Persistence

An Introduction to the CRUD Process

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Topic List

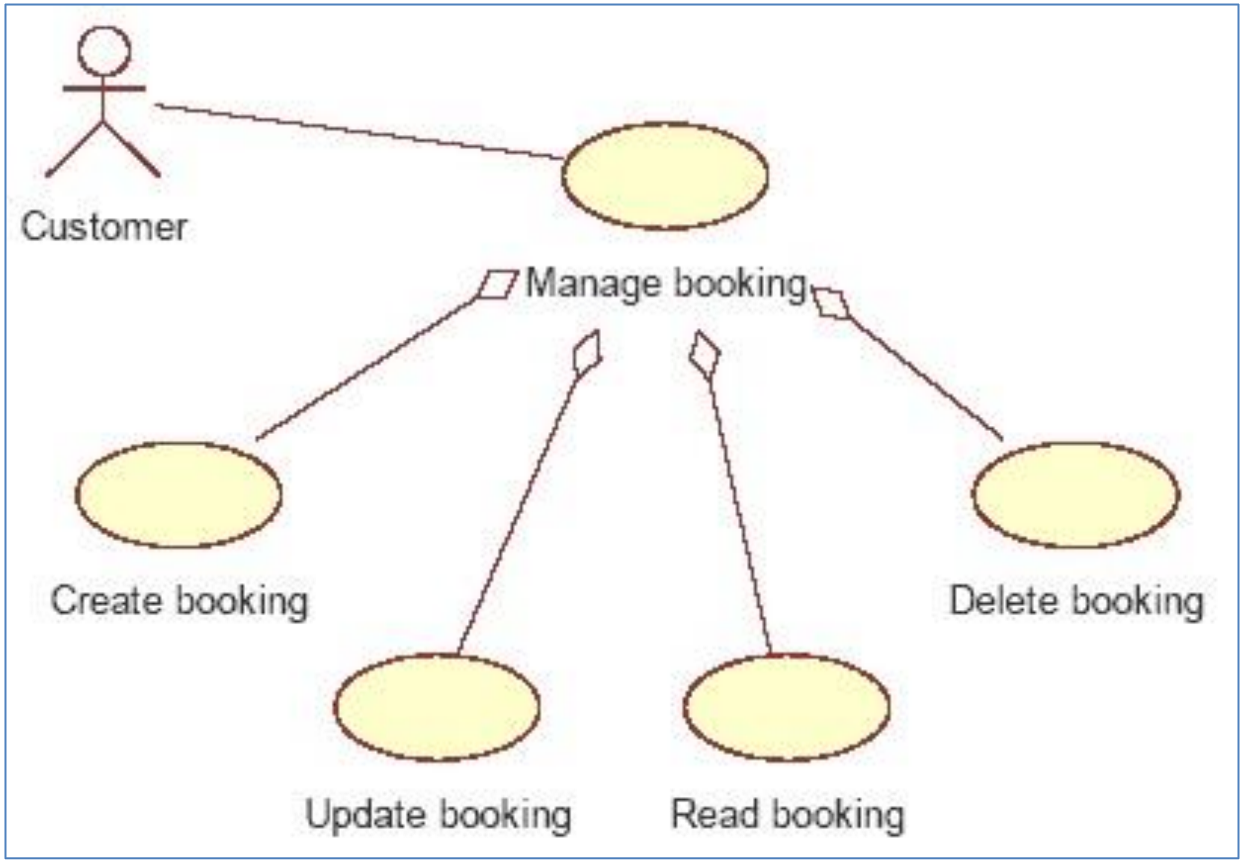
- What is CRUD?
- Shop V3.0 – a recap
- Shop V4.0 (Driver.java):
  - revised menu
  - recap of case 1 (add a product)
  - recap of case 2 (list a product)
  - coding case 4 (delete a product)
  - coding case 3 (update a product)

CRUD

The four basic functions of **persistent storage**:

- Create or add new objects
- Read, retrieve or search for existing objects
- Update or edit existing objects
- Delete existing objects

