Point of Retail (address, name)

IVM (serial number, manuf)

Installed-at(serial number, manuf, address, nr)

.serial\_number, manuf: FK (IVM.serial\_number, IVM.manuf)

.address: FK (Point\_of\_Retail.address)

Responsible-for (name, TIN, serial number, manuf)

.name: FK (Category.name)

.TIN: FK (Retailer.TIN)

.serial\_number, manuf: FK (IVM.serial\_number, IVM.manuf)

Retailer (TIN, name)

.Unique (name)

Of (serial number, manuf, nr)

.nr: FK (Shelve.nr)

.serial\_number, manuf: FK (IVM.serial\_number, IVM.manuf)

Replenishment event (ean, nr, TIN, instant, units)

.ean: FK (Product.ean)

.nr: FK (Shelve.nr)

.TIN: FK (Retailer.TIN)

Replenishment(TIN, nr, ean, instant, units)

.TIN: FK (Retailer.TIN)

.nr: FK (planogram.nr)

.ean: FK (planogram.ean)

.RI-4 In a Replenishment event, at the ‘replenishment’ association the Replenishment\_Event.units can’t exceed the planogram.units.

.RI-5 An ean can only be associated to a shelf.nr, shelf.manuf and to a shelf.serial\_number if in the ‘has’ association is associated to a Category.name that in the ‘displayed’ association is associated to the same shelf.nr, shelf.manuf and shelf.serial\_number.

.RI-6 An ean can only be associated to a retailer.TIN if the product in the ‘has’ association is associated to the same Category.name than the retailer in the ‘responsible-for’ association.

Shelve (serial number, manuf, nr, height, name)

.serial number, manuf: FK (IVM.serial\_number, IVM.manuf)

.name: FK (Category)

.IC-5 Shelve.nr must exist in Ambient Temp Shelf or in Warm Shelf or in Cold Shelf.

.IC-6 No Shelve can exist at the same time in ‘Ambient Temp Shelf’ and in ‘Warm Shelf’ and in ‘Cold Shelf’.

Ambient Temp Shelf(serial number, nr)

.serial number: FK (Shelve.serial\_number)

.nr :FK (Shelve.nr)

Warm Shelf(serial number, nr)

.serial number: FK (Shelve.serial\_number)

.nr :FK (Shelve.nr)

Cold Shelf(serial number, nr)

.serial number: FK (Shelve.serial\_number)

.nr :FK (Shelve.nr)

Planogram(ean, nr, faces, units, loc)

.nr: FK (Shelve.nr)

.ean: FK (Product.ean)

Displayed(nr, name)

.nr: FK (Shelve.nr)

.name: FK (Category.name)

Product (ean, descr)

.Unique (descr)

. IC-1 Every product (Product.ean) must participate in the ‘has’ a association.

Has (ean, name)

.ean: FK (Product.ean)

.name: FK (Category.name)

Category (name)

.IC-3 Category.name must exist in Super Category or in Simple Category.

.IC-4 No Category can exist at the same time in ‘Super Category’ and in ‘Simple Category’.

Super Category (name)

.name: FK (Category.name)

. IC-2 Every Super Category (Category.name) must participate in the ‘has-other’ association.

Simple Category (name)

.name: FK (Category.name)

Has-other (nameCategory, nameSuperCategory)

.nameCategory: FK (Category.name)

.nameSuperCategory: FK (SuperCatergory.name)

.RI-1 A Category.name can’t be the same that its own SuperCategory.name.

.RI-2 It’s not possible to have cycles in Category hierarchy.

Algebra Relacional

1.

A <- name(‘has’) ⋈ ‘Product’

B <- ‘Replenishment Event’ ⋈ A

∏ ( ean, descr (δ (‘name’ = “barras energética”, ‘units’ > 10, ‘instant’ > 2021/12/31) (B))

2.

A <- ean(‘has’) ⋈ ‘displayed’

∏( ‘serial number’ ( δ (ean = ‘9002490100070’(A)))

3.

∏ ( ‘total’ ( superCategoryName G count() -> total ( δ( superCategoryName = “Sopas Take Away” (has-other)))

4.

A <- ean G count(units)->Count (Replenishment)

∏ (‘ean’, ‘descr’ (Product ⋈ (G max(count) ->Count(A) ⋈ A))