**DATE**
July 2nd, 2018

**BACKEND CHALLENGE**

**I. SUMMARY**:
In e-commerce, a common strategy for increasing revenue is to offer cross-sell of related products on product listing pages, making it easy for a customer to complete their entire shopping experience in a smooth flow. A client is building an e-commerce website for their line of coffee machines and custom coffee pods; they are looking to cross-sell pods on the machine pages, and different sizes of pod packages on each pod page. Your task is to simulate this environment and build a cross-sell function.

**II. PRODUCT SCHEMA**:
Each machine has a non-interchangeable pod type...for example, small coffee pods cannot be used in espresso or large coffee machines.

Coffee machines

- Product type – *product_type*

    o COFFEE_MACHINE_LARGE
    o COFFEE_MACHINE_SMALL
    o ESPRESSO_MACHINE

- Water line – *water_line_compatible*

    o true
    o false Coffee pods

- Product type – *product_type*

    o COFFEE_POD_LARGE
    o COFFEE_POD_SMALL
    o ESPRESSO_POD

- Coffee flavor – *coffee_flavor*

    o COFFEE_FLAVOR_VANILLA
    o COFFEE_FLAVOR_CARAMEL
    o COFFEE_FLAVOR_PSL
    o COFFEE_FLAVOR_MOCHA
    o COFFEE_FLAVOR_HAZELNUT

- Pack size – *pack_size*

    o 1 dozen (12)
    o 3 dozen (36)
    o 5 dozen (60)
    o 7 dozen (84)

## SWENSON HE

**III. SKU LIST**

- CM001 – small machine, base model
- CM002 – small machine, premium model
- CM003 – small machine, deluxe model, water line compatible
- CM101 – large machine, base model
- CM102 – large machine, premium model, water line compatible
- CM103 – large machine, deluxe model, water line compatible
- EM001 – espresso machine, base model
- EM002 – espresso machine, premium model
- EM003 – espresso machine, deluxe model, water line compatible
- CP001 – small coffee pod, 1 dozen, vanilla
- CP003 – small coffee pod, 3 dozen, vanilla
- CP011 – small coffee pod, 1 dozen, caramel
- CP013 – small coffee pod, 3 dozen, caramel
- CP021 – small coffee pod, 1 dozen, psl
- CP023 – small coffee pod, 3 dozen, psl
- CP031 – small coffee pod, 1 dozen, mocha
- CP033 – small coffee pod, 3 dozen, mocha
- CP041 – small coffee pod, 1 dozen, hazelnut
- CP043 – small coffee pod, 3 dozen, hazelnut
- CP101 – large coffee pod, 1 dozen, vanilla
- CP103 – large coffee pod, 3 dozen, vanilla
- CP111 – large coffee pod, 1 dozen, caramel
- CP113 – large coffee pod, 3 dozen, caramel
- CP121 – large coffee pod, 1 dozen, psl
- CP123 – large coffee pod, 3 dozen, psl
- CP131 – large coffee pod, 1 dozen, mocha
- CP133 – large coffee pod, 3 dozen, mocha
- CP141 – large coffee pod, 1 dozen, hazelnut
- CP143 – large coffee pod, 3 dozen, hazelnut
- EP003 – espresso pod, 3 dozen, vanilla
- EP005 – espresso pod, 5 dozen, vanilla
- EP007 – espresso pod, 7 dozen, vanilla
- EP013 – espresso pod, 3 dozen, caramel
- EP015 – espresso pod, 5 dozen, caramel
- EP017 – espresso pod, 7 dozen, caramel

**IV. USE CASES**

The first task is to determine what the return array should look like for the certain cross- sell scenarios (see reference examples).

- All large machines

  - CM101
  - CM102
  - CM103

- All cross-sell for large machine, smallest per flavor

  - CP101
  - CP111
  - CP121
  - CP131
  - CP141

- All choices on espresso vanilla landing page

  - EP003
  - EP005
  - EP007

- All espresso machines

  - ?

- All cross-sell for espresso machine, smallest per flavor

  - ?

- All choices on general vanilla landing page, smallest per product type

  - ?

**V. FUNCTION IMPLEMENTATION**

Implement a function (or multiple functions) to return cross-sell items for machines and pods as in the use cases above.

If possible, provide a way to test on a demo environment, preferably an API server endpoint (or multiple endpoints) that queries the results from a database.

Your code will be evaluated on cleanliness, organization, completeness, extensibility, and testability, among other factors. Good luck!