**// Challenging &  Real World Exercises**

**// Q NO: 01 Grocery Store Inventory**

class Product {

    String name;

    double price;

    int quantity;

public Product(String name, double price, int quantity) {

        this.name = name;

        this.price = price;

        this.quantity = quantity;

    }

}

class GroceryStore {

    Product[] inventory;

public GroceryStore(int size) {

        this.inventory = new Product[size];

    }

// Add Product

public void addProduct(Product product) {

        for (int i = 0; i < inventory.length; i++) {

            if (inventory[i] == null) {

                inventory[i] = product;

                System.out.println("Product added to inventory: " + product.name);

                return;

            }

        }

        System.out.println("Inventory is full");

    }

// Sell Product

public void sellProduct(String productName) {

        for (Product product : inventory) {

            if (product != null && product.name.equals(productName)) {

                if (product.quantity > 0) {

                    product.quantity--;

                    System.out.println("Sold 1 unit of " + productName);

                } else {

                    System.out.println("Insufficient stock " + productName);

                }

                return;

            }

        }

        System.out.println("Product not found!");

    }

// Search Product

    public void searchProduct(String productName) {

        for (Product product : inventory) {

            if (product != null && product.name.equals(productName)) {

                System.out.println("Product Details: Name: " + product.name + ", Price: " + product.price + ", Quantity in Stock: " + product.quantity);

                return;

            }

        }

        System.out.println("Product not found.");

    }

// Print Inventory Report

public void printInventoryReport() {

        System.out.println("Inventory Report:");

        for (Product product : inventory) {

            if (product != null) {

                System.out.println("Product: " + product.name + ", Price: " + product.price + ", Quantity: " + product.quantity);

            }

        }

    }

}

public class Main {

    public static void main(String[] args) {

        GroceryStore store = new GroceryStore(5);

Product product1 = new Product("Apple", 50, 50);

        Product product2 = new Product("Banana", 20, 100);

store.addProduct(product1);

       store.addProduct(product2);

store.sellProduct("Apple");

store.searchProduct("Banana");

store.printInventoryReport();

    }

}

**// Q No: 02 Online Shopping Cart**

package shoppingcart;

public class Product {

    String name;

    int price;

    int quantity;

public Product(String name, int price, int quantity) {

        this.name = name;

        this.price = price;

        this.quantity = quantity;

    }

public String getName() {

        return name;

    }

public int getPrice() {

        return price;

    }

public int getQuantity() {

        return quantity;

    }

public void setName(String name) {

        this.name = name;

    }

public void setPrice(int price) {

        this.price = price;

    }

public void setQuantity(int quantity) {

        this.quantity = quantity;

    }

    public String toString() {

        return "name: " + getName() + " price: " + getPrice() + " quantity: " + getQuantity();

    }

}

package shoppingcart;

import java.util.\*;

public class ShoppingCart {

    private ArrayList<Product> cart;

    public ShoppingCart() {

        cart = new ArrayList<>();

    }

    // Add product

    public void addProduct(String name, int price, int quantity) {

        for (Product product : cart) {

            if (product.getName().equals(name)) {

                System.out.println(name + " product is already added");

                return;

            }

        }

        cart.add(new Product(name, price, quantity));

    }

    // Update product

    public void updateProduct(String name, String newName, int newPrice, int newQuantity) {

        for (Product product : cart) {

            if (product.getName().equals(name)) {

                product.setName(newName);

                product.setPrice(newPrice);

                product.setQuantity(newQuantity);

                return;

            }

        }

        System.out.println(name + " is not found");

    }

    // Remove product

    public void removeProduct(String name) {

        for (Product carts : cart) {

            if(carts.getName().equals(name)){

                cart.remove(carts);

                System.out.println(name +"remove successfully");

           }

        }

System.out.println(name+"is not found");

    }

    // Total bill

    public void totalBill() {

        int total = 0;

        for (Product product : cart) {

            total += product.getPrice() \* product.getQuantity();

        }

        System.out.println("Total bill: " + total);

    }

    // Display products

    public void displayProduct() {

        for (Product product : cart) {

            System.out.println(product);

        }

        System.out.println();

