https://8weeksqlchallenge.com/case-study-2/

Introduction

Did you know that over **115 million kilograms** of pizza is consumed daily worldwide??? (Well according to Wikipedia anyway…)

Danny was scrolling through his Instagram feed when something really caught his eye - "80s Retro Styling and Pizza Is The Future!"

Danny was sold on the idea, but he knew that pizza alone was not going to help him get seed funding to expand his new Pizza Empire - so he had one more genius idea to combine with it - he was going to *Uberize* it - and so Pizza Runner was launched!

Danny started by recruiting "runners" to deliver fresh pizza from Pizza Runner Headquarters (otherwise known as Danny's house) and also maxed out his credit card to pay freelance developers to build a mobile app to accept orders from customers.

Problem Statement

Because Danny had a few years of experience as a data scientist - he was very aware that data collection was going to be critical for his business' growth.

He has prepared for us an entity relationship diagram of his database design but requires further assistance to clean his data and apply some basic calculations so he can better direct his runners and optimize Pizza Runner's operations.

All datasets exist within the `pizza_runner` database schema - be sure to include this reference within your SQL scripts as you start exploring the data and answering the case study questions.

Entity Relationship Diagram

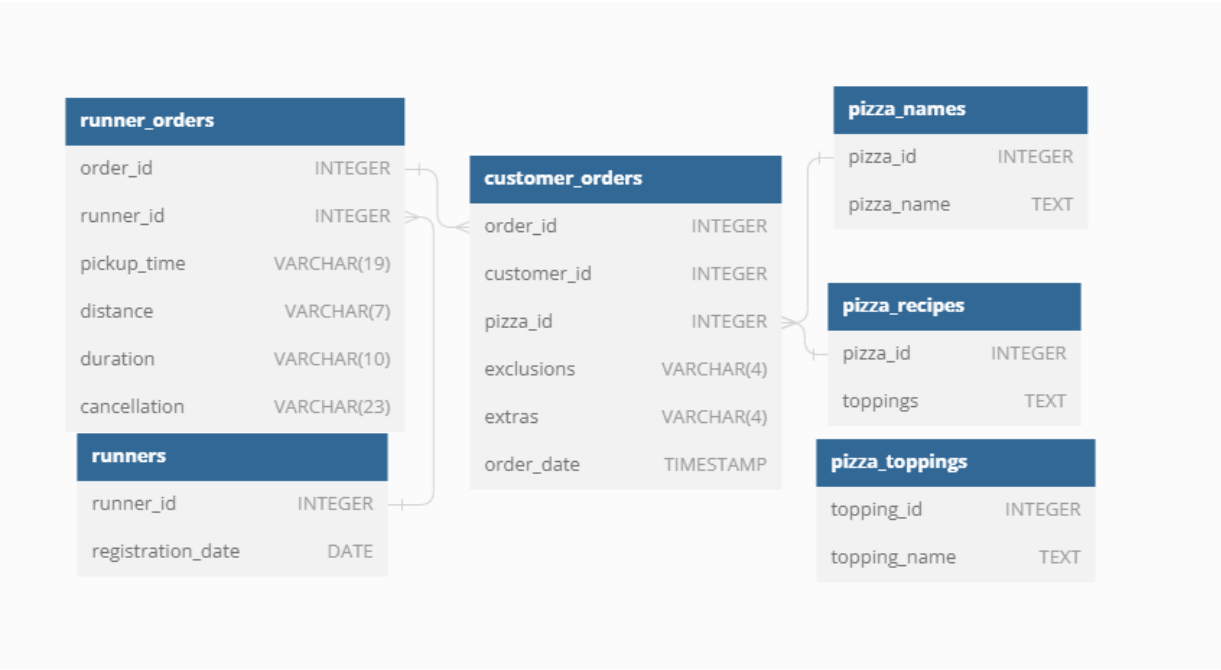


Table 1: runners

The runners table shows the registration_date for each new runner

runner_id	registration_date
1	2021-01-01
2	2021-01-03
3	2021-01-08
4	2021-01-15

Table 2: customer_orders

Customer pizza orders are captured in the customer_orders table with 1 row for each individual pizza that is part of the order.
The pizza_id relates to the type of pizza which was ordered whilst the exclusions are the ingredient_id values which should be removed from the pizza and the extras are the ingredient_id values which need to be added to the pizza.
Note that customers can order multiple pizzas in a single order with varying exclusions and extras values even if the pizza is the same type!
The exclusions and extras columns will need to be cleaned up before using them in your queries.

order_id	customer_id	pizza_id	exclusions	extras	order_time
1	101	1			2021-01-01 18:05:02
2	101	1			2021-01-01 19:00:52
3	102	1			2021-01-02 23:51:23
3	102	2		NaN	2021-01-02 23:51:23
4	103	1	4		2021-01-04 13:23:46
4	103	1	4		2021-01-04 13:23:46
4	103	2	4		2021-01-04 13:23:46
5	104	1	null	1	2021-01-08 21:00:29
6	101	2	null	null	2021-01-08 21:03:13
7	105	2	null	1	2021-01-08 21:20:29
8	102	1	null	null	2021-01-09 23:54:33
9	103	1	4	1, 5	2021-01-10 11:22:59
10	104	1	null	null	2021-01-11 18:34:49
10	104	1	2, 6	1, 4	2021-01-11 18:34:49

Table 3: runner_orders

After each orders are received through the system - they are assigned to a runner - however not all orders are fully completed and can be cancelled by the restaurant or the customer.

