ Insert Fruit ○ Update Fruit info ○ Delete Fruit ○ Read Fruits Info ○ Reset Form ○ Get info about one fruit ○ Switch to customer view
FRUIT_RECIPE_TAB	○ Insert Fruit-Recipe correlation ○ Update Fruit-Recipe correlation ○ Delete Fruit-Recipe correlation ○ Read Fruit-Recipe correlation ○ Reset Form ○ Get info about one Fruit-Recipe correlation
USER_TAB	○ Insert User ○ Update User ○ Delete User ○ Read Users Info ○ Reset Form ○ Get info about one user
SENSOR_TAB	○ Insert Sensor ○ Update Sensor info ○ Delete Sensor ○ Read Sensors Info ○ Reset Form ○ Get info about one sensor

TABLE NAME	OPERATIONS
FRUIT_SENSOR_TAB	○ Insert Freshness entry ○ Update Freshness entry info ○ Delete Freshness entry ○ Read Freshness Entry Info ○ Reset Form ○ Get info about one Freshness entry
FRESHNESS_TAB	○ Insert Freshness entry ○ Update Freshness entry info ○ Delete Freshness entry ○ Read Freshness Entry Info ○ Reset Form ○ Get info about one Freshness entry
OFFER_TAB	○ Insert Offer ○ Update Offer info ○ Delete Offer ○ Read Offer Info ○ Reset Form ○ Get info about one Offer ○ Switch to customer view ○ Buy offer as customer
OFFER_USER_TAB	○ Read Offer Info about customer purchases
ALLERGY_TAB	○ Insert Allergy ○ Update Allergy entry info ○ Delete Allergy ○ Read Allergy Info ○ Reset Form ○ Get info about one Allergy

GUI

The graphical user interface was created by using Angular framework with python module Flask as backend.

The main screen is the following one:

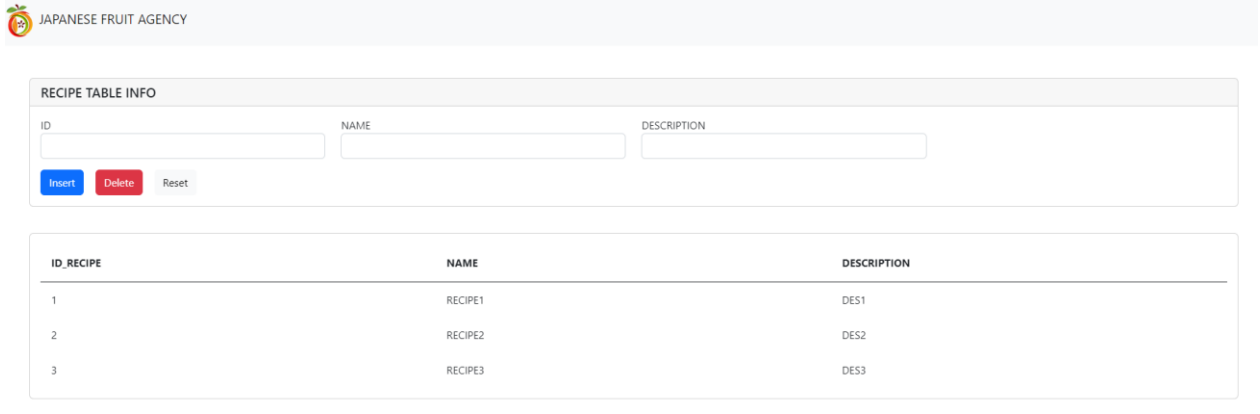


There are 11 cards, 10 for database table , and 1 for a custom operation .

Almost all sections are composed by two main components which are:

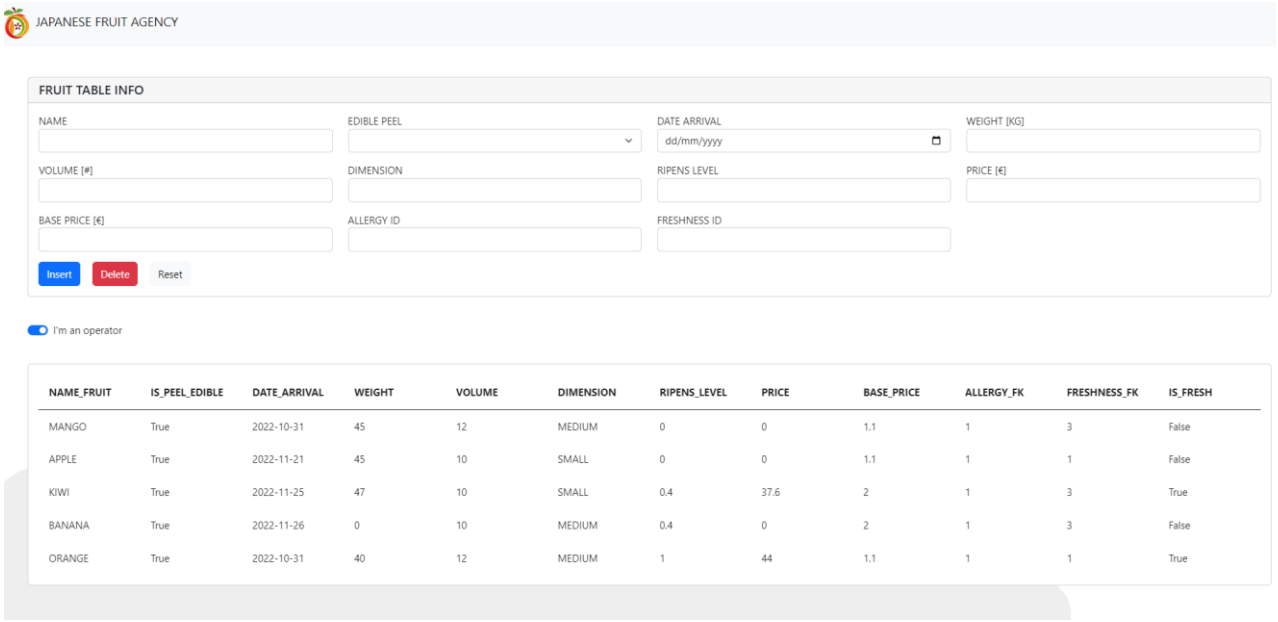
- A form for collect information
- A table for show information

The following table explore each section and give you all possible views:

RECIPE TAB
OPERATOR VIEW 

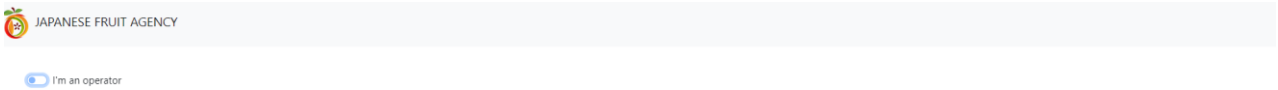
FRUIT TAB

OPERATOR VIEW



NAME_FRUIT	IS_PEEL_EDIBLE	DATE_ARRIVAL	WEIGHT	VOLUME	DIMENSION	RIPENS_LEVEL	PRICE	BASE_PRICE	ALLERGY_FK	FRESHNESS_FK	IS_FRESH
MANGO	True	2022-10-31	45	12	MEDIUM	0	0	1.1	1	3	False
APPLE	True	2022-11-21	45	10	SMALL	0	0	1.1	1	1	False
KIWI	True	2022-11-25	47	10	SMALL	0.4	37.6	2	1	3	True
BANANA	True	2022-11-26	0	10	MEDIUM	0.4	0	2	1	3	False
ORANGE	True	2022-10-31	40	12	MEDIUM	1	44	1.1	1	1	True

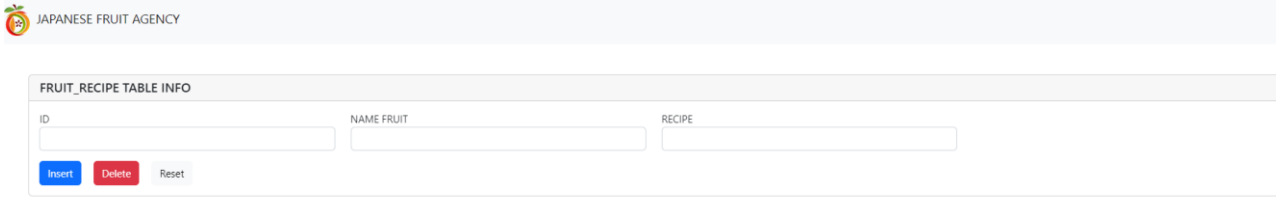
CUSTOMER VIEW



NAME_FRUIT	IS_PEEL_EDIBLE	WEIGHT	VOLUME	DIMENSION	RIPENS_LEVEL	PRICE	NAME_ALLERGY	EXPIRATION_DAY
KIWI	True	47	10	SMALL	0.4	37.6	ALLERGY	2022-11-26 00:00:00
ORANGE	True	40	12	MEDIUM	1	44	ALLERGY	2022-11-15 00:00:00