    }

    public static void main(String[] args) {

        ShoppingCart cart = new ShoppingCart();

        cart.addProduct("shoes", 2500, 2);

        cart.addProduct("perfume", 1000, 1);

        cart.addProduct("shirt", 800, 6);

        cart.displayProduct();

        cart.removeProduct("perfume");

        cart.displayProduct();

        cart.updateProduct("shoes","perfume",4000,1);

        cart.displayProduct();

        cart.totalBill();

    }

}

**// Q No: 03 Social Media Post**

package SocialMediaNewsFeed;

import java.time.LocalDateTime;

public class Post {

    private String author;

    private String content;

    private LocalDateTime timestamp;

    private int likes;

public Post(String author, String content) {

        this.author = author;

        this.content = content;

        this.timestamp = LocalDateTime.now();

        this.likes = 0;

    }

public String getauthor() {

        return author;

    }

public String getcontent() {

        return content;

    }

public LocalDateTime getTimestamp() {

        return timestamp;

    }

public int getLikes() {

        return likes;

    }

public void like() {

        this.likes++;

    }

    public String toString() {

        return "Author: " + author + "\nContent: " + content + "\nTimestamp: " + timestamp + "\nLikes: " + likes + "\n";

    }

}

package SocialMediaNewsFeed;

import java.util.ArrayList;

import java.util.List;

public class SocialMediaFeed {

    private ArrayList<Post> posts;

public SocialMediaFeed() {

        posts = new ArrayList<>();

    }

    // Add post

    public void addPost(Post post) {

        posts.add(0, post);

    }

// Like a post by incrementing its likes count

    public boolean likePost(String author) {

        for (Post post : posts) {

            if (post.getauthor().equals(author)) {

                post.like();

                return true;

  }

        }

        return false;

    }

    // Search for posts by a specific user and display them

    public List<Post> searchPost(String author) {

        List<Post> authorPosts = new ArrayList<>();

        for (Post post : posts) {

            if (post.getauthor().equals(author)) {

                authorPosts.add(post);

            }

        }

        return authorPosts;

    }

    // Display posts

    public void displayPosts() {

        for (Post post : posts) {

            System.out.println(post);

        }

    }

public static void main(String[] args) {

        Post post1 = new Post("sania", "Hello, this is my first post!");

        Post post2 = new Post("iqra", "It's a rainy day!");

        Post post3 = new Post("tahreem", "I love coding!");

        Post post4 = new Post("urwa", "I am Learning java:)");

SocialMediaFeed feed = new SocialMediaFeed();

        feed.addPost(post1);

        feed.addPost(post2);

        feed.addPost(post3);

feed.addPost(post4);

        System.out.println("Display the feed:");

        feed.displayPosts();

        feed.likePost("sania");

        System.out.println("\nDisplay the feed after liking sania's post:");

        feed.displayPosts();

        System.out.println("\nSearching posts by sania:");

        List<Post> saniaPosts = feed.searchPost("sania");

        for (Post post : saniaPosts) {

            System.out.println(post);

        }

    }

}

**// Q  No: 04 Restaurant Menu**

package RestaurantMenuManagement;

public class Dish {

    public String name,description,category;

    public Double price;

    Dish(String name,String description,String category,Double price){

        this.name=name;

        this.description=description;

        this.category=category;

        this.price=price;

    }

    public String getName(){

        return name;

    }

    public String getDescription(){

        return description;

    }

    public String getcategory(){

        return category;

    }

    public Double getprice(){

        return price;

    }

    public void setDescription(String description) {

        this.description = description;

    }

    public void setPrice(double price) {

        this.price = price;

    }

    public void setCategory(String category) {

        this.category = category;

    }

    public String toString() {

        return "Name: " + name + ", Description: " + description + ", Price: $" + price + ", Category: " + category;

    }

}

package RestaurantMenuManagement;

import java.util.ArrayList;

public class RestaurantMenu {

    private ArrayList<Dish> dishes;

    public RestaurantMenu() {

        dishes = new ArrayList<>();

    }

    // Find dish by name

    public Dish findDishByName(String name) {

        for (Dish dish : dishes) {

            if (dish.getName().equalsIgnoreCase(name)) {

                return dish;

            }

        }

        return null;

    }

    // Add a new dish

    public void addDish(String name, String description, String category, double price) {

        if (findDishByName(name) == null) {

            dishes.add(new Dish(name, description, category, price));