The pickup_time is the timestamp at which the runner arrives at the Pizza Runner headquarters to pick up the freshly cooked pizzas. The distance and duration fields are related to how far and long the runner had to travel to deliver the order to the respective customer.

There are some known data issues with this table so be careful when using this in your queries - make sure to check the data types for each column in the schema SQL!

order_id	runner_id	pickup_time	distance	duration	cancellation
1	1	2021-01-01 18:15:34	20km	32 minutes	
2	1	2021-01-01 19:10:54	20km	27 minutes	
3	1	2021-01-03 00:12:37	13.4km	20 mins	NaN
4	2	2021-01-04 13:53:03	23.4	40	NaN
5	3	2021-01-08 21:10:57	10	15	NaN
6	3	null	null	null	Restaurant Ca
7	2	2020-01-08 21:30:45	25km	25mins	null
8	2	2020-01-10 00:15:02	23.4 km	15 minute	null
9	2	null	null	null	Customer Ca
10	1	2020-01-11 18:50:20	10km	10minutes	null

Table 4: pizza_names

At the moment - Pizza Runner only has 2 pizzas available the Meat Lovers or Vegetarian!

pizza_id	pizza_name
1	Meat Lovers
2	Vegetarian

Table 5: pizza_recipes

Each `pizza_id` has a standard set of `toppings` which are used as part of the pizza recipe.

pizza_id	toppings
1	1, 2, 3, 4, 5, 6, 8, 10
2	4, 6, 7, 9, 11, 12

Table 6: pizza_toppings

This table contains all of the `topping_name` values with their corresponding `topping_id` value

topping_id	topping_name
1	Bacon
2	BBQ Sauce
3	Beef
4	Cheese
5	Chicken
6	Mushrooms
7	Onions
8	Pepperoni
9	Peppers
10	Salami
11	Tomatoes
12	Tomato Sauce

Case Study Questions

This case study has **LOTS** of questions - they are broken up by area of focus including:

- Pizza Metrics
- Runner and Customer Experience
- Ingredient Optimisation
- Pricing and Ratings
- Bonus DML Challenges (DML = Data Manipulation Language)

Each of the following case study questions can be answered using a single SQL statement.

Again, there are many questions in this case study - please feel free to pick and choose which ones you'd like to try!

Before you start writing your SQL queries however - you might want to investigate the data, you may want to do something with some of those null values and data types in the customer_orders and runner_orders tables!

B. Runner and Customer Experience

1. How many runners signed up for each 1 week period? (i.e. week starts `2021-01-01`)

```sql
select  weekofyear(registration_date+interval 1 week), count(runner_id)
from runners
group by 1;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

weekofyear(registration_date+interval 1 week)	count(runner_id)
1	2
2	1
3	1

2. What was the average time in minutes it took for each runner to arrive at the Pizza Runner HQ to pickup the order?

pizza_runner_codes_b* | customer_orders | pizza_names | pizza_recipes | pizza_toppings | runner_orders

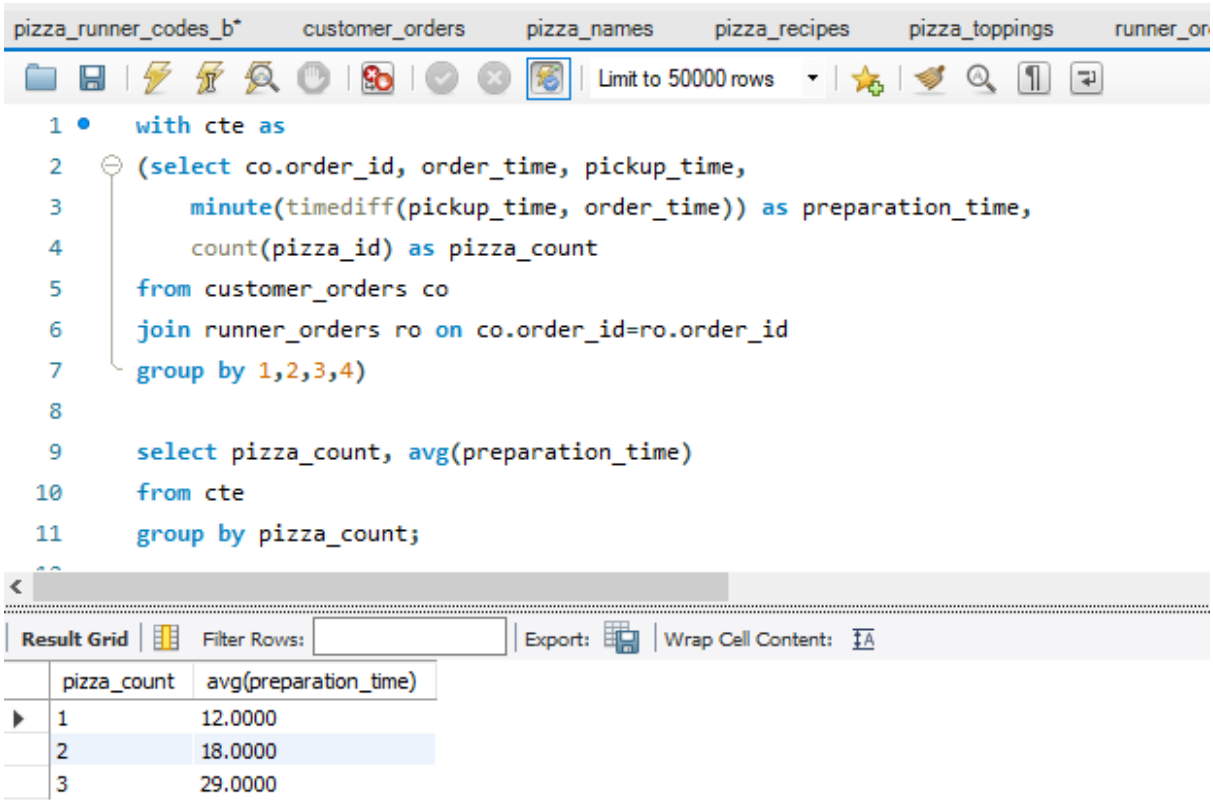
Limit to 50000 rows

