<u>Project/Design Proposal</u>

<u>Project Overview:</u>

The purpose of my project is to create an inventory simulation. I am choosing "inventory" as the topic for my simulation because I was a receiving manager/inventory analyst for a retail company at my previous job. The purpose of my simulation is to demonstrate the constant fluctuations and inventory-related events that may occur on a daily basis (during a specific season) at a retail store. Retail is a business that is heavily dependent on seasons; the different holidays that occur during each season have a huge impact on a retail store's inventory. The purchases that a consumer makes are heavily influenced by the current season, and this, in turn, impacts a store's inventory. My project will strive to simulate this behavior.

In short, the simulation will showcase a retail store's inventory (made up of different products/ SKUs) across all 4 seasons. It will simulate 3 types of "inventory events" that may occur on a daily basis during a given season, across 3 different store departments. The simulation will cover a time span of 25 days (time periods).

<u>Implementation:</u>

The foundational component that will be needed to implement the framework of my project is my data structure. I will be using an std::map, which will hold inventory identifiers for different SKUs/products for each of the various seasons.

The **key** in my std::map will be the name of any of the 4 seasons: Spring, Summer, Fall, and Winter. This will be represented as a string value.

The **value** in my std::map will be an std::array of std::lists. My std::array will hold 3 std::lists, and each of these std::lists will represent a different department (that holds products/SKUs) within the retail store: Electronics, Clothing, and Groceries.

I will create an input file with all the necessary inventory data that my program will utilize. I plan to have each line in my input file follow this type of structure:

Winter,clothing,sweater (no spaces between commas, case sensitive)

Winter is the season (key, 4 to choose from), clothing is the department (value, 3 to choose from), and sweater is the product name/SKU that is associated with that particular department.

The products/SKUs within each department will be the same across seasons (and will therefore be the same in my input file). This helps to highlight how the simulation can impact the same product differently, depending on its season.

Simulated Events:

My simulation will focus on 3 events that can occur within any given time period.

My **time periods** (25) will represent days. I am choosing to represent the time periods as days because inventory fluctuations/events are best measured on a daily basis. Deliveries happen daily, items sell daily, etc.

The 3 simulated events will be:
1. Delivery of a product to any given department. The product does not have to be completely out of stock for another delivery to occur; sometimes, more product is delivered in order to "top off" the existing stock.
2. Purchase/sale of any given product by a customer.
3. Theft of any given product (I encountered a lot of theft at my previous job, that is why I am choosing to implement this situation as one of the simulated events.)

How the simulation will take place: a random number of any of these 3 events can occur daily (within a time period). The season, department (with its associated product/SKU), and type of event are also chosen randomly. I will create a function to perform this simulation.

For each season, the simulation will show what happens to the products throughout the day (each time period). For example, a department could receive a delivery of a product, a customer could buy a product, and/or a product could be stolen.