            System.out.println("Dish added successfully.");

        } else {

            System.out.println(name + ": Dish already exists.");

        }

    }

    // Display all dishes

    public void displayDishes() {

        for (Dish dish : dishes) {

            System.out.println(dish);

        }

        System.out.println();

    }

    // Modify dish details

    public void modifyDish(String name, String newDescription, String newCategory, double newPrice) {

        Dish dish = findDishByName(name);

        if (dish != null) {

            dish.setDescription(newDescription);

            dish.setCategory(newCategory);

            dish.setPrice(newPrice);

            System.out.println("Dish details modified successfully!");

        } else {

            System.out.println(name + " not found.");

        }

    }

    public static void main(String[] args) {

        RestaurantMenu menu = new RestaurantMenu();

        menu.addDish("Cake", "Caramel", "Dessert", 27.99);

        menu.addDish("Pasta", "Creamy Alfredo pasta", "Main Course", 12.99);

        menu.addDish("Caesar Salad", "Fresh Caesar salad", "Appetizer", 8.99);

        menu.addDish("Tiramisu", "Classic Italian dessert", "Dessert", 6.99);

        System.out.println("Displaying dishes by category:");

        menu.displayDishes();

        System.out.println("Modifying 'Pasta' details:");

        menu.modifyDish("Pasta", "Delicious creamy Alfredo pasta", "Main Course", 13.99);

        menu.displayDishes();

    }

}

**// Q No: 05 Music Playlist**

package MusicPlaylistOrganizers;

public class Song {

    private String title;

    private String artist;

    private String genre;

    private int duration;

    public Song(String title, String artist, String genre, int duration) {

        this.title = title;

        this.artist = artist;

        this.genre = genre;

        this.duration = duration;

    }

    public String getTitle() {

        return title;

    }

    public String getArtist() {

        return artist;

    }

    public String getGenre() {

        return genre;

    }

    public int getDuration() {

        return duration;

    }

    public String toString() {

        return "Title: " + title + "\nArtist: " + artist + "\nGenre: " + genre + "\nDuration: " + duration + " seconds";

    }

}

package MusicPlaylistOrganizers;

import java.util.\*;

public class MusicPlay {

    private List<Song> playlist;

    public MusicPlay() {

        this.playlist = new ArrayList<>();

    }

    public void addSong(Song song) {

        if (!playlist.contains(song)) {

            playlist.add(song);

        } else {

            System.out.println("Song '" + song.getTitle() + "' by " + song.getArtist() + " is already in the playlist.");

        }

    }

    public boolean removeSong(String title) {

        for (Song song : playlist) {

            if (song.getTitle().equals(title)) {

                playlist.remove(song);

                return true;

            }

        }

        return false;

    }

    public void shufflePlaylist() {

        Collections.shuffle(playlist);

    }

    public List<Song> createGenrePlaylist(String genre) {

        List<Song> genrePlaylist = new ArrayList<>();

        for (Song song : playlist) {

            if (song.getGenre().equals(genre)) {

                genrePlaylist.add(song);

            }

        }

        return genrePlaylist;

    }

    public void printPlaylist() {

        if (playlist.isEmpty()) {

            System.out.println("The playlist is empty.");

        } else {

            for (Song song : playlist) {

                System.out.println(song);

            }

        }

    }

public static void main(String[] args) {

        Song song1 = new Song("ABC", "123", "Pop", 250);

        Song song2 = new Song("DEF", "456", "Pop", 200);

        Song song3 = new Song("GHI", "789", "holi", 350);

        Song song4 = new Song("JKL", "435", "holi", 150);

        MusicPlay player = new MusicPlay();

        player.addSong(song1);

        player.addSong(song2);

        player.addSong(song3);

        player.addSong(song4);

        System.out.println("\nInitial playlist:");

        player.printPlaylist();

        player.removeSong("DEF");

        System.out.println("\nPlaylist after removing 'DEF':");

        player.printPlaylist();

        player.shufflePlaylist();

        System.out.println("\nPlaylist after shuffling:");

        player.printPlaylist();

        List<Song> popPlaylist = player.createGenrePlaylist("Pop");

        System.out.println("\nPop genre playlist:");

        for (Song song : popPlaylist) {

            System.out.println(song);

        }

    }

}