Project Description

PROCESSING PLANT

1. **Domain Description**

   There is a universal processing plant that produces certain end products from raw materials supplied by vendors. These products are then purchased by other clients. Both suppliers and clients are representatives of different countries. Each supplier supplies certain raw materials with a specific price, volume, label, and raw material type. Various end products can be prepared from a single type of raw material. It is necessary to store information about suppliers and clients, raw materials (labeling, price, packaging), end products (including the type of raw material from which it was produced), factory orders for raw materials, and orders for end products from clients.

2. **Expected Queries to the Domain**

1. Determine how many kilograms of "halva" "Moldova" purchased.
2. Which of the supplying countries of "wheat flour" supplied the *most* of it?
3. Calculate by how many times the number of orders for factory products from "Turkey" differs from "Kazakhstan". Round the answer to tenths.
4. Which country purchased the *least* "marshmallow" (provided it purchased any at all)?
5. Output the names of two countries: the one that sold the *most* of the most *expensive* raw material, and the one that bought the *least* of the cheapest product.

3. Database Description

The PROCESSING PLANT database contains the following tables:

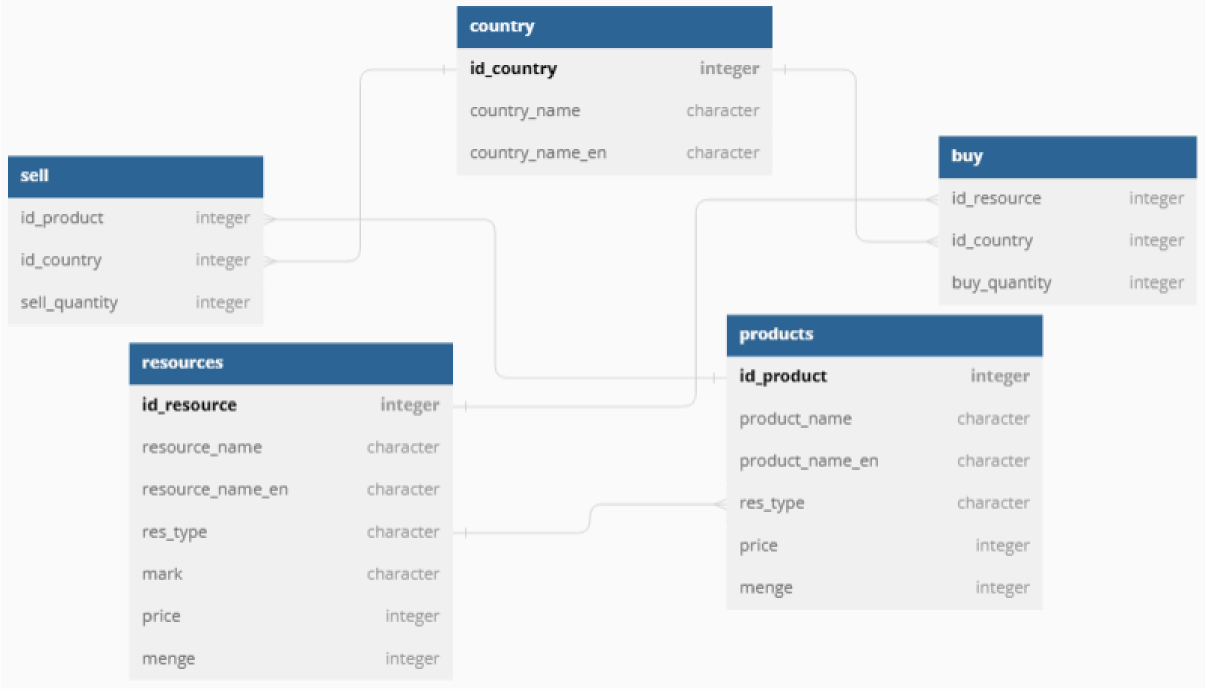
COUNTRY - list of countries: | Name | Type | Description | | :--- | :--- | :--- | | ID_COUNTRY | INTEGER | Client identifier | | COUNTRY_NAME | STRING | Country name | | COUNTRY_NAME_EN | STRING | Country name (Eng.) |

RESOURCES - list of raw materials: | Name | Type | Description | | :--- | :--- | :--- | | ID_RESOURCE | INTEGER | Resource identifier | | RESOURCE_NAME | STRING | Resource name | | RESOURCE_NAME_EN | STRING | Resource name (Eng.) | | TYPE | STRING | Type of raw material | | MARK | STRING | Label/Mark | | PRICE | INTEGER | Price per package | | MENGE | INTEGER | Amount of resource in package (weight in kg) |