FRUIT RECIPE TAB

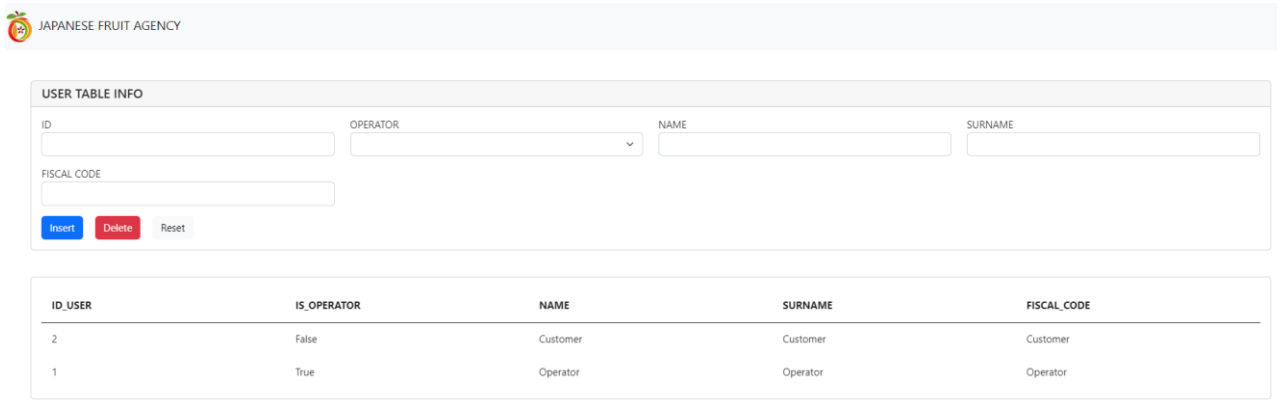
CUSTOMER/OPERATOR VIEW



ID_FRUIT_RECIPE	NAME_FRUIT_FK	RECIPE_FK
1	MANGO	1
2	BANANA	1

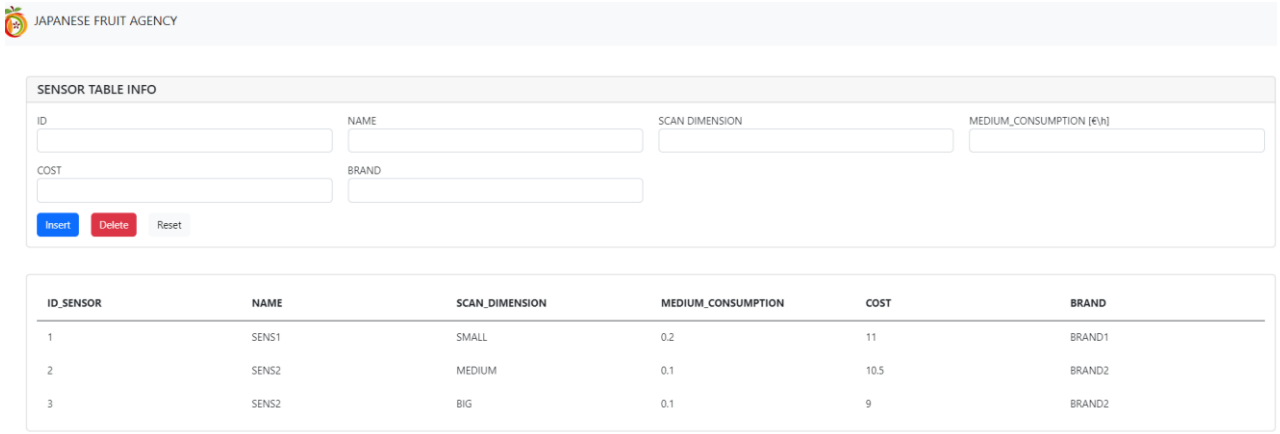
USER TAB

OPERATOR VIEW



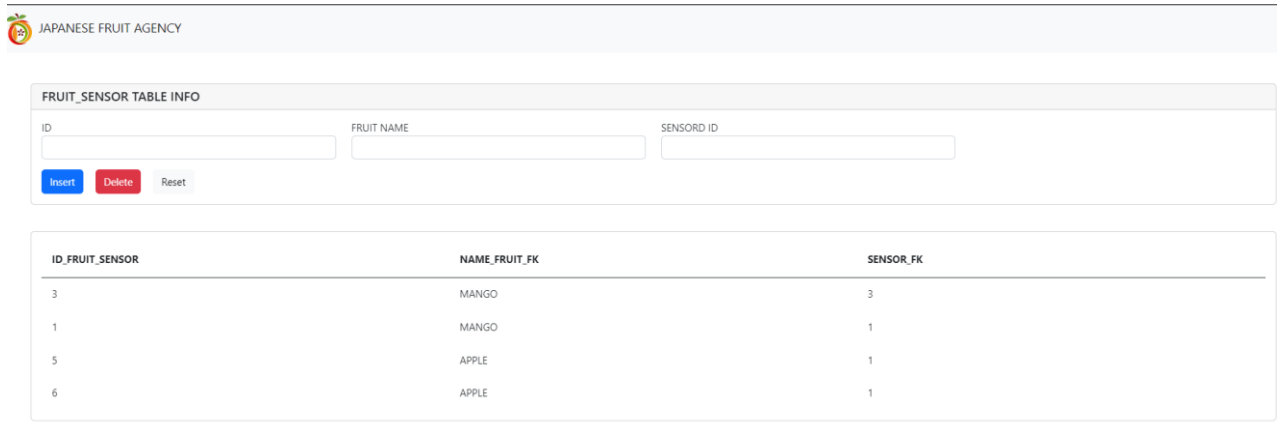
SENSOR TAB

OPERATOR VIEW



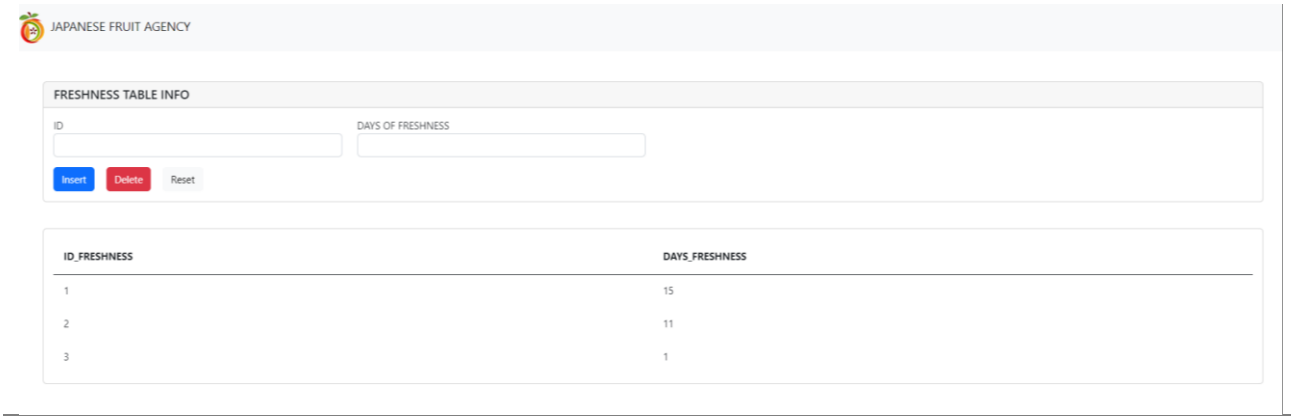
FRUIT SENSOR TAB

OPERATOR VIEW



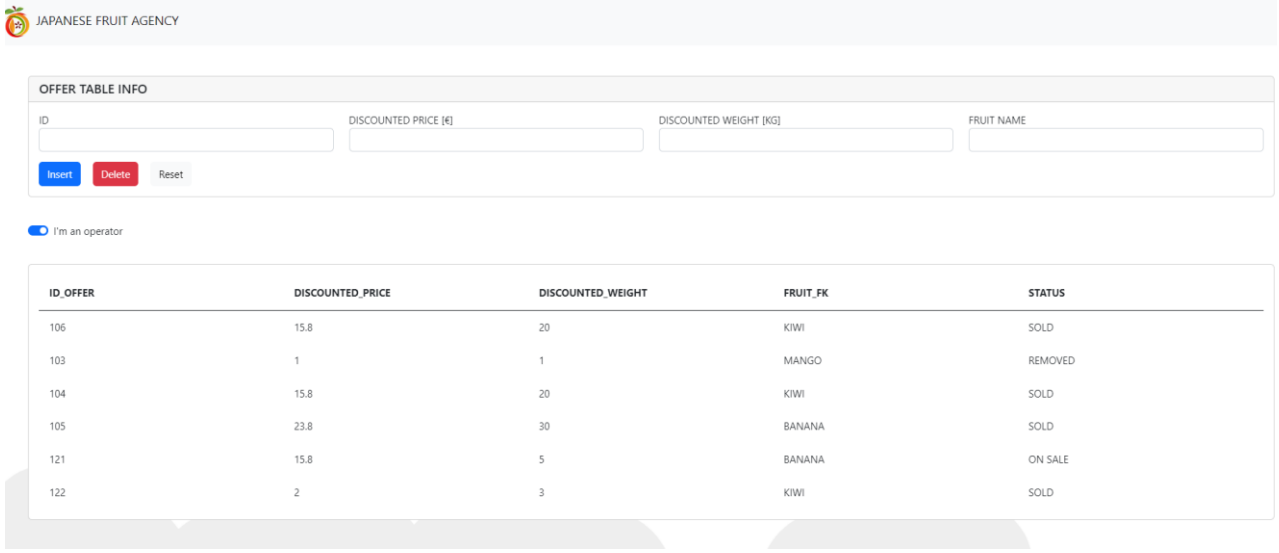
FRESHNESS TAB

OPERATOR VIEW

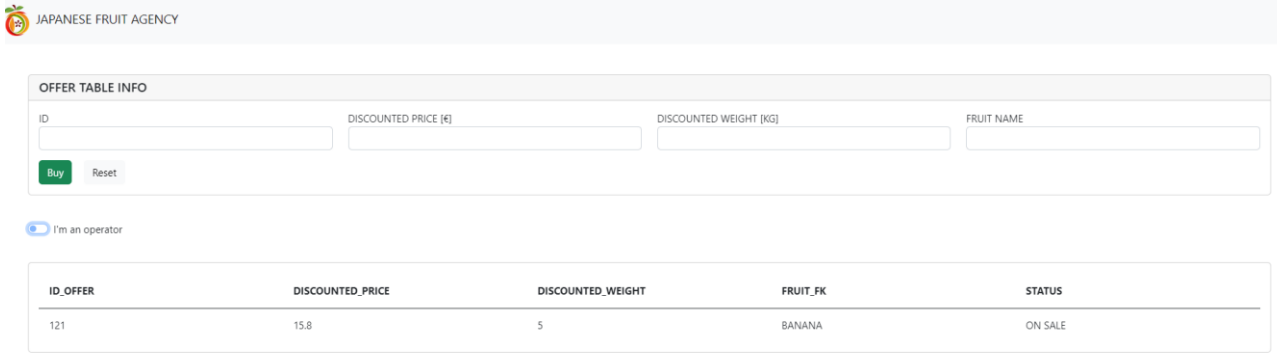


OFFER TAB

OPERATOR VIEW

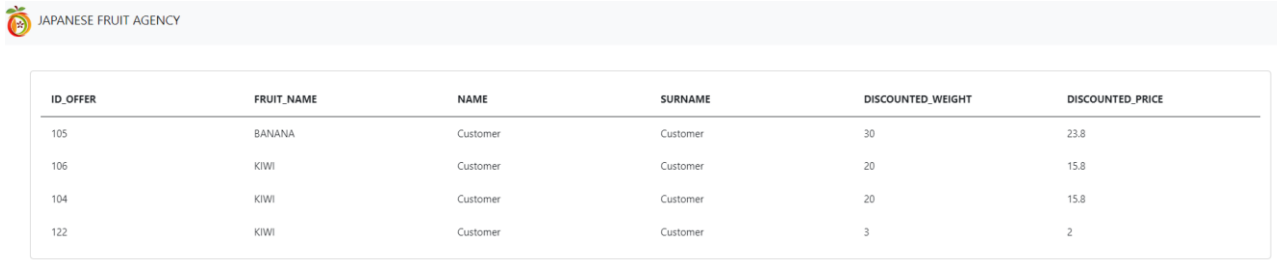


CUSTOMER VIEW



OFFER USER TAB

OPERATOR VIEW

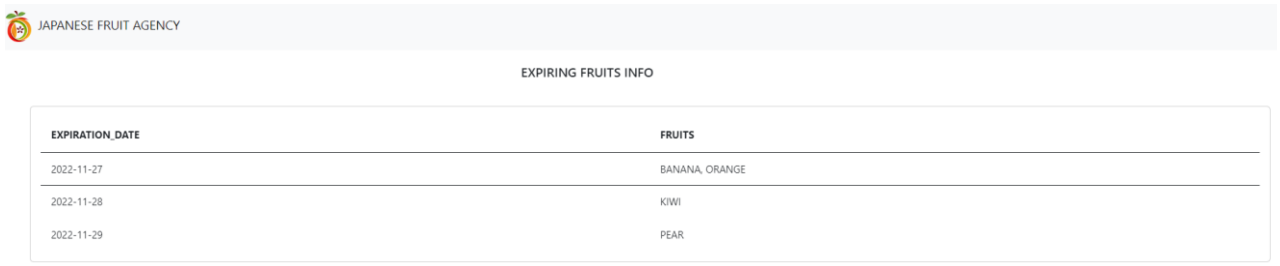


ID_OFFER	FRUIT_NAME	NAME	SURNAME	DISCOUNTED_WEIGHT	DISCOUNTED_PRICE
105	BANANA	Customer	Customer	30	23.8
106	KIWI	Customer	Customer	20	15.8
104	KIWI	Customer	Customer	20	15.8
122	KIWI	Customer	Customer	3	2

EXPIRING FRUIT OPERATION

Show expiring fruits in the current day, one day, two days.

OPERATOR VIEW



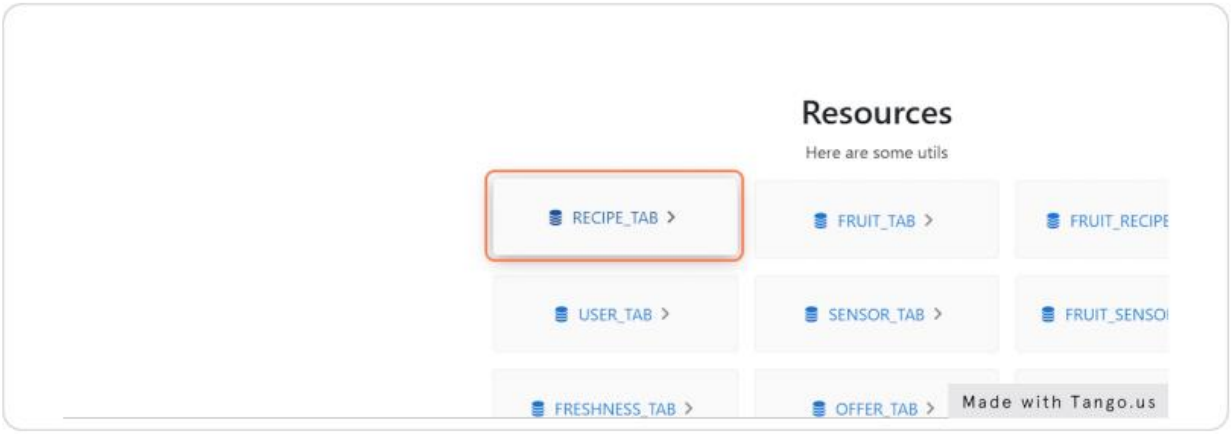
EXPIRATION_DATE	FRUITS
2022-11-27	BANANA, ORANGE
2022-11-28	KIWI
2022-11-29	PEAR

CRUD Operations

The CRUD operations (Create, Read, Update, Delete) are performed in the same way for all the tables that can support them.

