TÉCNICO LISBOA

DB Project

Part 2

Databases

Prof. Ana Cláudia Madeira David

Group nr.:: 177

Total Effort: 21 hours

Student's Number	Full Name	Relative effort
96098:	Tomás Gonçalves Lopes Costa Carvalho	33%
99078:	Guilherme Henrique Corrêa Carabalone	33%
99095:	João Paulo Melo Furtado	33%

Table 1: Students from the 'BDL05' shift.

Computer Science and Engineering

IST-TAGUSPARK

2021/2022

Relational Model

- point_of_retail(address, name).
- IVM(serial_number, manuf)
- product(EAN, descr)
  - shelf(serial_number, manuf, nr, height)
  - serial_number: FK(IVM)
  - manuf: FK(IVM)
- ambient_temp_shelf(nr)
  - nr: FK(shelf)
- warm_shelf(nr)
  - nr: FK(shelf)
- cold_shelf(nr)
  - nr: FK(shelf)
- category(name)
- simple_category(name)
  - name: FK(shelf)
- super_category(name)
  - name: FK(shelf)
- retailer(TIN, name)
  - UNIQUE(name)
- replenishment_event(instant, units)
- installed-at(address, serial_number, manuf, nr)
  - address: FK(point_of_retail)

  - serial_number: FK(IVM)
  - manuf: FK(IVM)

- replenisher_of(TIN, instant)
  - TIN: FK(retailer)
  - instant: FK(replenishment_event)

- replenishment(instant, EAN, nr)
  - instant: FK(replenishment_event)
  - EAN: FK(planogram.EAN, planogram.nr)
  - nr: FK(planogram.EAN, planogram.nr)

- has(EAN, name)
  - EAN: FK(product)
  - name: FK(category)

- planogram(EAN, nr, faces, units, loc)

- responsable_for(name, TIN, serial_number, manuf)
  - name: FK(category)
  - TIN: FK(retailer)
  - serial_number: FK(IVM)
  - manuf: FK(IVM)

- displayed(name, nr)
  - name: FK(category)
  - nr: FK(category)

- of(nr, serial_number, manuf)
  - nr: FK(shelf)
  - serial_number: FK(IVM)

  - manuf: FK(IVM)

- has-other(category_name, super_category_name)
  - category_name: FK(category.name)
  - super_category_name: FK(category.name)

Integrity Constraints

Relational Model

- (IC-1): category_name is always different from super_category_name.
- (IC-2): Cannot exist cycles in the hierarchy of Categories.
- (IC-3): The number of units replenished in a singular event of Replenishement cannot exceed the number of units specified on the Planogram.
- (IC-4): A Product can only be replenished in a Shelf where its category is noted.
- (IC-5): A Product can only be replenished by the Retailer responsible by Products's category.
- (IC-6): A name can only exist in simple_category or super_category.
- (IC-7): Every product (EAN) must participate in the has associaton.
- (IC-8): EAN can only exist in ambient_temp_shelf, warm_shelf or cold_shelf.

Relational Algebra

1. $\pi_{EAN,designacao}(\sigma_{name=\text{"Barras de Energetico"} \wedge instant>\text{"2021/12/31"} \wedge units>10}(Product \bowtie ReplenishmentEvent))$
2. $\pi_{serial\_number}(\sigma_{EAN=9002490100070})((Products \bowtie Planogram) \bowtie of)$
3. $G_{count}() \rightarrow_{c(has-other)} (\sigma_{name=\text{"SopasTake-Away"}}(category))$
4. $prods \leftarrow_{EAN,Designacao} G_{count() \rightarrow c(replenishment)}$
   $result \leftarrow G_{max(c)}(prods) \bowtie prods$

SQL

1. ```
   SELECT ean, descr
       FROM product NATURAL JOIN Replenishment_Event
       WHERE name = "Barras de Energético"
           AND instant > "2021/12/31"
           AND units > 10;
   ```

2. ```
   SELECT serial_number
       FROM Products NATURAL JOIN Planogram NATURAL JOIN of
       WHERE ean = 9002490100070;
   ```

3. ```
   SELECT COUNT(category_name)
       FROM has-other
       WHERE super_category_name = "SopasTake-Away";
   ```

4. ```
   SELECT ean, descr
   FROM (
       SELECT ean, descr, COUNT(instant)
       FROM product NATURAL JOIN replenishment
       GROUP BY ean, descr
   ) AS table
   WHERE count >= ALL (
       SELECT count
       FROM table
   );
   ```