CRUD – Example



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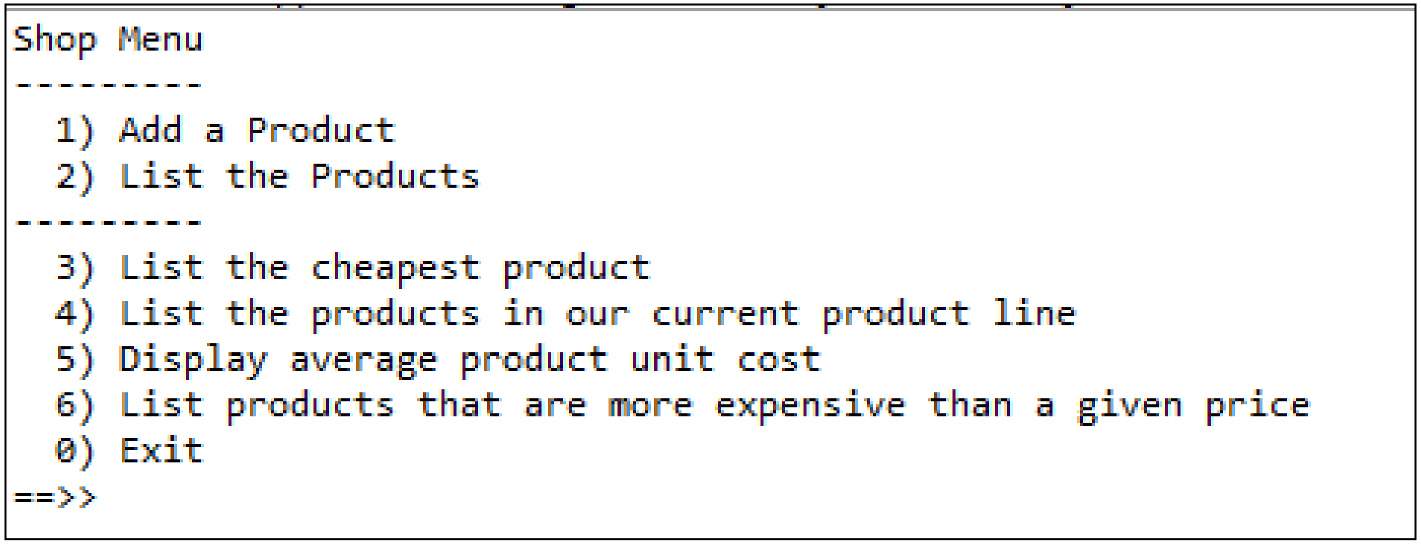
Shop V3.0 – a recap

- Three classes:
  - Driver (runs the menu, contains the main method)
  - Product
    - Four instance fields, productName, productCode, unitCost, inCurrentProductLine.
    - Basic class with Constructors, Getters, Setters and toString methods.
  - Store:
    - One instance field, products (an ArrayList of Product).
    - Has many additional methods such as listProducts, cheapestProduct, listCurrentProducts, etc.

Shop V3.0 – a recap

- Create a Product: Menu Option 1.
- Read a Product(s): Menu Options 2 - 6.
- The menu has NO Update or Delete!



```
Shop Menu
----------
  1) Add a Product
  2) List the Products
----------
  3) List the cheapest product
  4) List the products in our current product line
  5) Display average product unit cost
  6) List products that are more expensive than a given price
  0) Exit
==>>
```