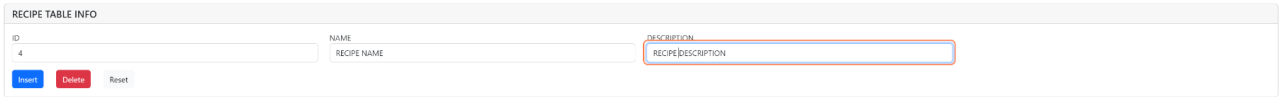
The following guide is an example of how to perform this operations on RECIPE table but the same procedure could be applied to all tables that allow CRUD operations.

Click on RECIPE_TAB

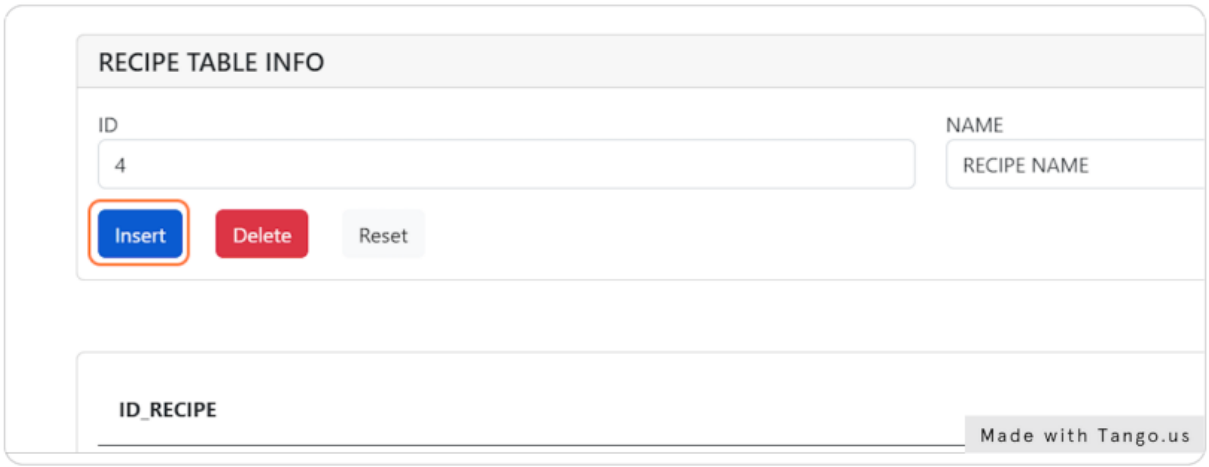


INSERT OPEARTION

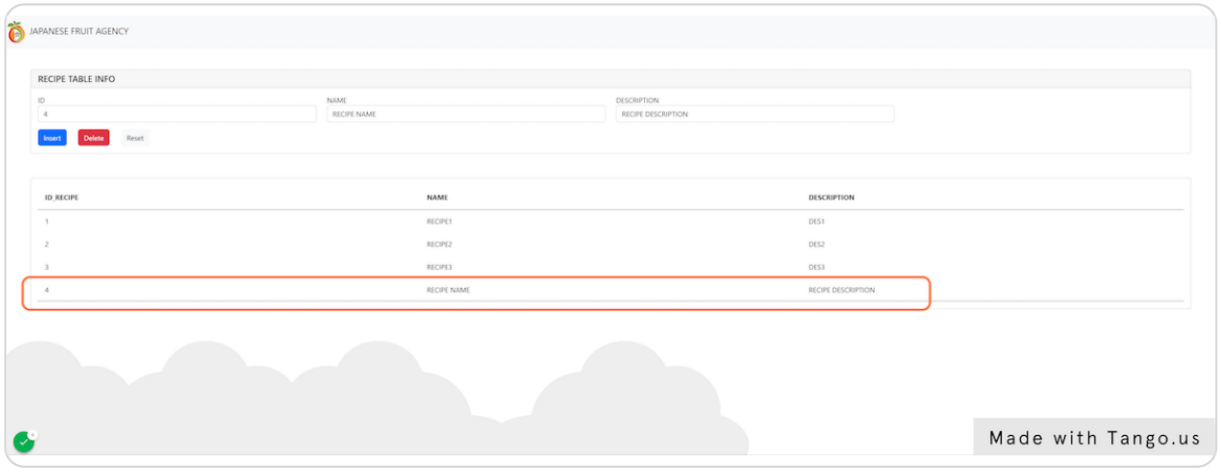
Compile the form with new recipe info



Click on Insert



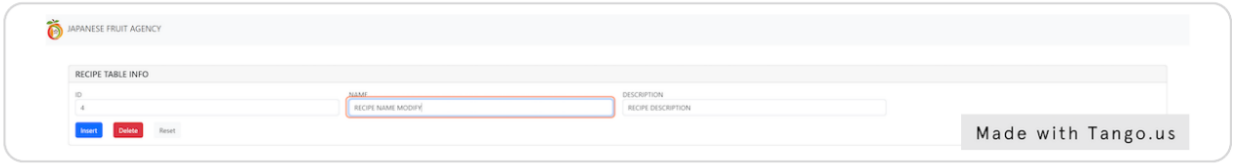
A new recipe is added !



UPDATE OPERATION

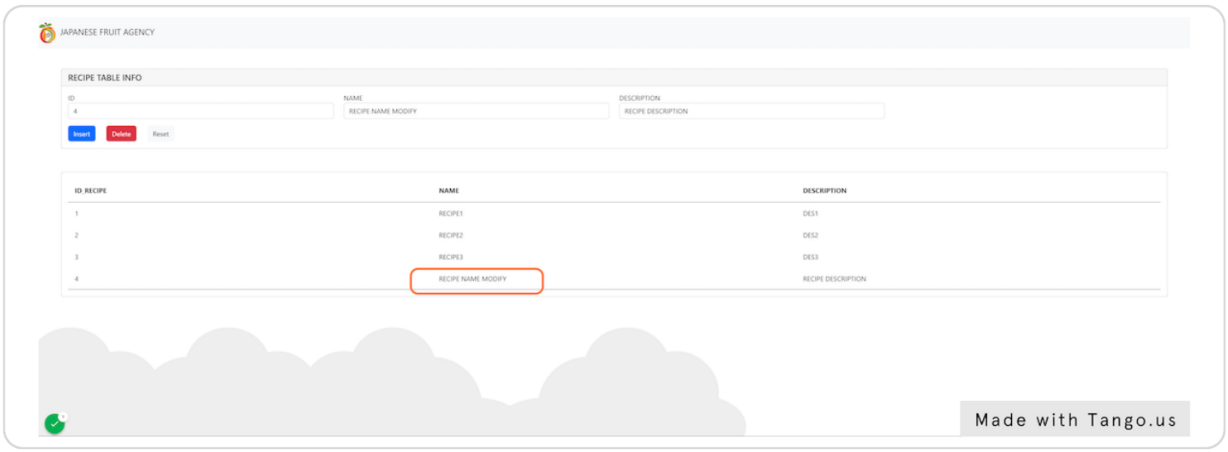
TIPS: You can click every element in the table and the form will automatically compiled with the record information

Modify the name or description but not change the ID for modify that entry



Click on Insert

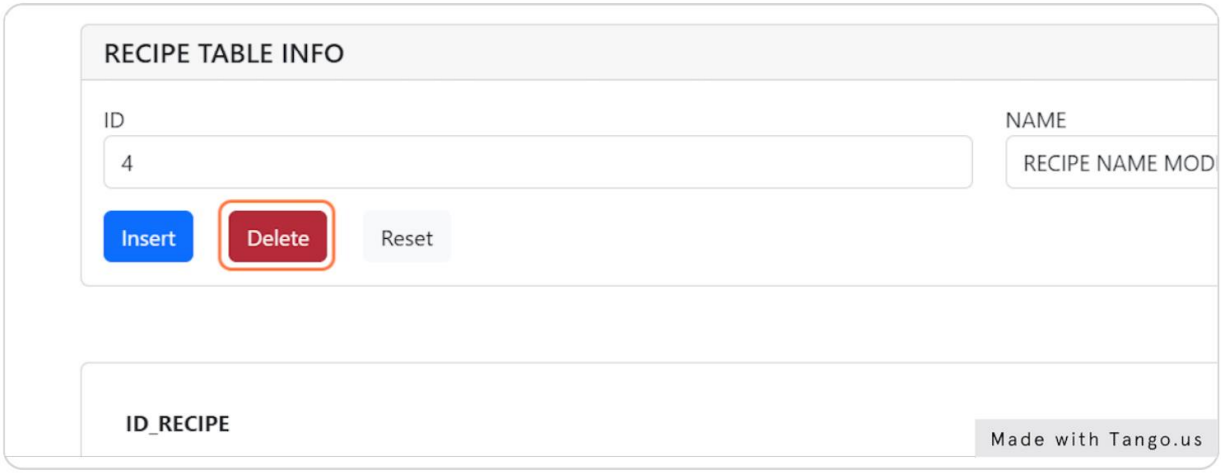
The information are updated !



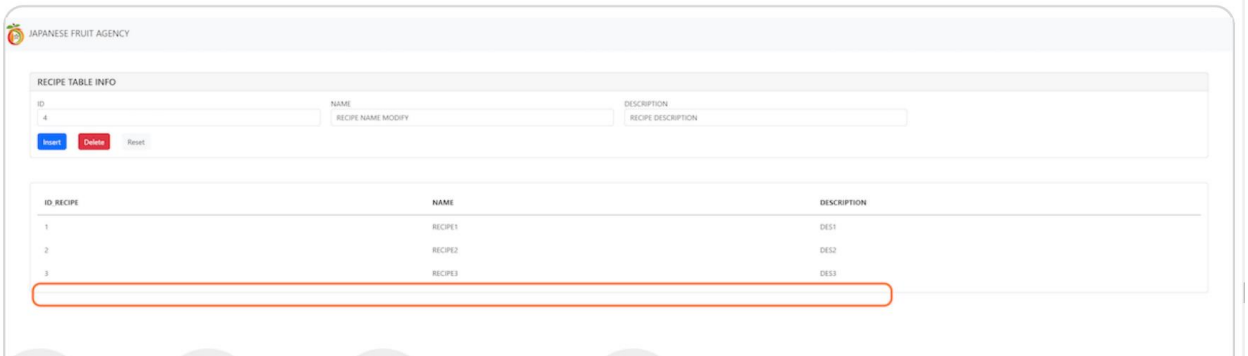
DELETE OPERATION

TIPS: You can click every element in the table and the form will automatically compiled with the record information

Select one row to delete and the click to delete



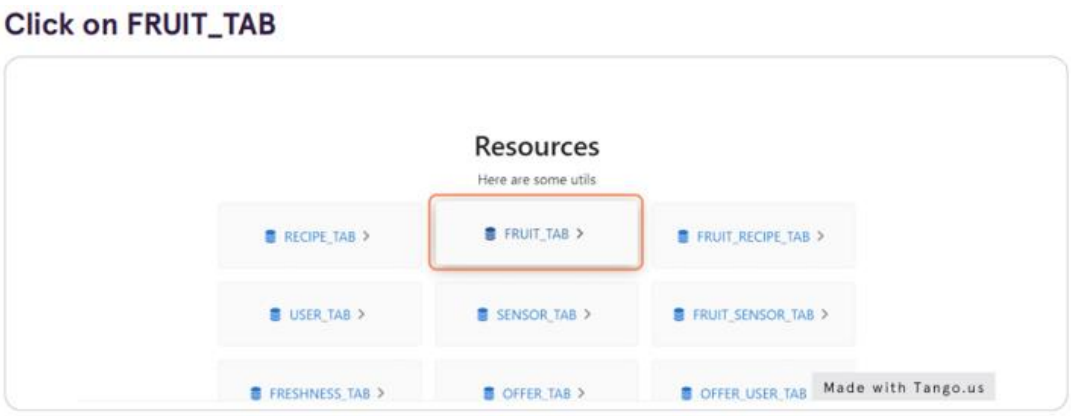
The element is deleted !