```sql
select runner_id, avg(minute(timediff(pickup_time, order_time))) as avg_time
from customer_orders co
join runner_orders ro on co.order_id=ro.order_id
group by runner_id;
```

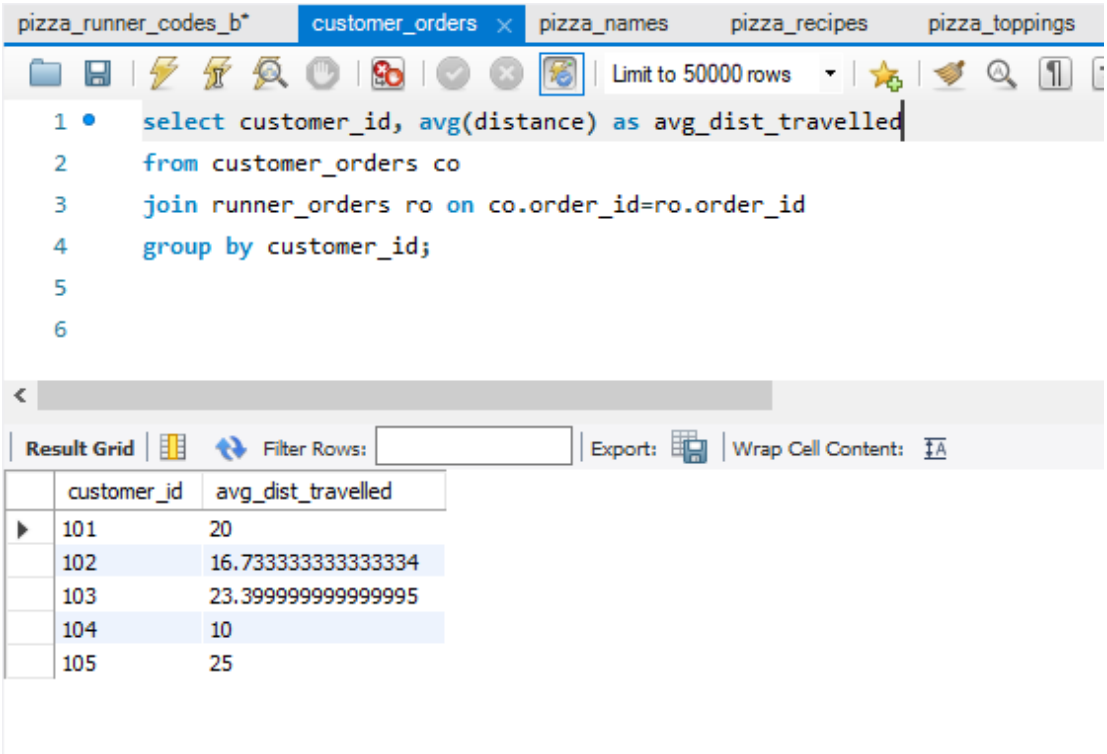
Result Grid | Filter Rows: | Export: | Wrap Cell Content:

runner_id	avg_time
1	15.3333
2	23.4000
3	10.0000

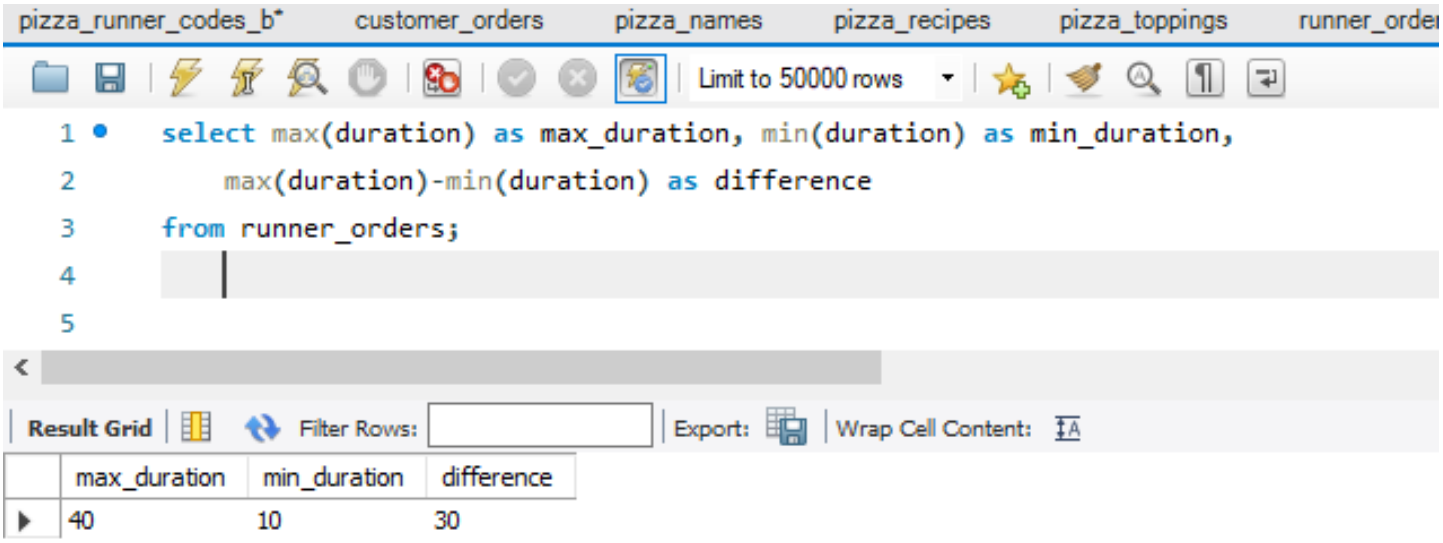
3. Is there any relationship between the number of pizzas and how long the order takes to prepare?



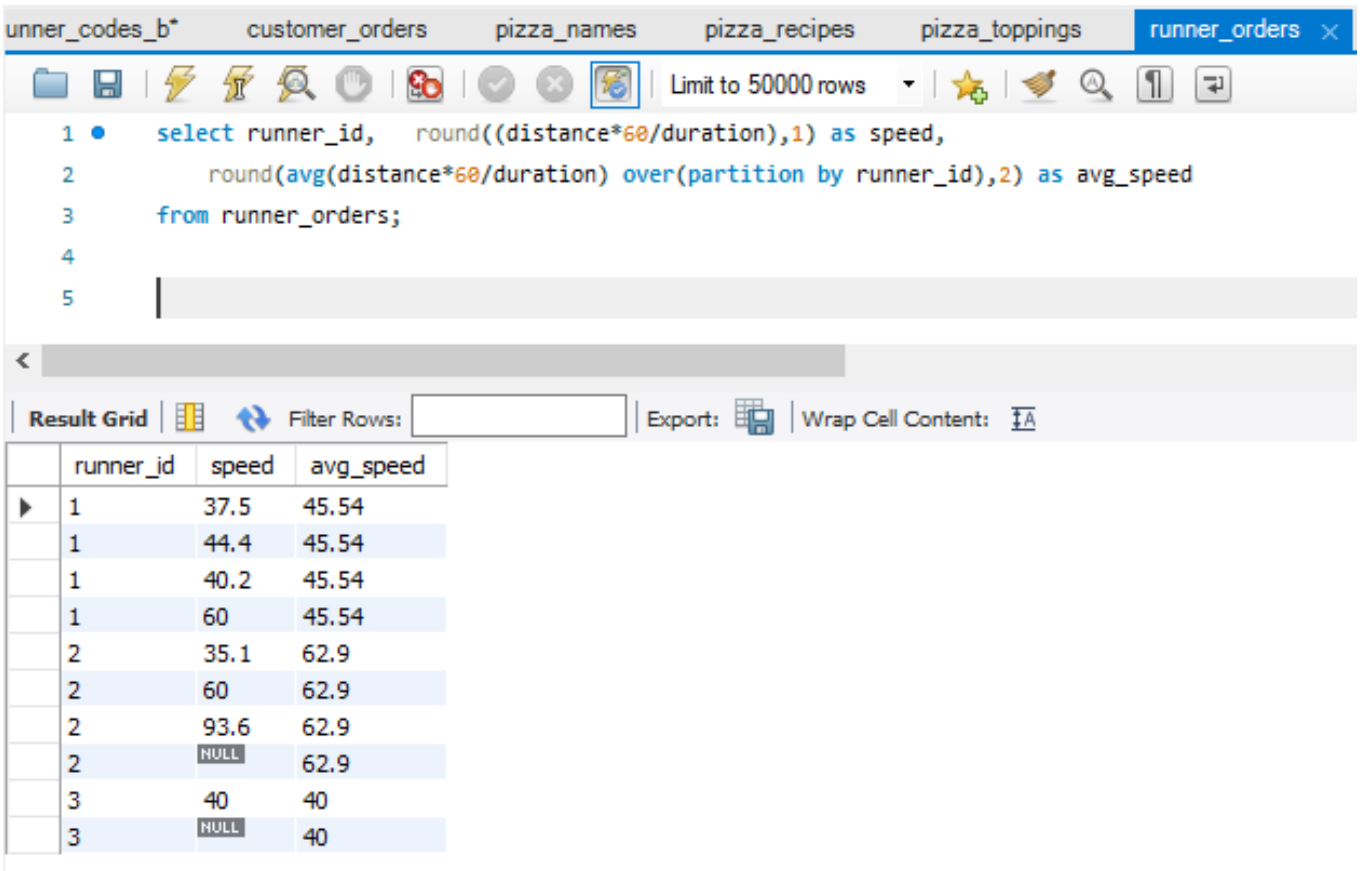
