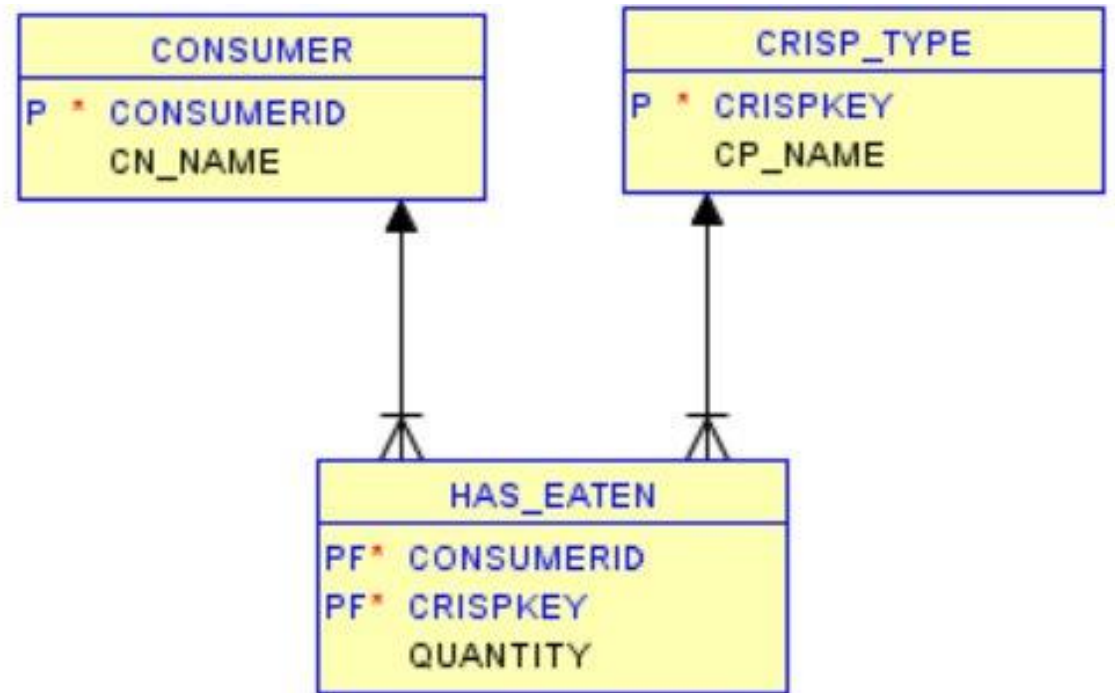# RELATIONAL DIVIDE

"Who ate all the crisps?"

# Join terminology

- Inner join
  - Equi-join or theta-join

- Semi-join
  - Can use an inner join or a sub-query (in or exists)

- Anti-join
  - Can use an outer join testing for nulls, a minus or a sub-query (not in, not exists)

# Relational Divide

- Return the names of consumers who
  have eaten every type of crisp.

- Return the names of staff members who
  have been paid by every customer.

- Return the names of students who
  have passed all modules.

# Relational Divide

- The query is:
  - Return the names of consumers who have eaten every type of crisp.

- Reword the query:
  - Return names of consumers where there is no type of crisp they haven't eaten.

- *This double negative is part of DeMorgan's theorem.*

- *It might be easier to think in terms of modules:*
  - *Which students have passed all there modules?*
    - *Is the same as*
  - *Which students have no modules that they haven't passed?*

# Who ate all the crisps?

```sql
SELECT cn_name
FROM consumer cn
WHERE NOT EXISTS
  (SELECT *
  FROM crisp_type ct
  WHERE NOT EXISTS
    (SELECT *
    FROM has_eaten e
    WHERE cn.consumerId = e.consumerid
    AND ct.crispkey    = e.crispkey
    )
  );
```