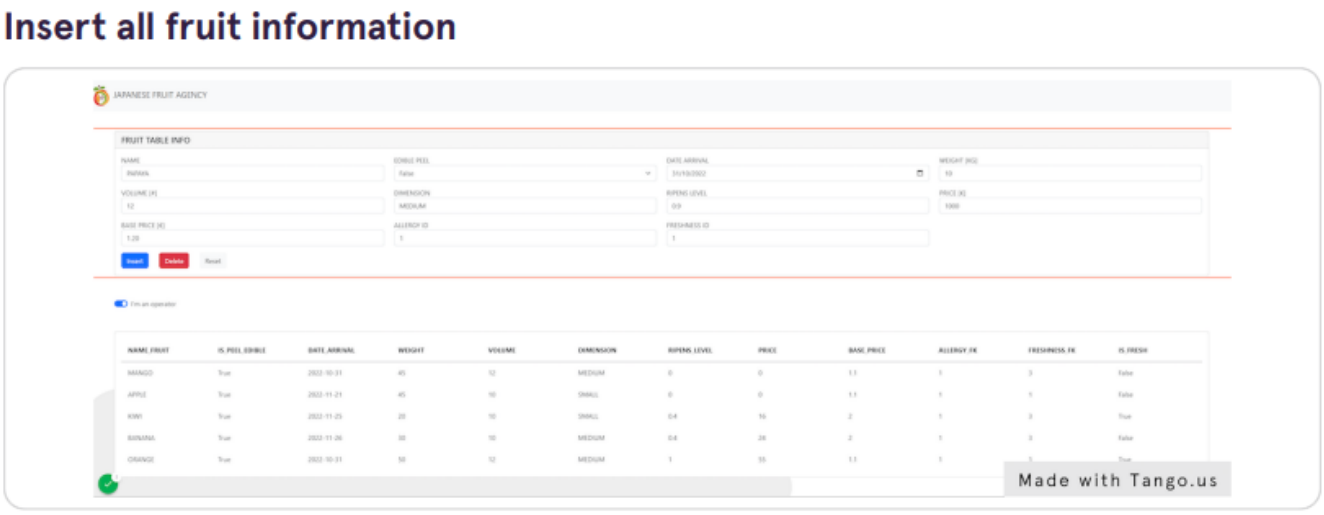
Other operations

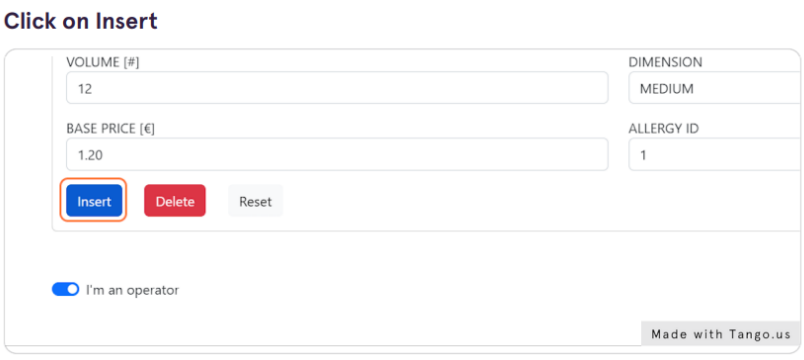
In this section we will analyze all the operations different from the CRUD operations listed in the previous section. These operations call for the execution of some triggers and require detailed investigation.

Fruit operations



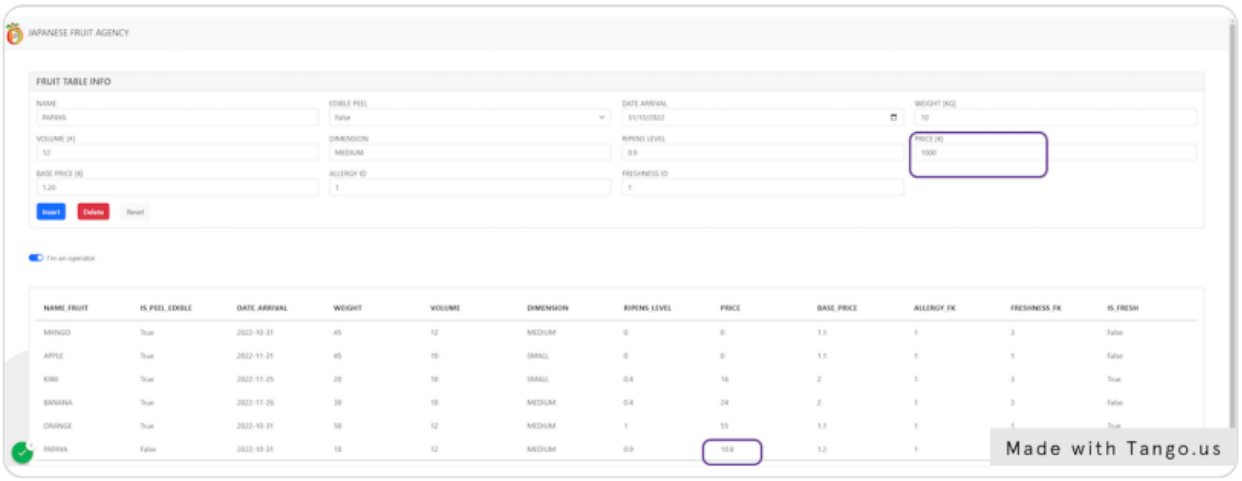
INSERT Operation





TRIGGER ON INSERT/UPDATE

We can see that the price is calculated base on the base price, the weight and the ripens level. The exact formula is
*base_price * ripens_level * weight*
So *1.20 * 0.9* * 10 = 10.8

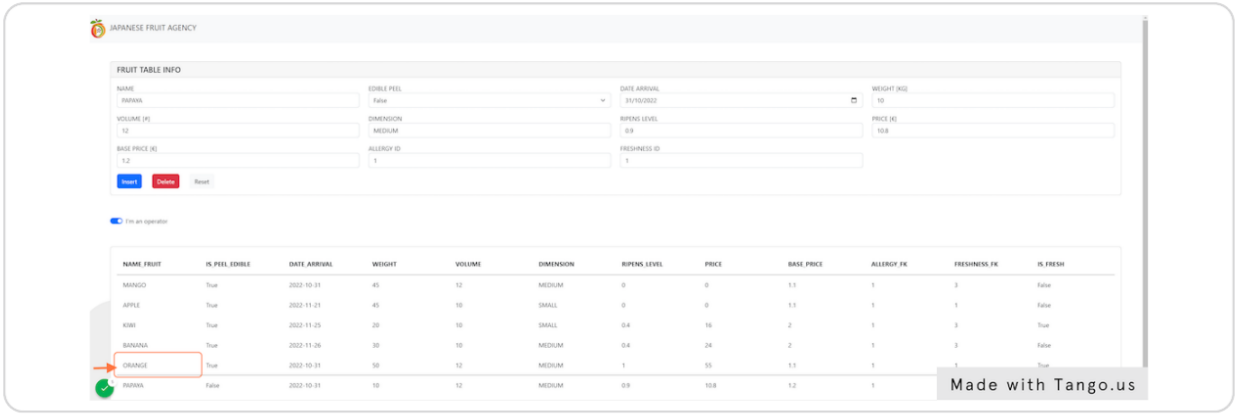


UPDATE Operation

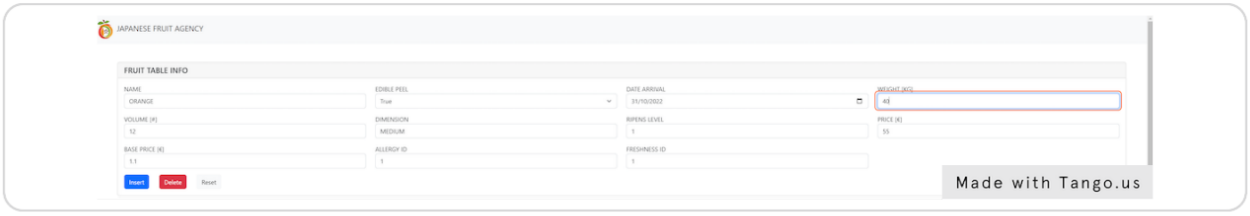
TIPS: You can click every element in the table and the form will automatically compiled with the record information

Click on fruit record

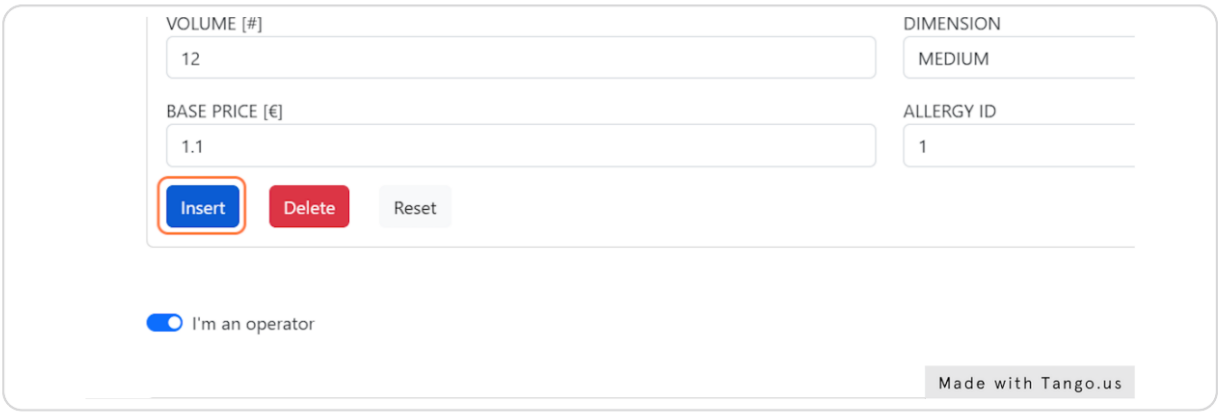
The form is compiled with all information about that record



Change some value

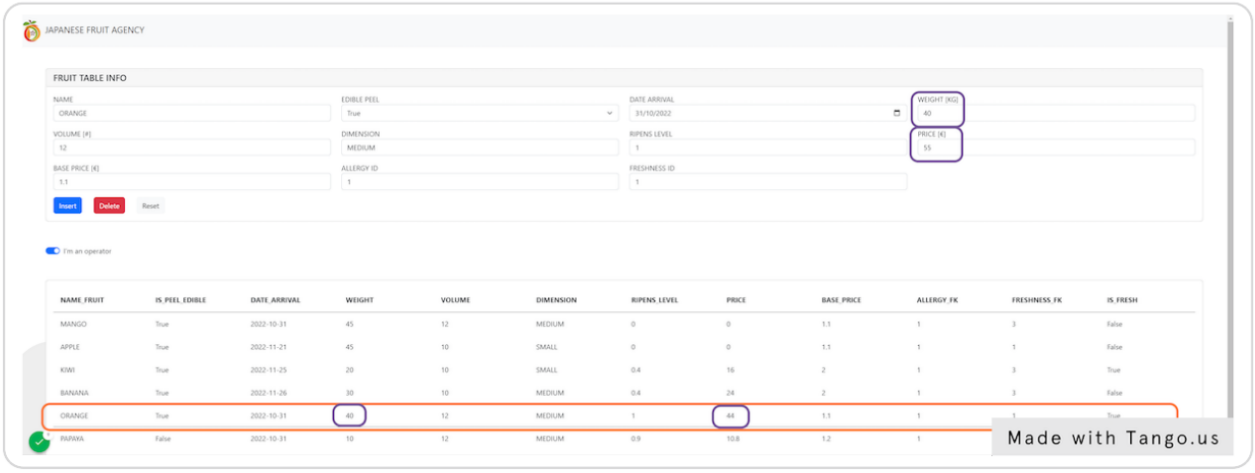


Click on Insert



The information are updated !

