**Case Study: Hardware**

You are a manager of product development for an online storefront and retailer. You have been tasked with coming up with a solution to a particular problem in the clothing department of your company’s storefront.

Customer experience in this particular department is below your company’s standards. The reason, as formulated by a task force examining customer feedback, is item organization. Your company has traditionally permitted sellers to categorize their own items for sale, but the categorization systems are not consistent across sellers. Customers report frustration at having to search across multiple categories—such as “shoes”; “boots”; and “athletic footwear”—for a specific item.

A quality control (QC) team has been hired to correct the categorization by hand, but your inventory boasts literally hundreds of thousands of unique items. Therefore, your team has been asked to supplement the QC effort through AI, by means of building a semi-supervised classifier.

1. What kind(s) of hardware are best suited to your task? Does that hardware include CPUs, GPUs, and/or FPGAs? Explain your reasoning.

* Then, using a flowchart, sketch a plan for a plausible hardware approach to the problem of item categorization.
* Include whether your plan includes Datacenters, Gateways, and/or Edge Devices, and describe their interactions with each other.

Your clothing classifier scheme is a success. As a result, your team has been asked to develop a new, related product. Your company has learned that customers would be interested in having the ability to take a photo, on a mobile device, of a particular clothing item and have it matched with your company’s inventory. The user would be queried and served with that precise item if you have it in stock, or with similar items.

2. The customer’s phone should be considered what type of compute engine?

* Revise your sketched plan in Question 1 to include a new node representing customers’ mobile devices. Be sure to mark which notes are used for model training and which for model inference.
* Describe how data gathered from customer queries could be used to improve the models over time. Trace the steps which new observations and updated models would take through your hardware system, and describe the compute engine to be used at each step.