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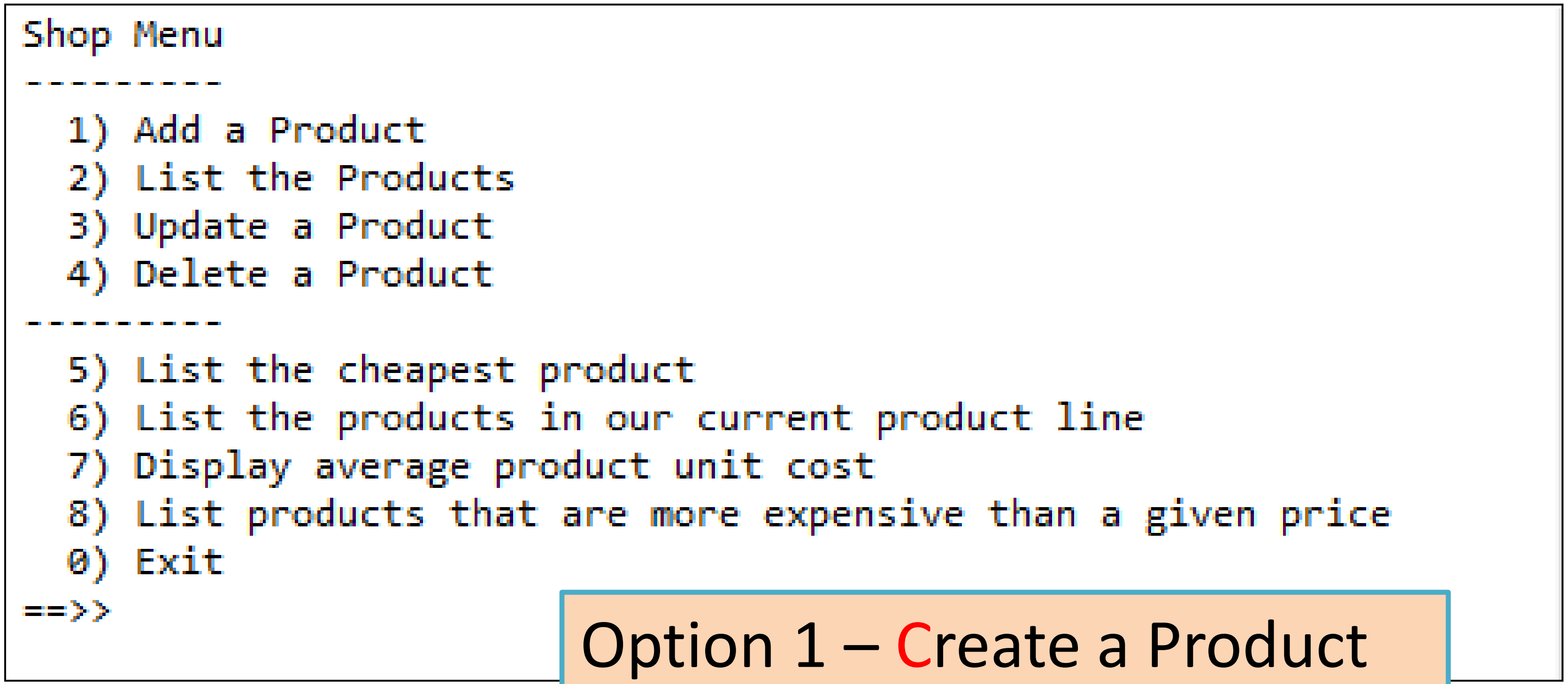
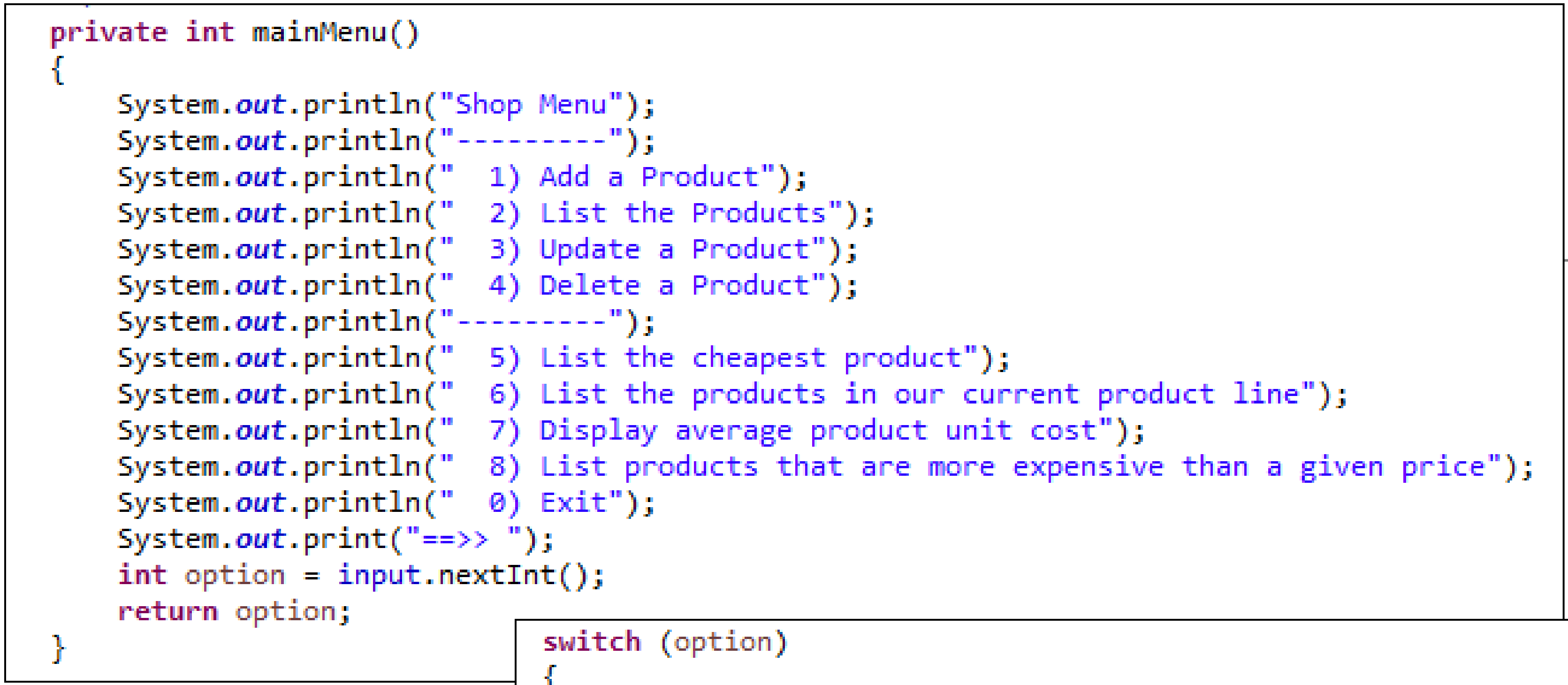
Shop V4.0 – Revised Menu