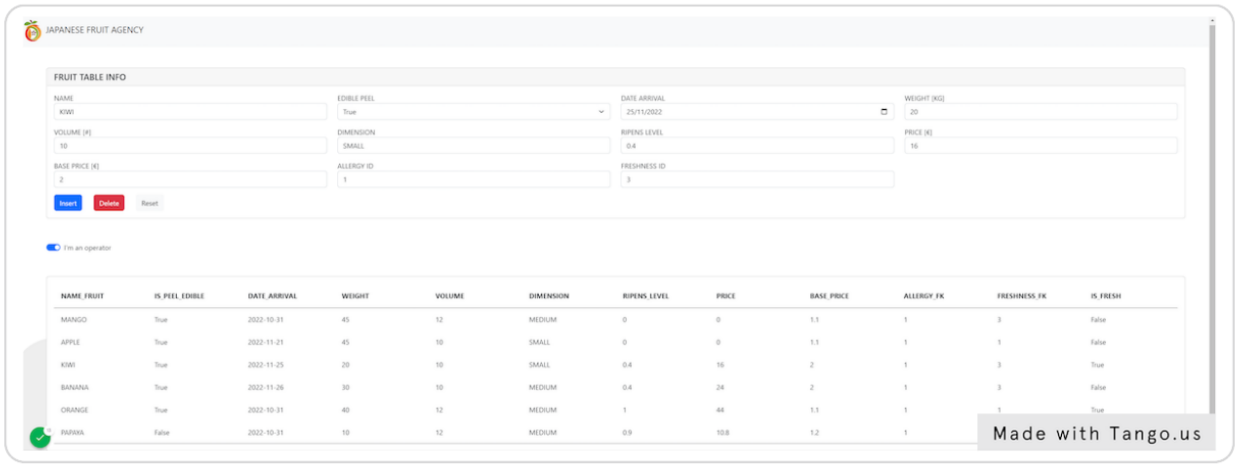
We can see that both the weight and price are changed. This append because when you change the weight, you change a value in the price calculation formula. For this reason the system need to recalculate the final price based on new values.



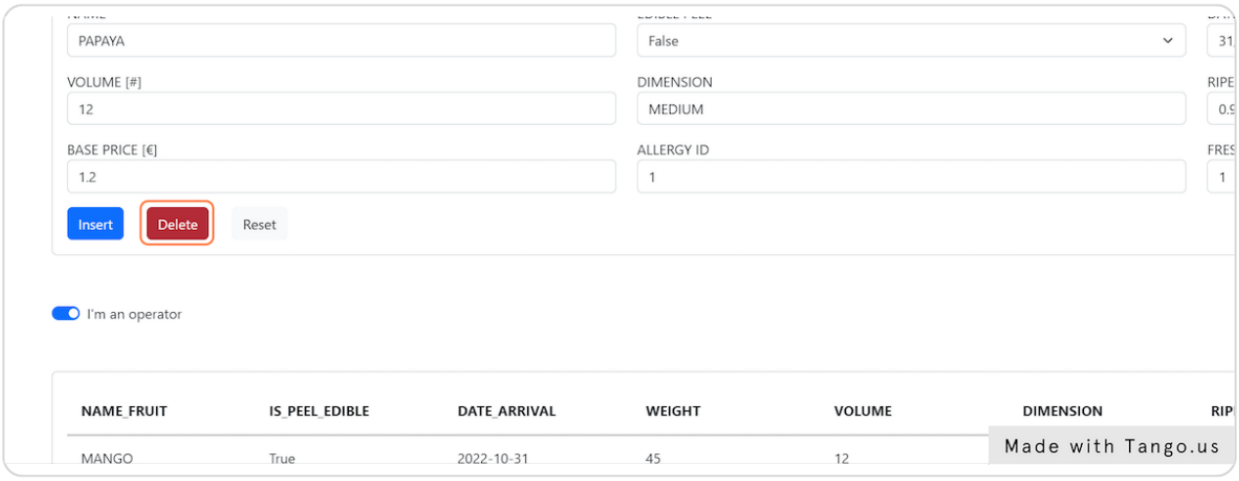
DELETE Operation

STEP 14

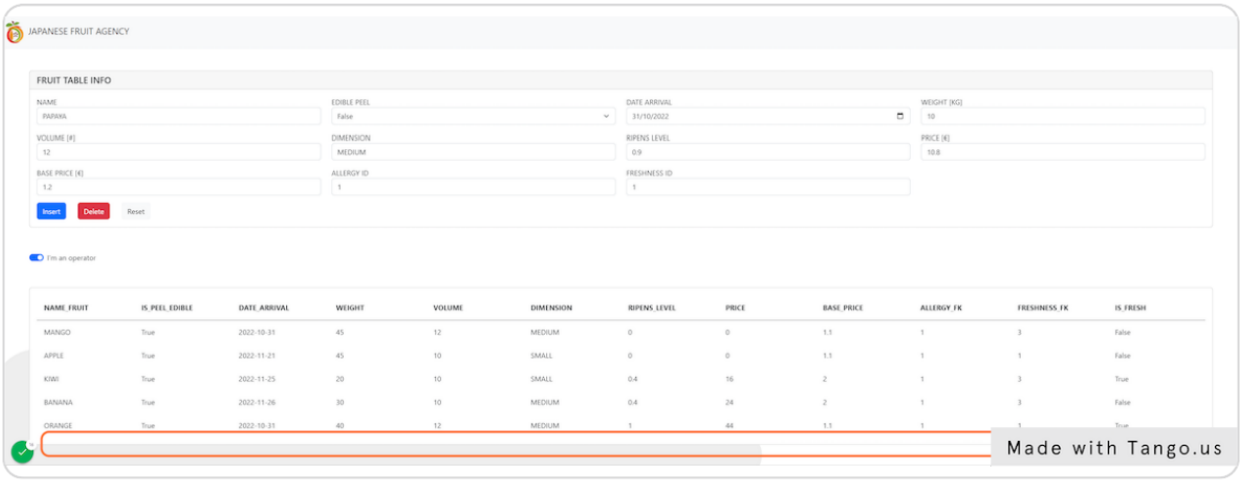
Click on cell to populate the form



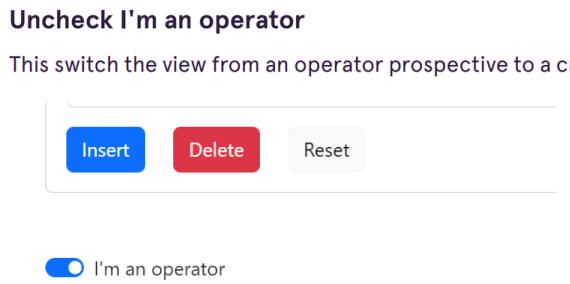
Click on Delete



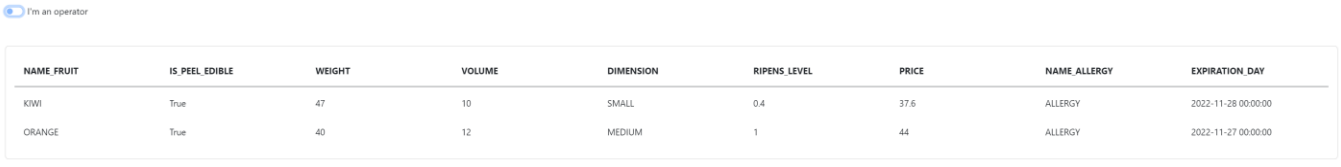
The row is deleted



Switch to customer view



The result is:

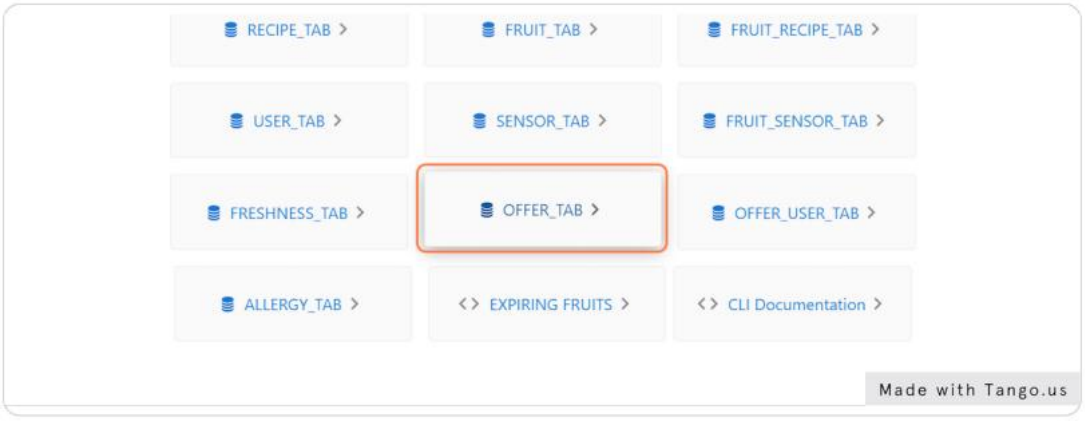


The customer can see only fresh fruit and can’t insert or delete anything from fruit table.