4. What was the average distance travelled for each customer?



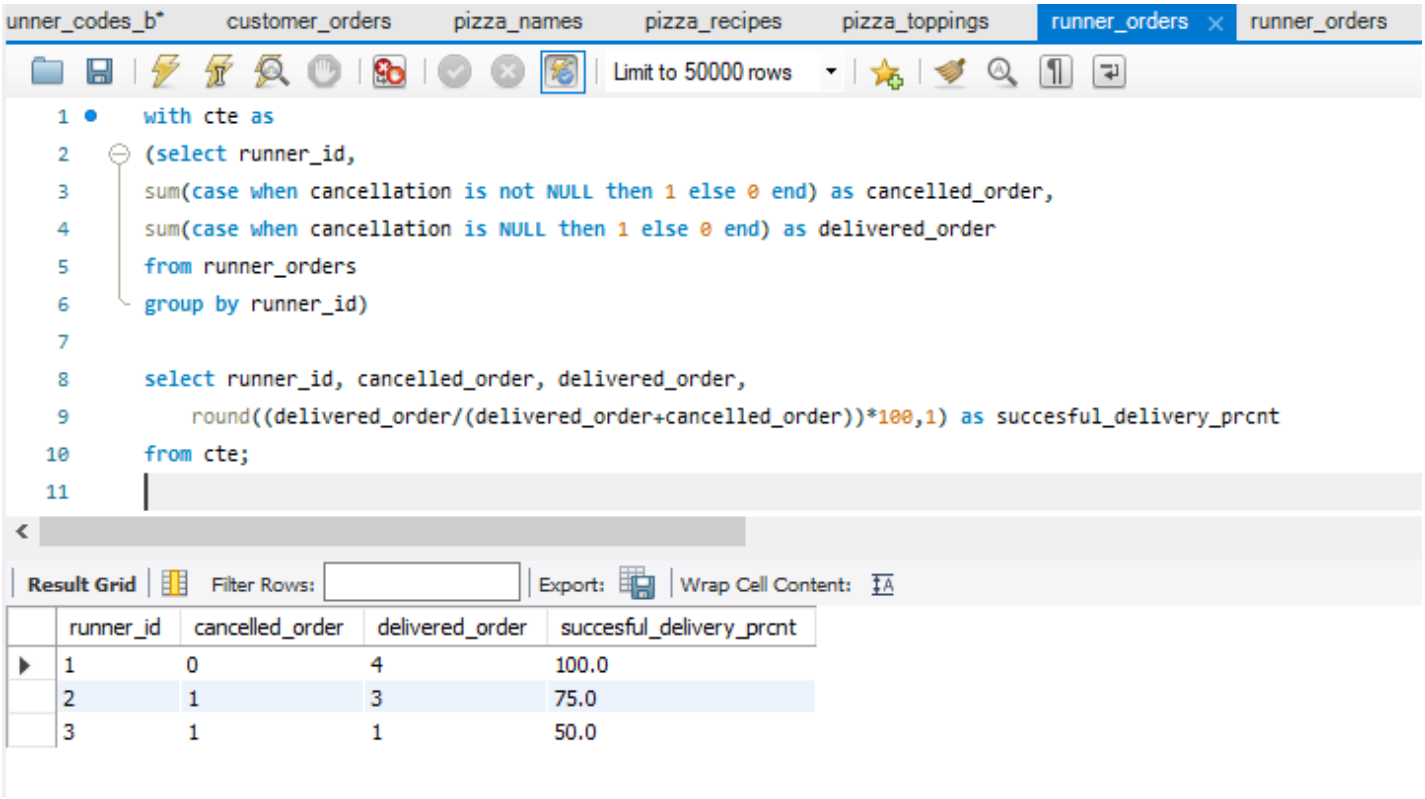
5. What was the difference between the longest and shortest delivery times for all orders?



6. What was the average speed for each runner for each delivery and do you notice any trend for these values?