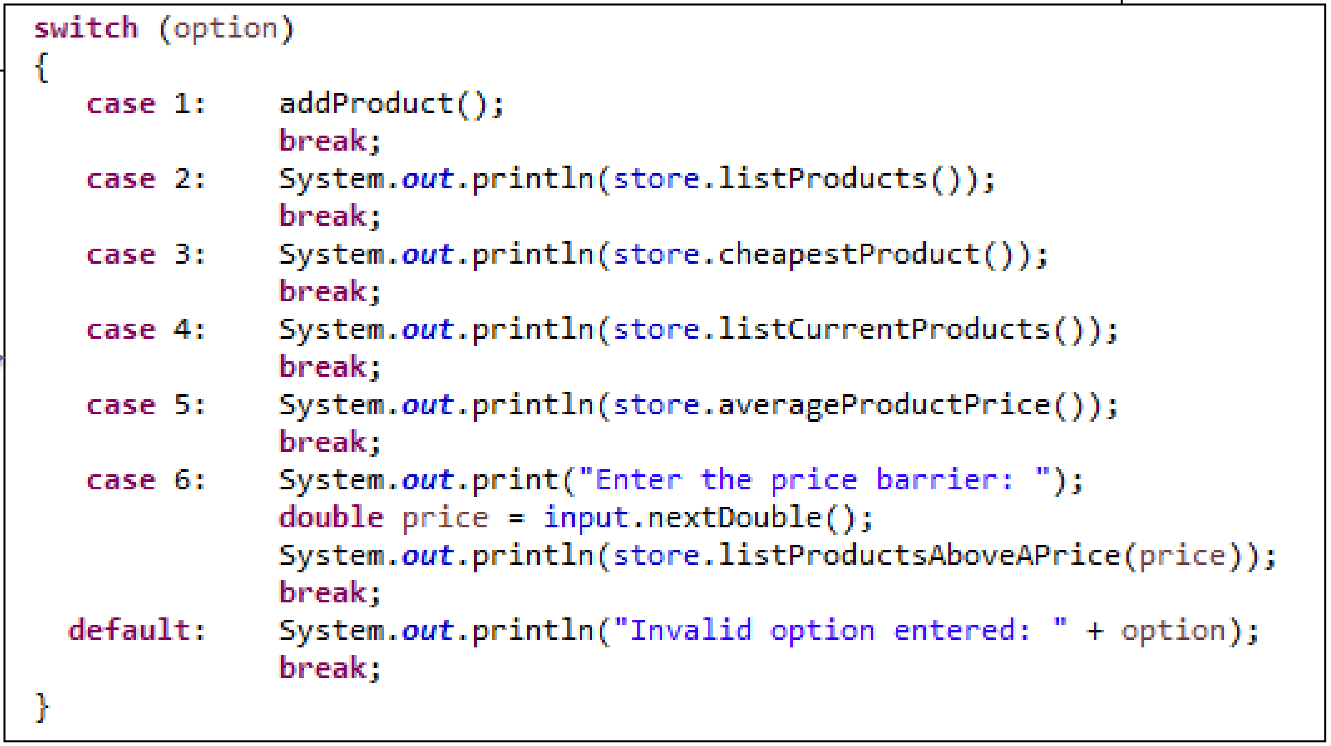
```
Shop Menu
----------
  1) Add a Product
  2) List the Products
  3) Update a Product
  4) Delete a Product
----------
  5) List the cheapest product
  6) List the products in our current product line
  7) Display average product unit cost
  8) List products that are more expensive than a given price
  0) Exit
==>>
```