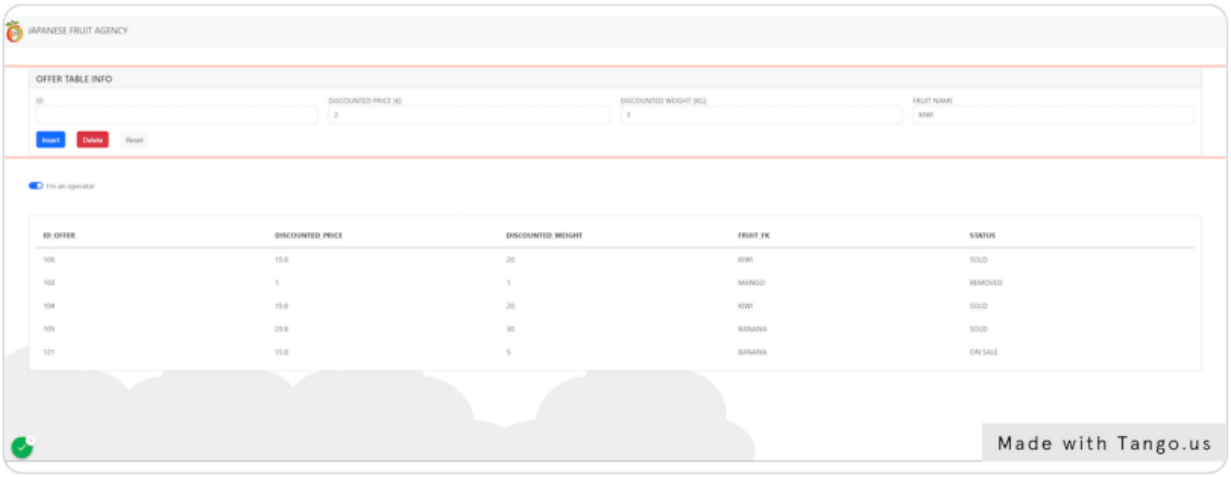
OFFER Operations

INSERT Operation

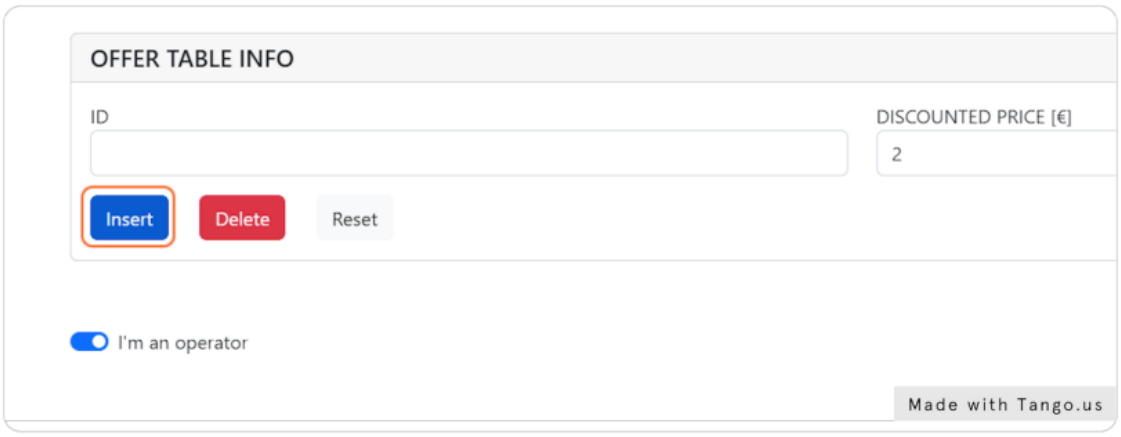
Click on OFFER_TAB



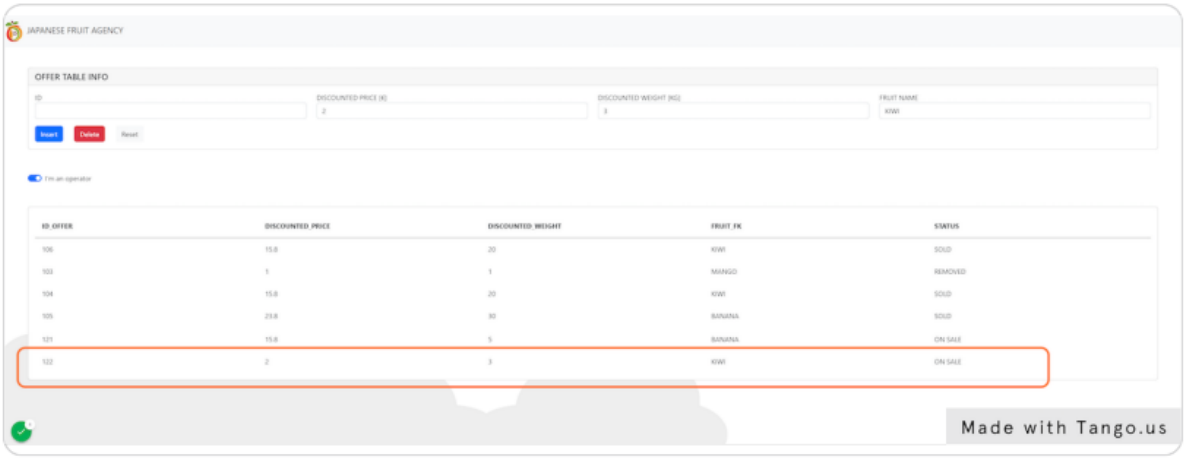
Add offer info in the form



Click on Insert



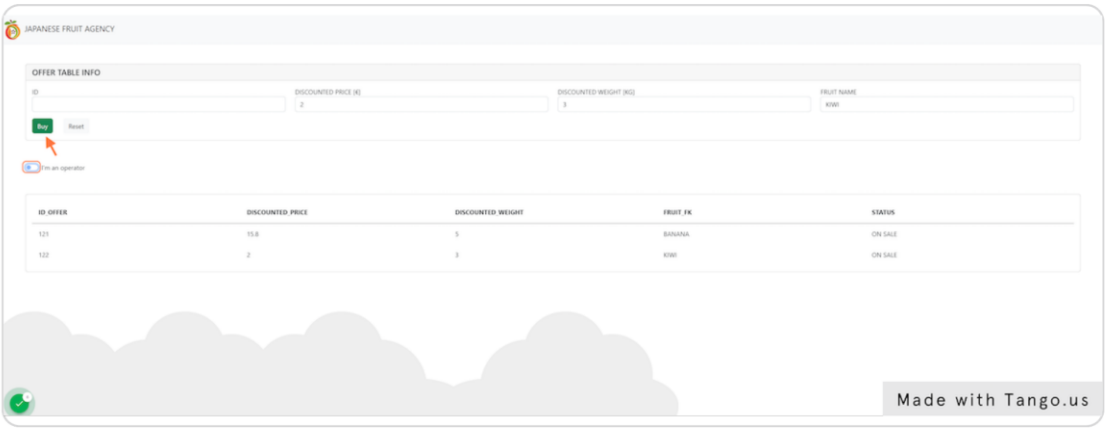
An offer is added



Switch to customer view

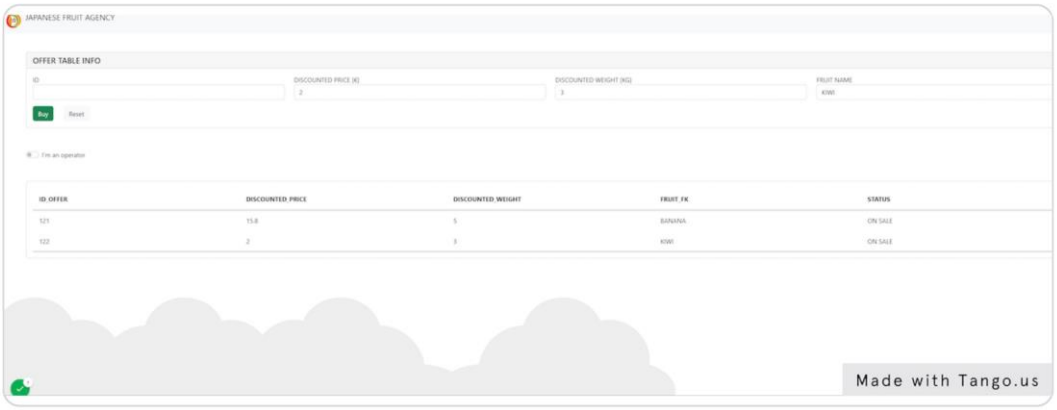
Uncheck I'm an operator

This switch the view from an operator prospective to a customer prospective. Infact there is a 'BUY' button

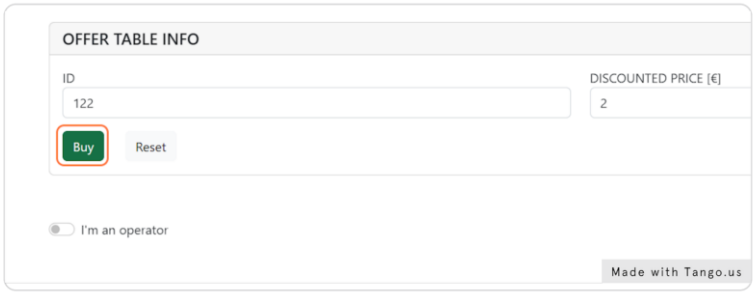


Select an offer by click on the row

NOTE: the only visible offers are the 'ON SALE' ones. In fact there are only two records.
TIPS: You can click every element in the table and the form will automatically compiled with the record information

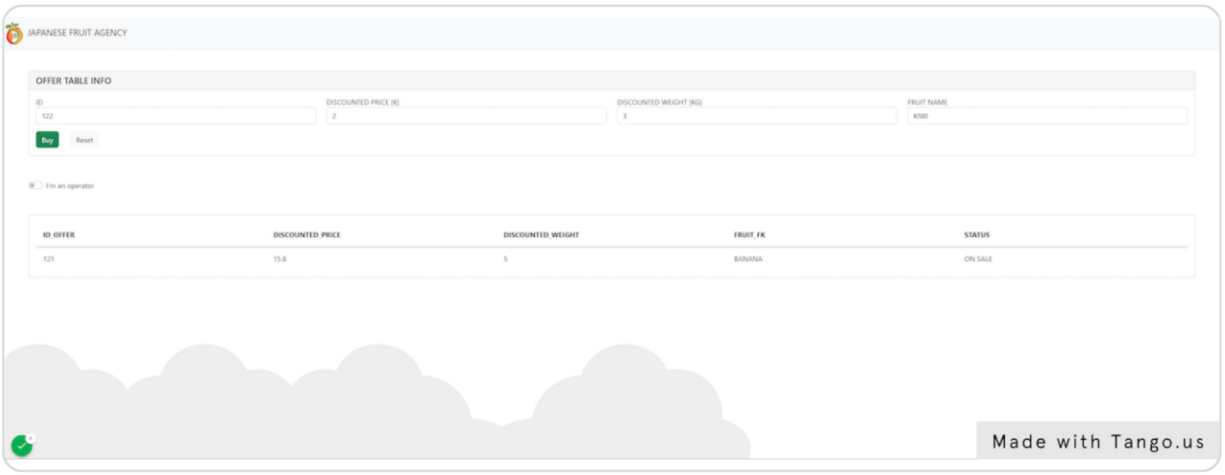


Click on Buy



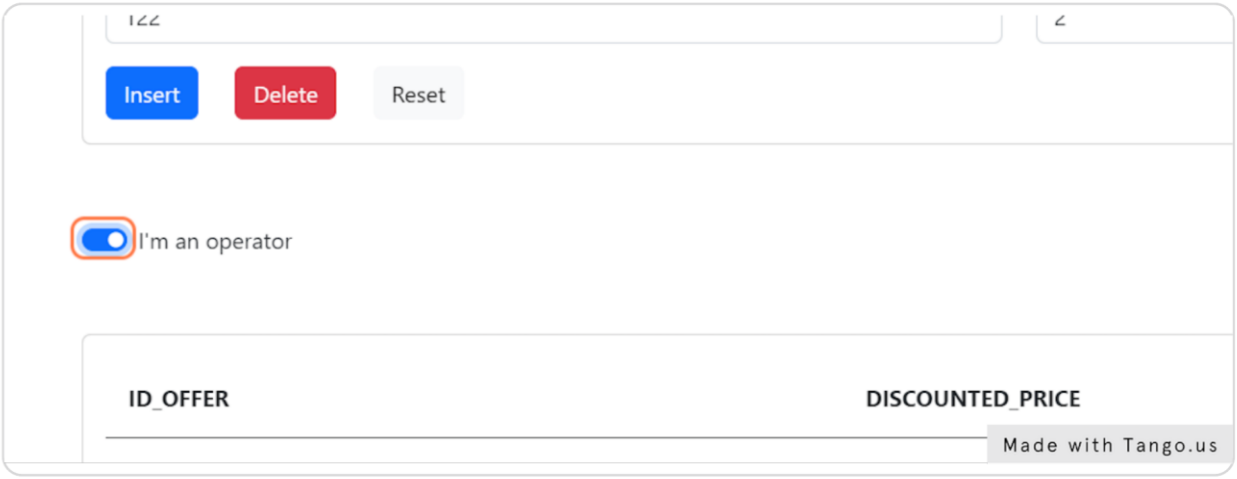
The offer bought just disappears from this view.

This appends because customer are allowed to see only 'ON SALE'.
When a customer buy an offer, then it is set to 'SOLD'.