PRODUCTS - list of manufactured products: | Name | Type | Description | | :--- | :--- | :--- | | ID_PRODUCT | INTEGER | Product identifier | | PRODUCT_NAME | STRING | Product name | | PRODUCT_NAME_EN | STRING | Product name (Eng.) | | TYPE | STRING | Type of raw material | | PRICE | INTEGER | Price per package | | MENGE | INTEGER | Amount of resource in package (weight in kg) |

BUY - list of raw material orders: | Name | Type | Description | | :--- | :--- | :--- | | ID_RESOURCE | INTEGER | Raw material identifier | | ID_COUNTRY | INTEGER | Selling country | | BUY_QUANTITY | INTEGER | Number of packages ordered |

SELL - list of product orders: | Name | Type | Description | | :--- | :--- | :--- | | ID_PRODUCT | INTEGER | Product identifier | | ID_COUNTRY | INTEGER | Buying country | | SELL_QUANTITY | INTEGER | Number of packages ordered |



country	
id_country	integer
country_name	character
country_name_en	character

sell	
id_product	integer
id_country	integer
sell_quantity	integer

buy	
id_resource	integer
id_country	integer
buy_quantity	integer

resources	
id_resource	integer
resource_name	character
resource_name_en	character
res_type	character
mark	character
price	integer
menge	integer

products	
id_product	integer
product_name	character
product_name_en	character
res_type	character
price	integer
menge	integer

COUNTRY - list of countries:

Name	**Type**	**Description**
ID_COUNTRY	INTEGER	Client identifier
COUNTRY_NAME	STRING	Country name
COUNTRY_NAME_EN	STRING	Country name (EN)

RESOURCES - list of raw materials:

Name	**Type**	**Description**
ID_RESOURCE	INTEGER	Resource identifier
RESOURCE_NAME	STRING	Resource name
RESOURCE_NAME_EN	STRING	Resource name (EN)
TYPE	STRING	Type of raw materia
MARK	STRING	Label/Mark
PRICE	INTEGER	Price per package
MENGE	INTEGER	Amount of resource in package (weight in kg)

PRODUCTS - list of manufactured products:

Name	**Type**	**Description**
ID_PRODUCT	INTEGER	Product identifier
PRODUCT_NAME	STRING	Product name
PRODUCT_NAME_EN	STRING	Product name (EN)
TYPE	STRING	Type of raw material
PRICE	INTEGER	Price per package
MENGE	INTEGER	Amount of resource in package (weight in kg)

BUY - list of raw material orders:

Name	**Type**	**Description**
ID_RESOURCE	INTEGER	Resource identifier
ID_COUNTRY	INTEGER	Selling country
BUY_QUANTITY	INTEGER	Number of packages ordered

SELL - list of product orders:

Name	**Type**	**Description**
ID_PRODUCT	INTEGER	Product identifier
ID_COUNTRY	INTEGER	Buying country
SELL_QUANTITY	INTEGER	Number of packages ordered

1. Database Creation Script

```
CREATE TABLE country
(
 id_country integer ,
 country_name character varying(16) ,
 country_name_en character varying(16) ,
 PRIMARY KEY (id_country)
);
CREATE TABLE resources
(
 id_resource integer ,
 resource_name character varying(32) ,
 resource_name_en character varying(32) ,
 res_type character varying(32) ,
 mark character varying(32) ,
 price integer ,
 menge integer ,
 UNIQUE (id_resource),
 PRIMARY KEY (res_type)
);
CREATE TABLE products
(
 id_product integer ,
 product_name character varying(32) ,
 product_name_en character varying(32) ,
 res_type CHARACTER VARYING(32) ,
 price integer ,
 menge integer ,
PRIMARY KEY (id_product),
FOREIGN KEY (res_type) REFERENCES resources (res_type)
);
CREATE TABLE buy
(
 id_resource integer ,
 id_country integer ,
 buy_quantity integer ,
 FOREIGN KEY (id_country) REFERENCES country (id_country),
 FOREIGN KEY (id_resource) REFERENCES resources (id_resource)
);
CREATE TABLE sell
(
 id_product integer ,
 id_country integer ,
 sell_quantity integer ,
  FOREIGN KEY (id_country) REFERENCES country (id_country),
FOREIGN KEY (id_product) REFERENCES products (id_product)
)
```