Option 1 – Create a Product
Option 2 – Read products
Option 3 – Update a product
Option 4 – Delete a product



```java
private int mainMenu()
{
    System.out.println("Shop Menu");
    System.out.println("---------");
    System.out.println("  1) Add a Product");
    System.out.println("  2) List the Products");
    System.out.println("  3) Update a Product");
    System.out.println("  4) Delete a Product");
    System.out.println("---------");
    System.out.println("  5) List the cheapest product");
    System.out.println("  6) List the products in our current product line");
    System.out.println("  7) Display average product unit cost");
    System.out.println("  8) List products that are more expensive than a given price");
    System.out.println("  0) Exit");
    System.out.print("==>> ");
    int option = input.nextInt();
    return option;
}
```

We need to add code for case 3 (update) and 4 (delete) to Driver.java and move the current options for 3-6 to be 5-8.



```java
switch (option)
{
   case 1:     addProduct();
               break;
   case 2:     System.out.println(store.listProducts());
               break;
   case 3:     System.out.println(store.cheapestProduct());
               break;
   case 4:     System.out.println(store.listCurrentProducts());
               break;
   case 5:     System.out.println(store.averageProductPrice());
               break;
   case 6:     System.out.print("Enter the price barrier: ");
               double price = input.nextDouble();
               System.out.println(store.listProductsAboveAPrice(price));
               break;
  default:     System.out.println("Invalid option entered: " + option);
               break;
}
```

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Code for case 1: Add a Product

```
switch (option)
{
    case 1:     addProduct();
                break;
    case 2:     System.out.println(store.listProducts());
                break;
```

```
//gather the product data from the user and create a new product.
private void addProduct(){
    //dummy read of String to clear the buffer - bug in Scanner class.
    input.nextLine();
    System.out.print("Enter the Product Name:  ");
    String productName = input.nextLine();
    System.out.print("Enter the Product Code:  ");
    int productCode = input.nextInt();
    System.out.print("Enter the Unit Cost:  ");
    double unitCost = input.nextDouble();
    System.out.print("Is this product in your current line (y/n): ");
    char currentProduct = input.next().charAt(0);
    boolean inCurrentProductLine = false;
    if ((currentProduct == 'y') || (currentProduct == 'Y'))
        inCurrentProductLine = true;

    store.add(new Product(productName, productCode, unitCost, inCurrentProductLine));
}
```