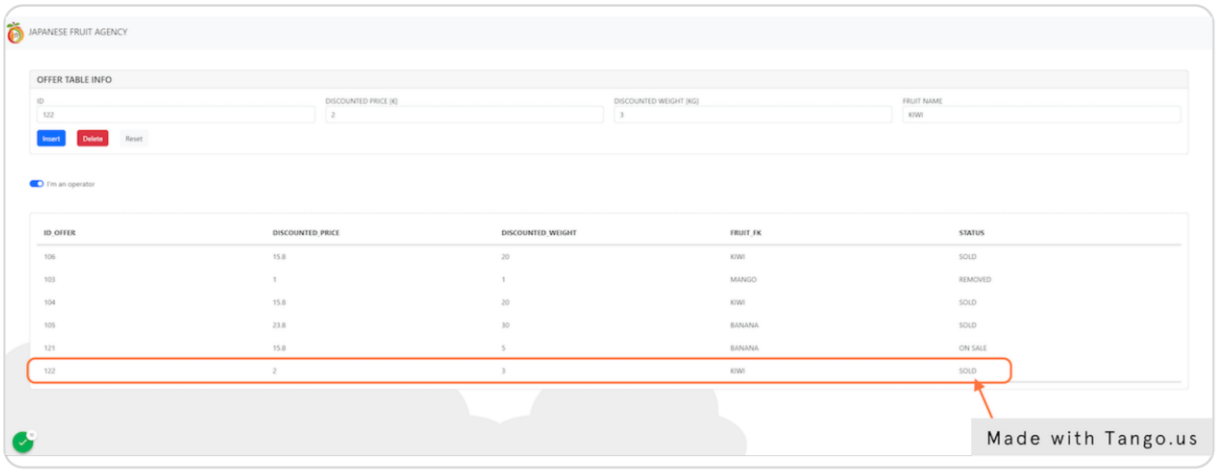


Check I'm an operator

Switch to operator view

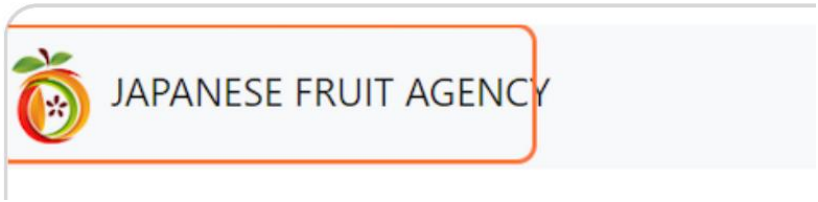


The offer is set to 'SOLD'

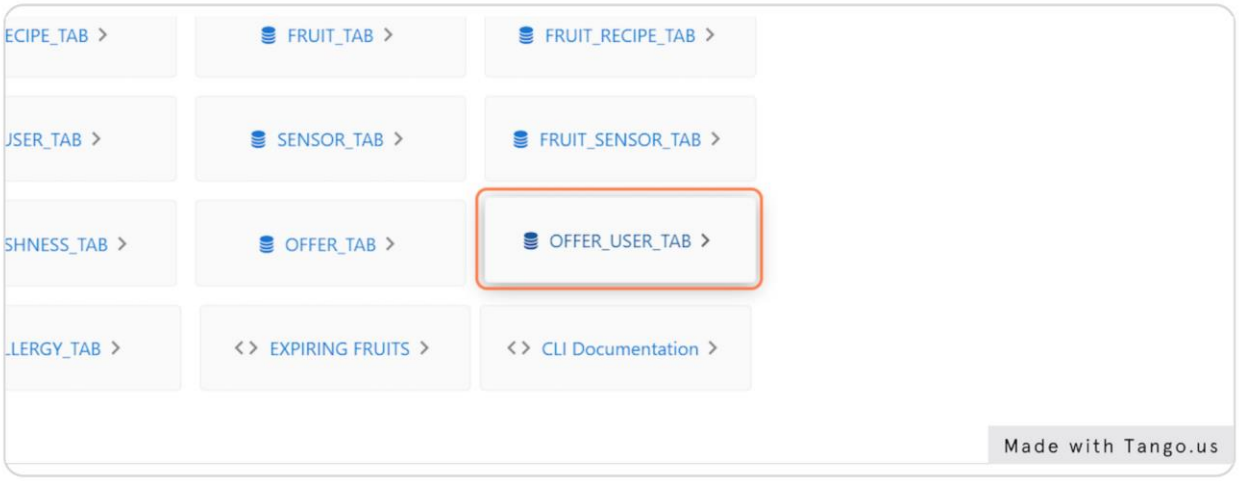


Let check the user offer table. In the user offer table all purchases are registered.

Let's go back to home page

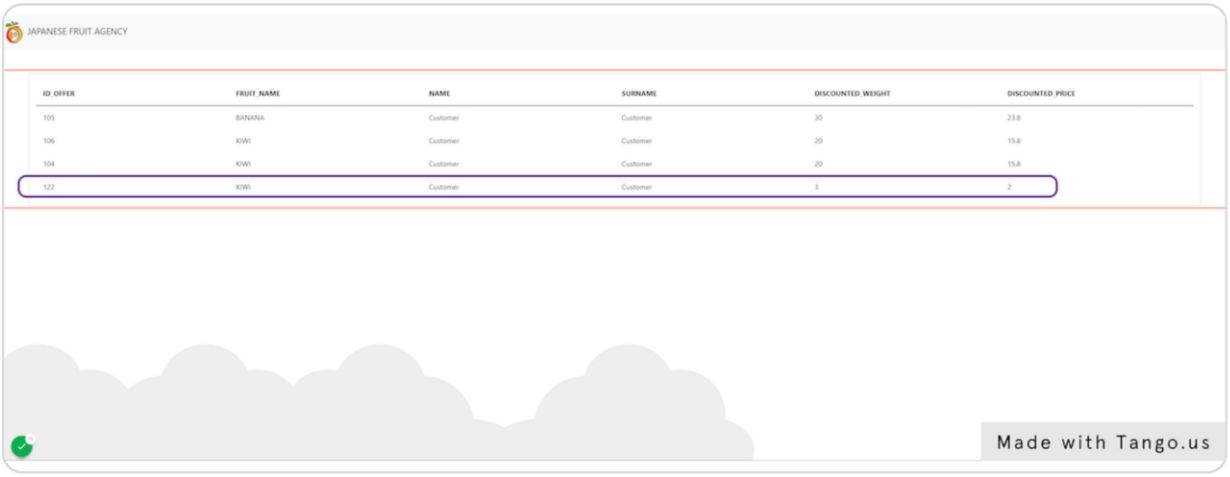


Click on OFFER_USER_TAB



This section records all customer purchases

The last record is the offer that we bought in this guide.



SENSOR FRUIT Operations

We use three fruits:

FRUIT	DIMENSION
apple	small
banana	medium
watermelon	big

and three sensors

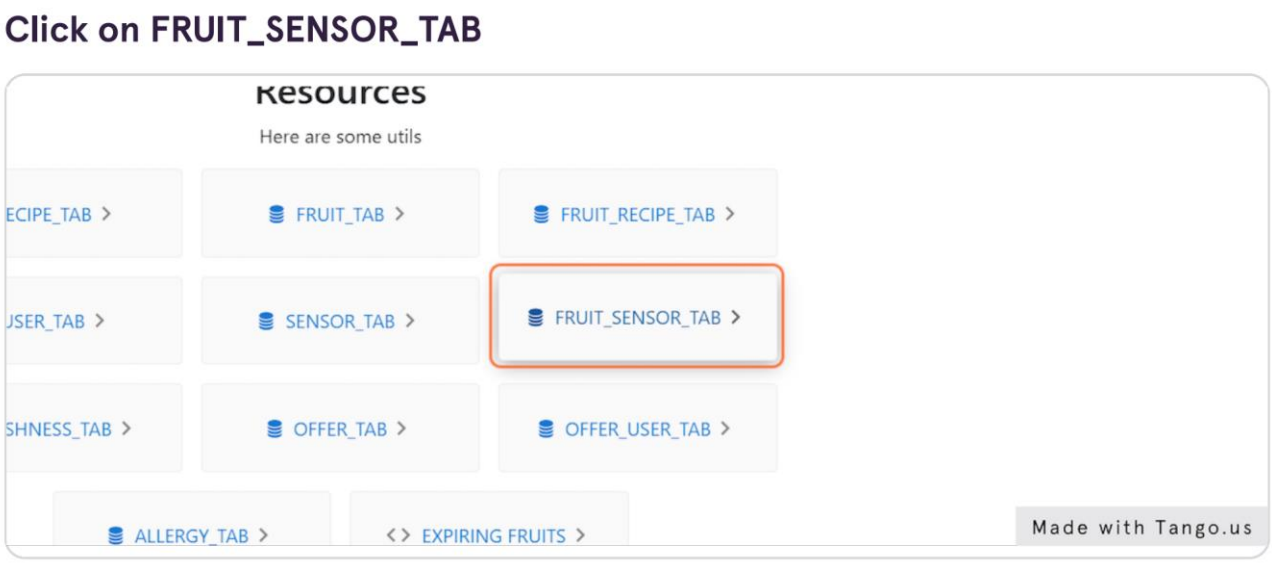
SENSOR	DIMENSION
sensor 1	small
sensor 2	medium
sensor 3	big

There is a trigger that avoid assignment between a sensor and a bigger dimension fruit.

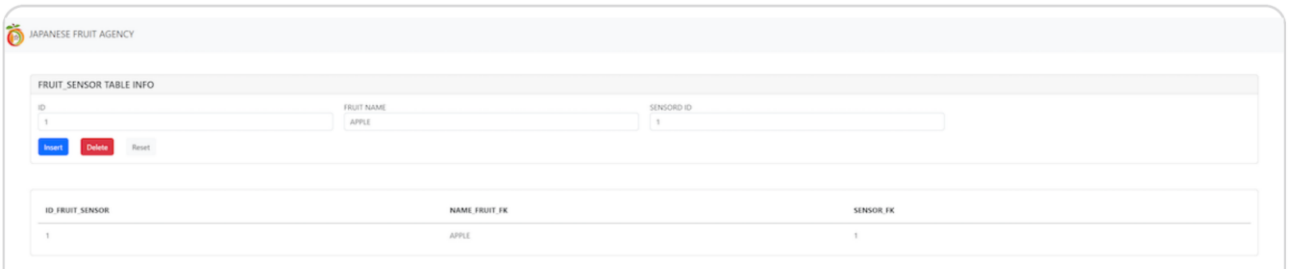
So, each sensor could scan equal size fruits or smaller ones.

We try each combination and we expect this result:

SENSOR	FRUIT
sensor 1	apple
sensor 2	Apple, banana
sensor 3	Apple, banana, watermelon

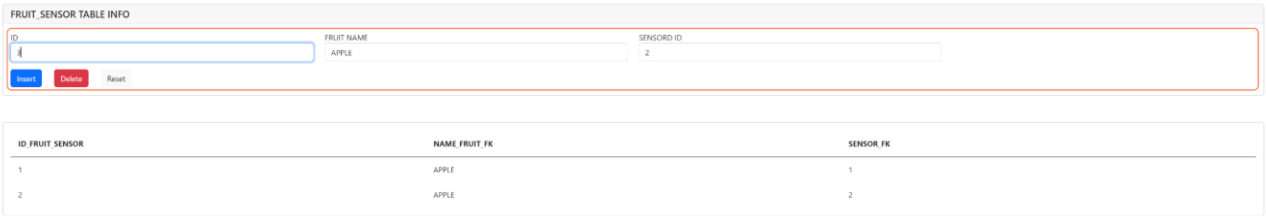


The first combination is APPLE (small) – SENSOR 1 (small)



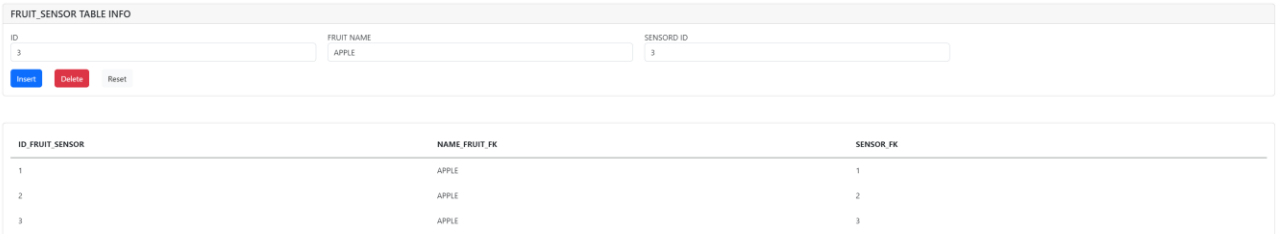
We can see that an entry is added, so this combination is correct.

Now the combination is APPLE (small) – SENSOR 2 (medium)



We can see that an entry is added, so this combination is correct.

