

1. For each *customer, product, month* and *state* combination, compute (1) the customer's average sale of this product for the given month and state, (2) the customer's average sale for the given month and state, but for *all other products* (3) the customer's average sale for the given product and state, but for *all other months* and (4) the average sale of the product and the month but for *all other states*.
2. For *customer, product* and *state*, show the average sales before and after each quarter (e.g., for Q2, show average sales of Q1 and Q3. For "before" Q1 and "after" Q4, display <NULL>. The "YEAR" attribute is not considered for this query – for example, both Q1 of 2017 and Q1 of 2018 are considered Q1 regardless of the year.
3. For each product, find the median sales quantity (assume an odd number of sales for simplicity of presentation). (NOTE – "**median**" is defined as "*denoting or relating to a value or quantity lying at the midpoint of a frequency distribution of observed values or quantities, such that there is an equal probability of falling above or below it.*" E.g., Median value of the list {13, 23, 12, 16, 15, 9, 29} is 15.

For example, given the following sales transactions for Bread, the median quant for Bread is 3.

PRODUCT	QUANT
=====	=====
Bread	1
Bread	1
Bread	1
Bread	2
Bread	2
Bread	3
Bread	4
Bread	5
Bread	6
Bread	7
Bread	7

4. For *customer* and *product*, find the month by which time, 75% of the sales quantities have been purchased. Again, for this query, the "YEAR" attribute is not considered. Another way to view this query is to pretend all 10,000 rows of sales data are from the same year.

Solutions:

1.

```
with t1 as
(
    select cust,prod,month,state,round(avg(quant))
as cust_avg
```

```
        from sales
        group by cust,prod,month,state
    ),

    t2 as
    (
        select
        t1.cust,t1.prod,t1.month,t1.state,t1.cust_avg,
        round(avg(s.quant)) as other_prod_avg
        from t1,sales s
        where t1.cust=s.cust
        and t1.prod!=s.prod
        and t1.month=s.month
        and t1.state=s.state
        group by
        t1.cust,t1.prod,t1.month,t1.state,t1.cust_avg
    ),

    t3 as
    (
        select
        t1.cust,t1.prod,t1.month,t1.state,t1.cust_avg,
        round(avg(s.quant)) as other_month_avg
        from t1,sales s
        where t1.cust=s.cust
        and t1.prod=s.prod
        and t1.month!=s.month
        and t1.state=s.state
        group by
```

```
t1.cust,t1.prod,t1.month,t1.state,t1.cust_avg  
)
```

```
t4 as  
(  
select  
t1.cust,t1.prod,t1.month,t1.state,t1.cust_avg,  
round(avg(s.quant)) as other_state_avg  
from t1,sales s  
where t1.cust=s.cust  
and t1.prod=s.prod  
and t1.month=s.month  
and t1.state!=s.state  
group by  
t1.cust,t1.prod,t1.month,t1.state,t1.cust_avg  
)
```

```
select t1.cust as customer, t1.prod as  
product,t1.month , t1.state, t1.cust_avg,  
t2.other_prod_avg, t3.other_month_avg,  
t4.other_state_avg  
from (t1 full outer join t2 on t1.cust=t2.cust and  
t1.prod=t2.prod and t1.month=t2.month and  
t1.state=t2.state  
full outer join t3 on t1.cust=t3.cust and  
t1.prod=t3.prod and t1.month=t3.month and  
t1.state=t3.state  
full outer join t4 on t1.cust=t4.cust and  
t1.prod=t4.prod and t1.month=t4.month and
```

```
t1.state=t4.state)
order by t1.cust,t1.prod,t1.month,t1.state;
```

2.

```
with t as
(
select cust, prod, state,(select
(case when month between 1 and 3 then 1
when month between 4 and 6 then 2
when month between 7 and 9 then 3
when month between 10 and 12 then 4 end)) as Q1,
round(avg(quant)) as avg
from sales
group by cust, prod, state, Q1
order by cust, prod, state, Q1
)
select t.cust, t.prod, t.state, t.Q1, t2.avg as
Before_avg, t1.avg as after_avg
from t
left join
t as t1 on t.cust= t1.cust and t.prod = t1.prod and
t.state = t1.state and t1.Q1-1= t.Q1
left join
t as t2 on t.cust= t2.cust and t.prod = t2.prod and
t.state = t2.state and t2.Q1+1= t.Q1;
```

3.

```
with v as
(
    select s.prod, s.quant, (select count(*)
    from sales
    where quant<=s.quant
    and prod = s.prod) as count
    from sales s
    order by s.prod, count
),
mid as
(
    select v.prod, (max(count)/2+1) as midpoint
    from v
    group by prod
),
v1 as
(
    select v.prod, v.quant
    from v, mid
    where v.prod= mid.prod and v.count >=
mid.midpoint
    order by v.prod, v.quant
)
select v1.prod as product, min(v1.quant) as "Median"
```

```
Quant"  
from v1  
group by prod;
```

4.

```
with t1 as (  
  select cust, prod, month, sum(quant)  
  from sales  
  group by cust, prod, month  
,  
  t2 as (  
    select cust, prod, sum(quant) as wholesum  
    from sales  
    group by cust, prod  
  ),  
  t4 as  
  (select a.*, sum(b.sum) as running_sum  
   from t1 as a join t1 as b on b.month <= a.month and  
   a.cust = b.cust and a.prod = b.prod  
   group by a.cust, a.prod, a.month, a.sum order by  
   cust, prod, month),  
  t5 as (  
    select t4.*, t2.wholesum  
    from t4, t2  
    where t4.cust=t2.cust and t4.prod=t2.prod
```

```
)  
select cust,prod,min(month) as month_75  
from t5  
where running_sum>=(0.75 * wholesum)  
group by cust,prod
```