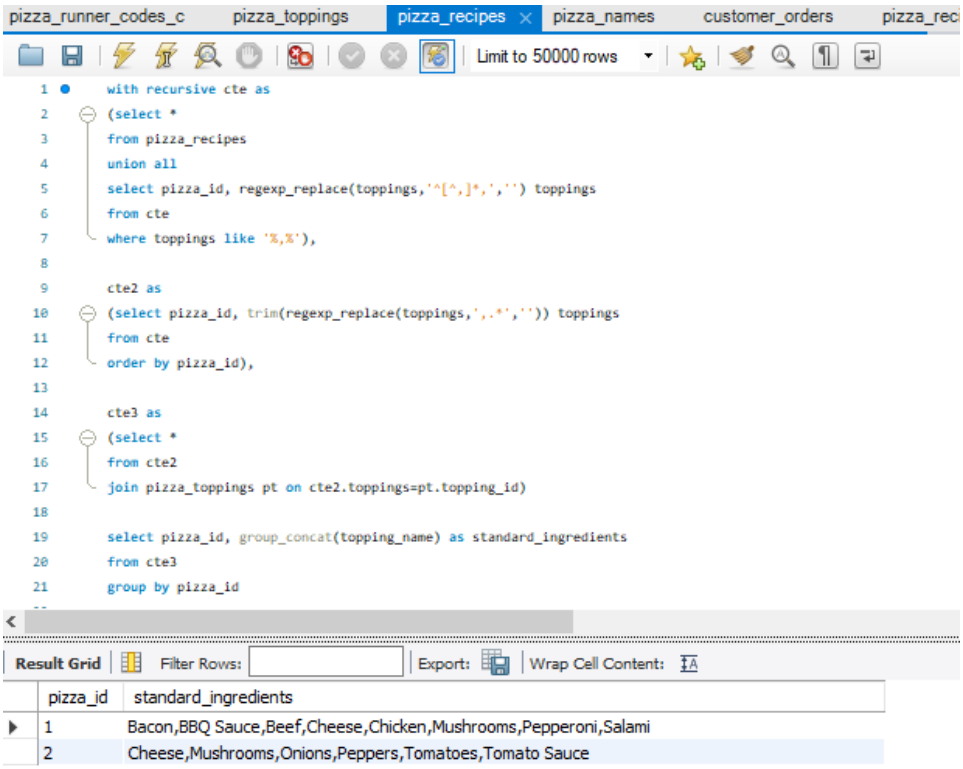


7. What is the successful delivery percentage for each runner?



C. Ingredient Optimisation

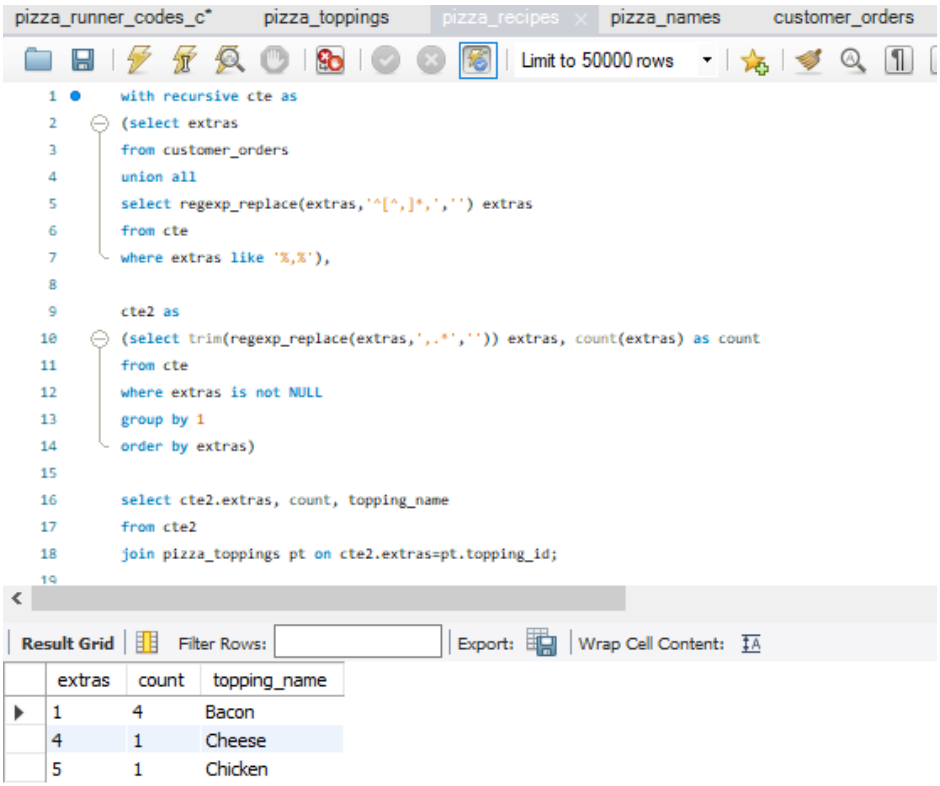
1. What are the standard ingredients for each pizza?