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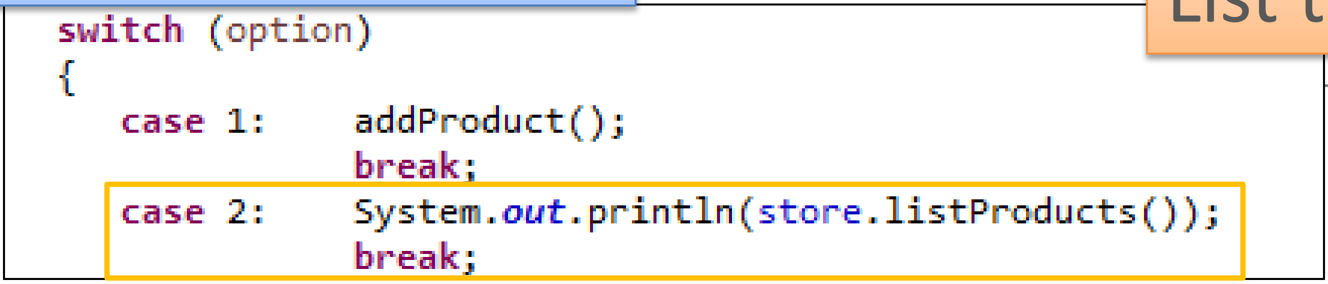
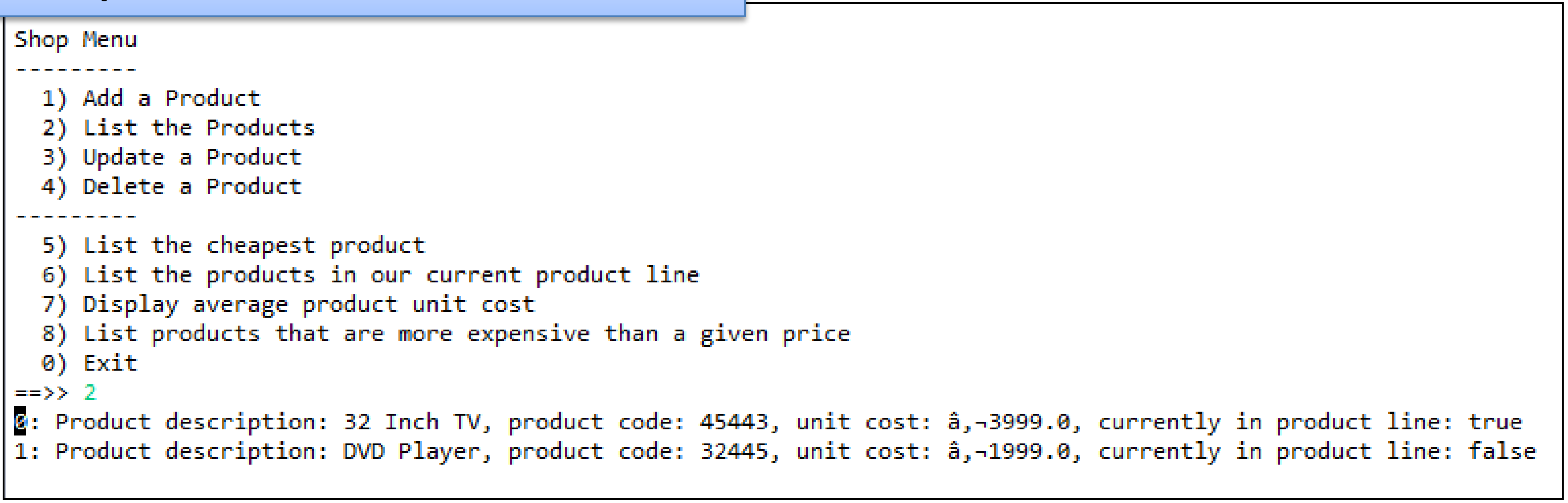
Code for case 2: List the Products

Driver.java code:



```
switch (option)
{
   case 1:     addProduct();
               break;
   case 2:     System.out.println(store.listProducts());
               break;
```