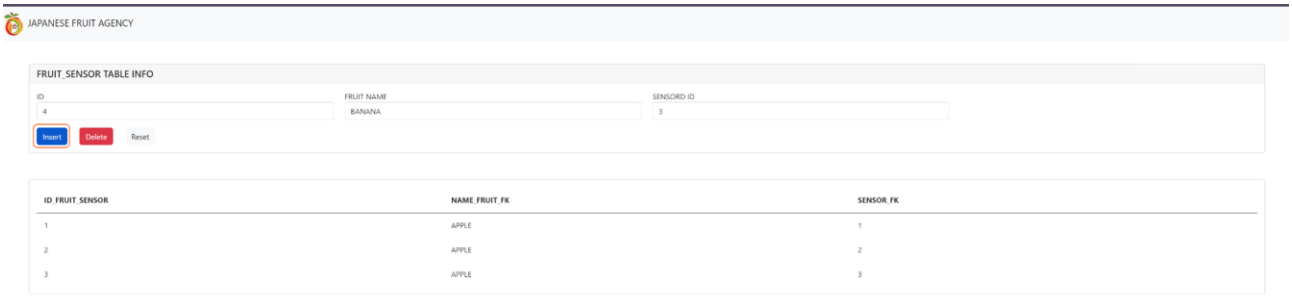
The last combination is APPLE (small) – SENSOR 3 (big)



We can see that an entry is added, so this combination is correct.

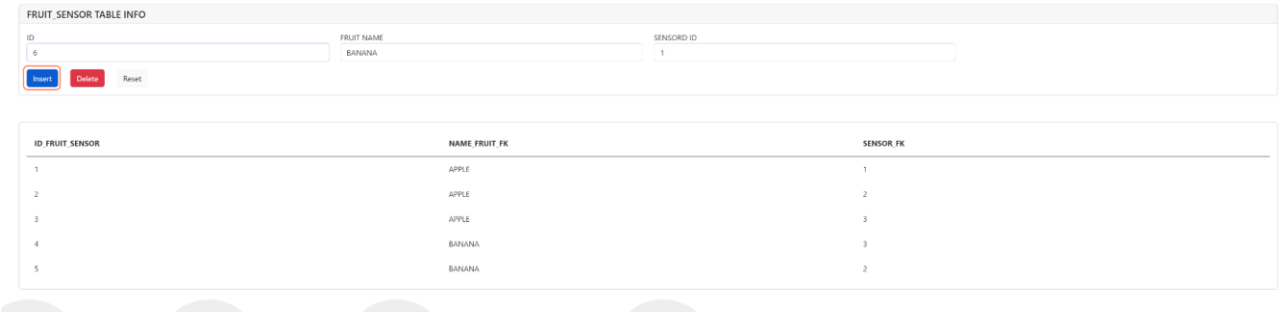
Let's try with different fruit and different dimension

Now the combination is BANANA (medium) – SENSOR 1(small)



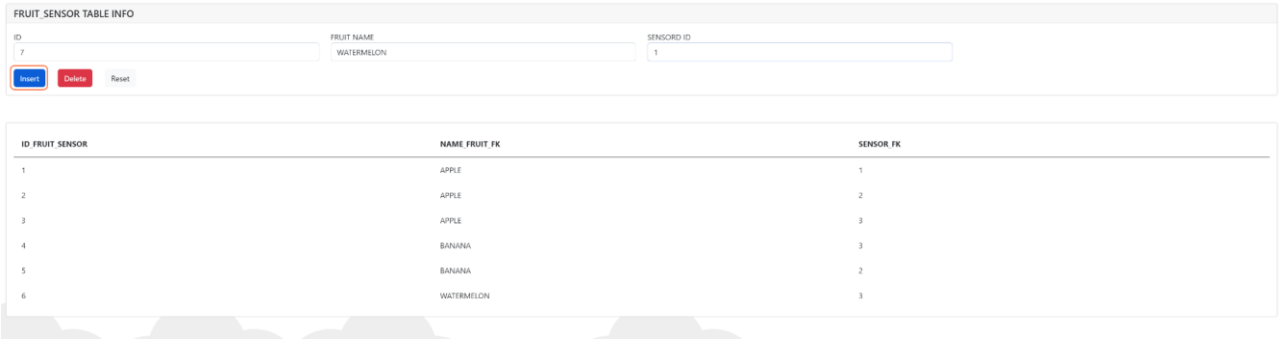
We can see that after the trigger avoid this combination because it is not correct and abort the transaction.

While with SENSOR 2 (medium) and SENSOR 3(big) there is an insert on the table because they are both a valid combination of fruit – sensor.



The final scenario is with the WATERMELON (BIG)

The only insert allowed is WATERMELON (big) – SENSOR 3 (big)



While the combination

- WATERMELON (big) – SENSOR 2 (medium) and
- WATERMELON (big) – SENSOR 1 (small)

are both aborted.

Jobs

Freshness check job

Today is 27/11/2022

When the job freshness check job is executed, all fruits with arrival date added to the number of freshness days are set to be not fresh.

Date arrival + days of freshness < today's date → NOT FRESH

We take into account only fresh fruits and we check this condition.

NAME_FRUIT	IS_PEEL_EDIBLE	DATE_ARRIVAL	WEIGHT	VOLUME	DIMENSION	RIPENS_LEVEL	PRICE	BASE_PRICE	ALLERGY_FK	FRESHNESS_FK	IS_FRESH
MANGO	True	2022-10-27	45	12	MEDIUM	0	0	1.1	1	3	False
APPLE	True	2022-11-21	45	10	SMALL	0	0	1.1	1	1	False
KIWI	True	2022-11-26	47	10	SMALL	0.4	37.6	2	1	2	True
BANANA	True	2022-11-26	0	10	MEDIUM	0.4	0	2	1	3	False
ORANGE	True	2022-11-26	40	12	MEDIUM	1	44	1.1	1	3	True
WATERMELON	True	2022-11-21	45	10	BIG	0	0	1.5	1	1	True
PEAR	True	2022-11-23	45	12	MEDIUM	0	0	1.1	1	3	True

2 days

1 day

15 days

1 day

We can say that the only fruit not fresh today is the pear with arrival date 23/11/2022 and 1 day of freshness.

After the execution of the job the last row should be not fresh. Note that the operator can't modify the freshness value because it is calculated.

NAME_FRUIT	IS_PEEL_EDIBLE	DATE_ARRIVAL	WEIGHT	VOLUME	DIMENSION	RIPENS_LEVEL	PRICE	BASE_PRICE	ALLERGY_FK	FRESHNESS_FK	IS_FRESH
MANGO	True	2022-10-27	45	12	MEDIUM	0	0	1.1	1	3	False
APPLE	True	2022-11-21	45	10	SMALL	0	0	1.1	1	1	False
KIWI	True	2022-11-26	47	10	SMALL	0.4	37.6	2	1	2	True
BANANA	True	2022-11-26	0	10	MEDIUM	0.4	0	2	1	3	False
ORANGE	True	2022-11-26	40	12	MEDIUM	1	44	1.1	1	3	True
WATERMELON	True	2022-11-21	45	10	BIG	0	0	1.5	1	1	True
PEAR	True	2022-11-23	45	12	MEDIUM	0	0	1.1	1	3	False

And the result is correct.

Daily Refill Job

Increase the weight of all fruit of 30 kg

BEFORE JOB

NAME_FRUIT	IS_PEEL_EDIBLE	DATE_ARRIVAL	WEIGHT	VOLUME
MANGO	True	2022-10-27	45	12
APPLE	True	2022-11-21	45	10
KIWI	True	2022-11-26	47	10
BANANA	True	2022-11-26	0	10
ORANGE	True	2022-11-26	40	12
WATERMELON	True	2022-11-21	45	10
PEAR	True	2022-11-23	45	12

AFTER JOB

NAME_FRUIT	IS_PEEL_EDIBLE	DATE_ARRIVAL	WEIGHT
MANGO	True	2022-10-27	75
APPLE	True	2022-11-21	75
KIWI	True	2022-11-26	77
BANANA	True	2022-11-26	30
ORANGE	True	2022-11-26	70
WATERMELON	True	2022-11-21	75
PEAR	True	2022-11-23	75

Freshness Decay Job

This job decreases the ripens level of each fruit of 0.1. This is helpful to simulate the natural fruit process during the days.

BEFORE JOB

NAME_FRUIT	IS_PEEL_EDIBLE	DATE_ARRIVAL	WEIGHT	VOLUME	DIMENSION	RIPENS_LEVEL
MANGO	True	2022-10-27	75	12	MEDIUM	0
APPLE	True	2022-11-21	75	10	SMALL	0
KIWI	True	2022-11-26	77	10	SMALL	0.4
BANANA	True	2022-11-26	30	10	MEDIUM	0.4
ORANGE	True	2022-11-26	70	12	MEDIUM	1
WATERMELON	True	2022-11-21	75	10	BIG	0
PEAR	True	2022-11-23	75	12	MEDIUM	0

AFTER JOB

NAME_FRUIT	IS_PEEL_EDIBLE	DATE_ARRIVAL	WEIGHT	VOLUME	DIMENSION	RIPENS_LEVEL
MANGO	True	2022-10-27	75	12	MEDIUM	0
APPLE	True	2022-11-21	75	10	SMALL	0
KIWI	True	2022-11-26	77	10	SMALL	0.3
BANANA	True	2022-11-26	30	10	MEDIUM	0.3
ORANGE	True	2022-11-26	70	12	MEDIUM	0.9
WATERMELON	True	2022-11-21	75	10	BIG	0
PEAR	True	2022-11-23	75	12	MEDIUM	0

Of course, if the ripens level is already 0, the ripens level does not undergo changes.

Offer low ripens level job

The objective of this job is to simulate the creation of an offer when the level of ripeness of a fruit is very low. Of course, all the fruit weight in the system is involved in the offer. In this way the aim is to sell the entire stock of ripe fruit as soon as possible. To do that every time this procedure is execute, the discounted price of the fruit is decreased by 0.20€.

Finally, when this job finds a fruit with ripens level 0, then all the offers on that fruit are set to 'REMOVED' and customer are no longer able to see those offers.

The threshold of the ripens level used for establish if a fruit is valid for an offer is 0.4.

If a fruit has this ripens level or less, then there will be an offer on all the stock of that fruit with a discounted price.

BEFORE JOB

Kiwi and banana are valid fruit for this job with their ripens levels equal to 0.3

NAME_FRUIT	IS_PEEL_EDIBLE	DATE_ARRIVAL	WEIGHT	VOLUME	DIMENSION	RIPENS_LEVEL
MANGO	True	2022-10-27	75	12	MEDIUM	0
APPLE	True	2022-11-21	75	10	SMALL	0
KIWI	True	2022-11-26	77	10	SMALL	0.3
BANANA	True	2022-11-26	30	10	MEDIUM	0.3
ORANGE	True	2022-11-26	70	12	MEDIUM	0.9
WATERMELON	True	2022-11-21	75	10	BIG	0
PEAR	True	2022-11-23	75	12	MEDIUM	0

Let's check If there are some offer 'ON SALE' on those fruits before the job.

ID_OFFER	DISCOUNTED_PRICE	DISCOUNTED_WEIGHT	FRUIT_FK	STATUS
106	15	5	KIWI	ON SALE
104	46	77	KIWI	SOLD
105	17.8	30	BANANA	SOLD
122	46	77	KIWI	SOLD

We can see that the fruit BANANA has no active offer. While kiwi has an old offer of 5 kg. Furthermore

The BANANA is no longer fresh so it is excluded.

BANANA	True	2022-11-26	30	10	MEDIUM	0.3	18	2	1	3	False

AFTER JOB

ID_OFFER	DISCOUNTED_PRICE	DISCOUNTED_WEIGHT	FRUIT_FK	STATUS
106	46	77	KIWI	ON SALE
104	46	77	KIWI	SOLD
105	17.8	30	BANANA	SOLD
122	46	77	KIWI	SOLD

The kiwi offer is update and all the stock is now on sale with a new discounted price.

Run application

In order to run the application, the following steps must be followed:

Download the code from repo:

```
git clone https://github.com/Francesco-Ranieri/database_system.git
```

If you want, you can create a virtual env using conda

```
conda create --name myenv
conda activate myenv
```

Then install the requirements.txt

```
cd ../backend
pip install -r requirements.txt
```

And now start docker for oracle database

```
cd ../backend
docker compose up
```

Start the backend

```
cd ../backend/controllers
python app.py
```

And start the frontend

```
cd ../frontend
ng serve
```