2. Database Population Script

```
INSERT INTO country(id_country, country_name,
country_name_en) VALUES (1, 'АФГАНИСТАН',
'AFGHANISTAN');
INSERT INTO country(id_country, country_name,
country_name_en) VALUES (2, 'ТУРЦИЯ', 'TURKEY');
INSERT INTO country(id_country, country_name,
country_name_en) VALUES (3, 'МОЛДОВА', 'MOLDOVA');
INSERT INTO country(id_country, country_name,
country_name_en) VALUES (4, 'КАЗАХСТАН', 'KAZAKHSTAN');
INSERT INTO country(id_country, country_name,
country_name_en) VALUES (5, 'БЕЛАРУСЬ', 'BELARUS');
INSERT INTO country(id_country, country_name,
country_name_en) VALUES (6, 'ГРУЗИЯ', 'GEORGIA');
INSERT INTO country(id_country, country_name,
country_name_en) VALUES (7, 'УЗБЕКИСТАН', 'UZBEKISTAN');
INSERT INTO country(id_country, country_name,
country_name_en) VALUES (8, 'ГЕРМАНИЯ', 'GERMANY');
INSERT INTO country(id_country, country_name,
country_name_en) VALUES (9, 'ПОЛЬША', 'POLAND');
INSERT INTO country(id_country, country_name,
country_name_en) VALUES (10, 'ТАДЖИКИСТАН',
'TAJIKISTAN');

INSERT INTO resources(id_resource, resource_name,
resource_name_en, res_type, mark, price, menge) VALUES (1,
'ПШЕНИЧНАЯ МУКА', 'WHEAT FLOUR', 'МУЧНОЕ', 'ОБЩЕГО
НАЗНАЧЕНИЯ', '250', '50');
INSERT INTO resources(id_resource, resource_name,
resource_name_en, res_type, mark, price, menge) VALUES (2,
'СЕМЕНА ПОДСОЛНЕЧНИКА', 'SUNFLOWER SEEDS',
'МАСЛИЧНЫЕ', 'ВЫСШИЙ СОРТ', '350', '100');
INSERT INTO resources(id_resource, resource_name,
resource_name_en, res_type, mark, price, menge) VALUES (3,
'ВОДА', 'WATER', 'ЖИДКОСТИ', 'РАСХОДНИК', '10', '1000');
INSERT INTO resources(id_resource, resource_name,
resource_name_en, res_type, mark, price, menge) VALUES (4,
'МОЛОКО', 'MILK', 'МОЛОЧНЫЕ ПРОДУКТЫ', 'РАСХОДНИК',
'590', '100');
INSERT INTO resources(id_resource, resource_name,
resource_name_en, res_type, mark, price, menge) VALUES (5,
'САХАР', 'SUGAR', 'САХАРА', 'ДЛЯ СИРОПА', '15', '100');
INSERT INTO resources(id_resource, resource_name,
resource_name_en, res_type, mark, price, menge) VALUES (6,
'ПАТОКА', 'TREACLE', 'КАРАМЕЛЬНОЕ', 'ДЛЯ СИРОПА', '780',
'1040');
INSERT INTO resources(id_resource, resource_name,
resource_name_en, res_type, mark, price, menge) VALUES (7,
'ГРЕЦКИЙ ОРЕХ', 'WALNUT', 'ОРЕХИ', 'ДЛЯ НАЧИНКИ', '1730',
'500');
INSERT INTO resources(id_resource, resource_name,
resource_name_en, res_type, mark, price, menge) VALUES (8,
'КУКУРУЗНАЯ МУКА', 'CORN FLOUR', 'ЗЛАКОВОЕ', 'ОБЩЕГО
НАЗНАЧЕНИЯ', '290', '1060');
INSERT INTO resources(id_resource, resource_name,
resource_name_en, res_type, mark, price, menge) VALUES (9,
'АРАХИС', 'PEANUT', 'БОБОВЫЕ', 'В СКОРЛУПЕ', '1450', '300');
INSERT INTO resources(id_resource, resource_name,
resource_name_en, res_type, mark, price, menge) VALUES (10,
'СМЕТАНА', 'SOUR CREAM', 'КИСЛОМОЛОЧКА', 'ДЛЯ
НАЧИНКИ', '1730', '500');

INSERT INTO products(id_product, product_name,
product_name_en, res_type, price, menge) VALUES (1,
'КОЗИНАКИ', 'KOZINAKI', 'МАСЛИЧНЫЕ', '2500', '50');
```

```
INSERT INTO products(id_product, product_name,
product_name_en, res_type, price, menge) VALUES (2, 'ХАЛВА',
'HALVA', 'МАСЛИЧНЫЕ', '1300', '60');
INSERT INTO products(id_product, product_name,
product_name_en, res_type, price, menge) VALUES (3,
'ПРЯНИКИ', 'TREACLE CAKES', 'МУЧНОЕ', '400', '10');
INSERT INTO products(id_product, product_name,
product_name_en, res_type, price, menge) VALUES (4, 'ИРИС',
'TOFFEE', 'ХИМИЯ', '340', '220');
INSERT INTO products(id_product, product_name,
product_name_en, res_type, price, menge) VALUES (5, 'ЗЕФИР',
'MARSHMALLOW', 'МОЛОЧНЫЕ ПРОДУКТЫ', '120', '15');
INSERT INTO products(id_product, product_name,
product_name_en, res_type, price, menge) VALUES (6,
'ПАХЛАВА', 'PAHLAVA', 'ОРЕХИ', '765', '50');
INSERT INTO products(id_product, product_name,
product_name_en, res_type, price, menge) VALUES (7, 'БУШЕ',
'BOUCHER', 'МУЧНОЕ', '710', '70');
INSERT INTO products(id_product, product_name,
product_name_en, res_type, price, menge) VALUES (8,
'АРАХИСОВАЯ ПАСТА', 'PEANUT BUTTER', 'ОРЕХИ', '890',
'110');
INSERT INTO products(id_product, product_name,
product_name_en, res_type, price, menge) VALUES (9, 'ВАФЛИ',
'WAFER', 'МУЧНОЕ', '250', '150');
INSERT INTO products(id_product, product_name,
product_name_en, res_type, price, menge) VALUES (10,
'ЩЕРБЕТ', 'SORBET', 'ХИМИЯ', '670', '100');
```