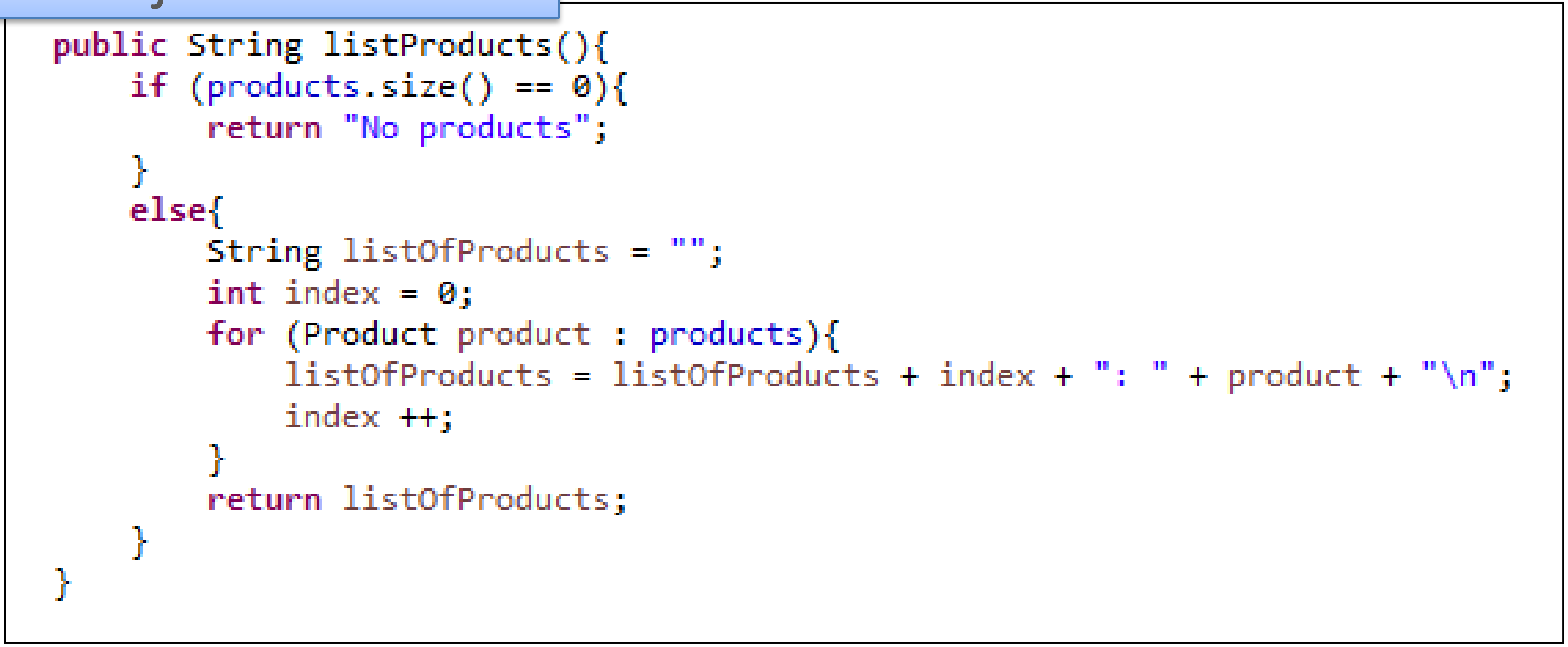
Output from case 2 call:



```
Shop Menu
---------
  1) Add a Product
  2) List the Products
  3) Update a Product
  4) Delete a Product
---------
  5) List the cheapest product
  6) List the products in our current product line
  7) Display average product unit cost
  8) List products that are more expensive than a given price
  0) Exit
==>> 2
0: Product description: 32 Inch TV, product code: 45443, unit cost: â,¬3999.0, currently in product line: true
1: Product description: DVD Player, product code: 32445, unit cost: â,¬1999.0, currently in product line: false
```

Code for case 2: List the Products

Store.java code:



```java
public String listProducts(){
    if (products.size() == 0){
        return "No products";
    }
    else{
        String listOfProducts = "";
        int index = 0;
        for (Product product : products){
            listOfProducts = listOfProducts + index + ": " + product + "\n";
            index ++;
        }
        return listOfProducts;
    }
}
```