```
with recursive cte as
(select *
from pizza_recipes
union all
select pizza_id, regexp_replace(toppings,'^[^,]*,','') toppings
from cte
where toppings like '%,%'),

cte2 as
(select pizza_id, trim(regexp_replace(toppings,',.*','')) toppings
from cte
order by pizza_id),

cte3 as
(select *
from cte2
join pizza_toppings pt on cte2.toppings=pt.topping_id)

select pizza_id, group_concat(topping_name) as standard_ingredients
from cte3
group by pizza_id
```

pizza_id	standard_ingredients
1	Bacon,BBQ Sauce,Beef,Cheese,Chicken,Mushrooms,Pepperoni,Salami
2	Cheese,Mushrooms,Onions,Peppers,Tomatoes,Tomato Sauce

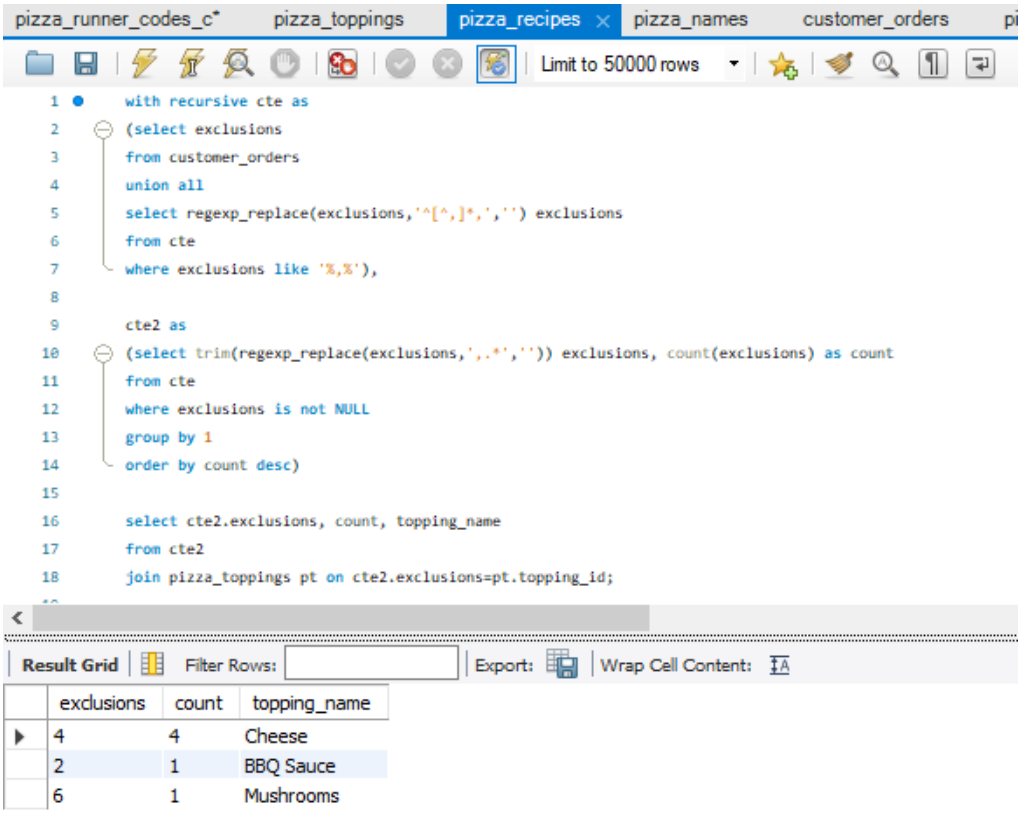
2. What was the most commonly added extra?