To fill the BUY and SELL tables, we will use the `random()` function, which generates a random float between 0 and 1. We multiply it by 10 to get an integer part from 0 to 9, extract this integer part with the `trunc` function, and add one, because country, resource, and product IDs vary from 1 to 10. The quantity of sold and purchased goods is set similarly, assuming volume up to 1000. We will create 50 rows for each table.

```
INSERT INTO buy(id_resource, id_country, buy_quantity) VALUES
(trunc(random()*10+1), trunc(random()*10+1),
trunc(random()*1000+1));
```

(copied and executed 50 times in a row)

```
INSERT INTO sell(id_product, id_country, sell_quantity) VALUES
(trunc(random()*10+1), trunc(random()*10+1),
trunc(random()*1000+1))
```

(copied and executed 50 times in a row)

3. Database Queries

   a) SELECT (SELECT SUM(sell_quantity) FROM sell WHERE id_product = (SELECT id_product FROM products WHERE product_name = 'ХАЛВА') and id_country = (SELECT id_country FROM country WHERE country_name_en = 'MOLDOVA')) * (SELECT menge FROM products WHERE id_product = (SELECT id_product FROM products WHERE product_name = 'ХАЛВА'))

   b) SELECT country_name FROM country WHERE id_country = (SELECT id_country FROM buy WHERE id_resource = (SELECT id_resource FROM resources WHERE resource_name = 'ПШЕНИЧНАЯ МУКА') AND buy_quantity = (SELECT MAX(buy_quantity) FROM buy WHERE id_resource = (SELECT id_resource FROM resources WHERE resource_name = 'ПШЕНИЧНАЯ МУКА')))

   c) SELECT trunc(trunc((SELECT (count(*)) FROM sell WHERE id_country = (SELECT id_country FROM country WHERE country_name_en = 'TURKEY')), 1) / (SELECT (count(*)) FROM sell WHERE id_country = (SELECT id_country FROM country WHERE country_name_en = 'KAZAKHSTAN')), 1)

d) SELECT country_name FROM country WHERE id_country = (SELECT id_country FROM sell WHERE id_product = (SELECT id_product FROM products WHERE product_name = 'ЗЕФИР') AND sell_quantity = (SELECT MIN(sell_quantity) FROM sell WHERE id_product = (SELECT id_product FROM products WHERE product_name = 'ЗЕФИР')))

e) SELECT country_name FROM country WHERE id_country = (SELECT id_country FROM sell WHERE id_product = (SELECT id_product FROM products WHERE price = (SELECT MAX(price) FROM products)) AND sell_quantity = (SELECT MIN(sell_quantity) FROM sell WHERE id_product = (SELECT id_product FROM products WHERE price = (SELECT MAX(price) FROM products)))) UNION SELECT country_name FROM country WHERE id_country = (SELECT id_country FROM buy WHERE id_resource = (SELECT id_resource FROM resources WHERE price = (SELECT MIN(price) FROM resources)) AND buy_quantity = (SELECT MAX(buy_quantity) FROM buy WHERE id_resource = (SELECT id_resource FROM resources WHERE price = (SELECT MIN(price) FROM resources))))