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Programming 3 – Assignment 1 – Task 2 – Threads

Description of the chosen scenario

The chosen scenario is a Pizza Store. There is a Pizza Making Machine that accepts orders either a Mushroom Pizza or an Anchovy Pizza from customers. The Pizza Making Machine also processes requests to replenish the supplies/ingredients to make the pizzas. Each of the ingredients have a storage limit. So once the storage limit for a particular ingredient is met, that ingredient cannot be replenished until the ingredient's current amount is less than the storage limit.

The ingredients are as follows:

Ingredient	Storage Limit
Garlic	6
Olives	8
Mushrooms	10
Anchovies	6

It should also be noted that a particular pizza has a recipe and requires certain number of ingredients in order to be made. The recipes are as follows:

Mushroom Pizza	
Ingredient	**Number Required**
Garlic	1
Olives	0
Mushrooms	4
Anchovies	0

Anchovy Pizza	
Ingredient	**Number Required**
Garlic	2
Olives	2
Mushrooms	0
Anchovies	3

If the number of ingredients required to make a pizza is not met, the pizza cannot be made and the creation of other similar pizzas will have to wait.

Name of the classes, methods, and objects that exists in the program

The main program is named Main.java. It has two types of Runnable objects that are run: ReplenishSuppliesRunnable and OrderRunnable.
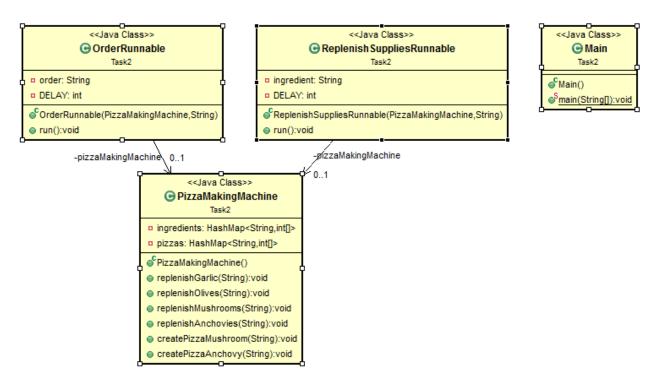
ReplenishSuppliesRunnable can take ingredient names and it will replenish that ingredient's supplies in the Pizza Making Machine.

OrderRunnable can take Pizza Order names and will take care of creating the specified pizza.

The main class that does all the logic is the PizzaMakingMachine.
It has a constructor that initializes the current number of ingredients and the pizza recipes.
It also has methods for replenishing the ingredient supplies and a method for creating a specified pizza.

Explanation as to how multithreading functionality is achieved

Multithreading is implemented for the replenishing of ingredients and the creation of pizzas. The replenishing of ingredients and creation of pizzas run concurrently, meaning the replenishment of the ingredients can happen at the same time as the creation of the pizzas. This kind of concurrency is needed so that pizzas can still be created when the ingredients run out, as the replenish supplies keeps the number of supplies updated.

Discussion on why you implemented Synchronization to your objects

In the PizzaMakingMachine, the replenish ingredient methods and create pizza method all have the synchronized keyword. This was done so that only one thread can make a particular pizza or refill a particular ingredient. This will prevent discrepancies in the current number of ingredients as access to the methods are locked until a thread finishes its execution of it. It could also be noticed that specific methods for replenishing each type of ingredient and creating each type of pizza was made. Before, only one method handles replenishment and one method handles the creation of a pizza. However, this will prevent the replenishment of ingredients or creation of pizzas that are not dependent on the current ingredient being replenished or pizza being created. For example, if there is only one replenish method, if the garlic is currently waiting for its current value to go below the storage limit, the other ingredients won't get their chance to be replenished given that they should not be dependent on the replenishment of garlic to proceed.

Screenshot illustrating the execution of the program