```
with recursive cte as
(select extras
from customer_orders
union all
select regexp_replace(extras,'^[^,]*,','') extras
from cte
where extras like '%,%'),

cte2 as
(select trim(regexp_replace(extras,',.*','')) extras, count(extras) as count
from cte
where extras is not NULL
group by 1
order by extras)

select cte2.extras, count, topping_name
from cte2
join pizza_toppings pt on cte2.extras=pt.topping_id;
```

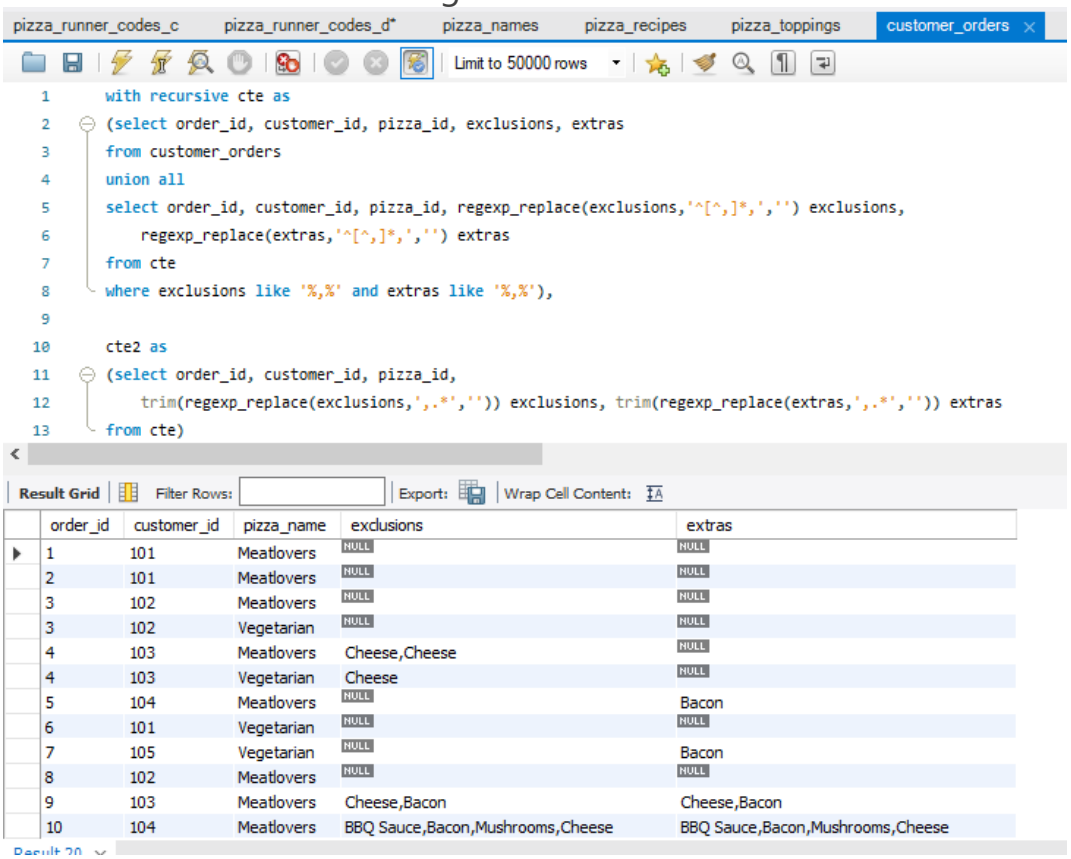
extras	count	topping_name
1	4	Bacon
4	1	Cheese
5	1	Chicken

3. What was the most common exclusion?



exclusions	count	topping_name
4	4	Cheese
2	1	BBQ Sauce
6	1	Mushrooms

4. Generate an order item for each record in the customers_orders table in the format of one of the following:



order_id	customer_id	pizza_name	exclusions	extras
1	101	Meatlovers	NULL	NULL
2	101	Meatlovers	NULL	NULL
3	102	Meatlovers	NULL	NULL
3	102	Vegetarian	NULL	NULL
4	103	Meatlovers	Cheese,Cheese	NULL
4	103	Vegetarian	Cheese	NULL
5	104	Meatlovers	NULL	Bacon
6	101	Vegetarian	NULL	NULL
7	105	Vegetarian	NULL	Bacon
8	102	Meatlovers	NULL	NULL
9	103	Meatlovers	Cheese,Bacon	Cheese,Bacon
10	104	Meatlovers	BBQ Sauce,Bacon,Mushrooms,Cheese	BBQ Sauce,Bacon,Mushrooms,Cheese

Insights

The following topics are completely covered in this case study:

- Common Table Expressions
- Group By and Aggregates
- Table Joins
- Case When clause
- Subqueries
- Group_concat
- Regexp_replace
- Window functions
- Date and Time functions like minute, timediff, weekofyear, etc.

The following insights can be gathered for this case study:

- As the number of pizzas increases the average time for cooking also increases.
- While the average speed of Runner 2 is maximum i.e., 62.9 kmph, but the average time to reach for pickup is minimum for Runner 3.
- Runner 1 has maximum successful delivery while Runner 3 has 50% of successful deliveries only.
- Bacon is the most added extra in Pizzas and Cheese is the most common exclusion from the Pizzas.
- Cheese and Mushrooms are put in both the pizzas.
- Customer 104 is nearest to restaurant while customer 105 lives farthest.