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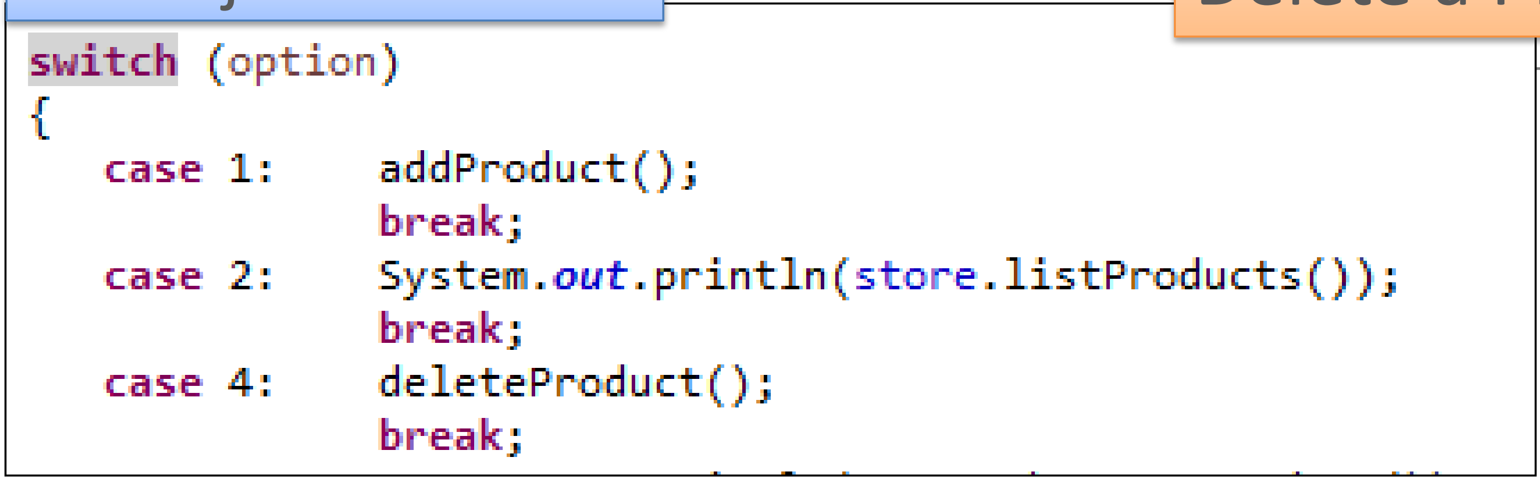
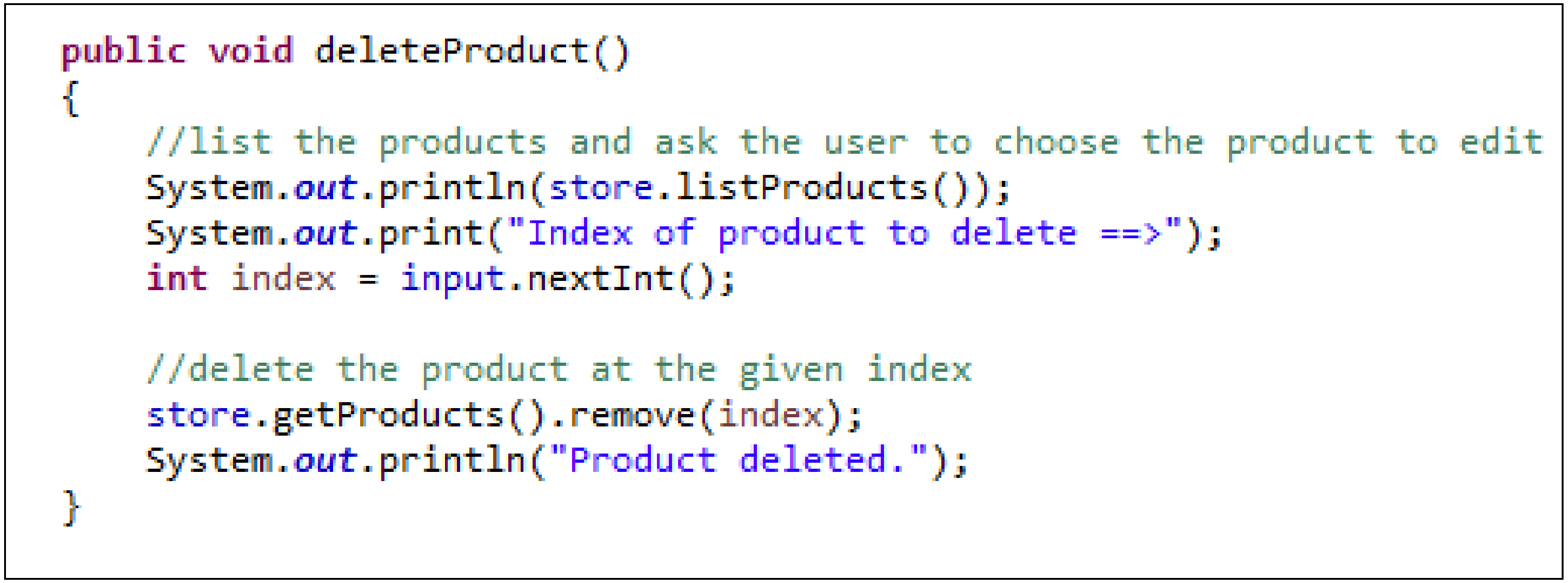
Code for case 4: Delete a Product

Driver.java code:



```
switch (option)
{
   case 1:    addProduct();
              break;
   case 2:    System.out.println(store.listProducts());
              break;
   case 4:    deleteProduct();
              break;
```

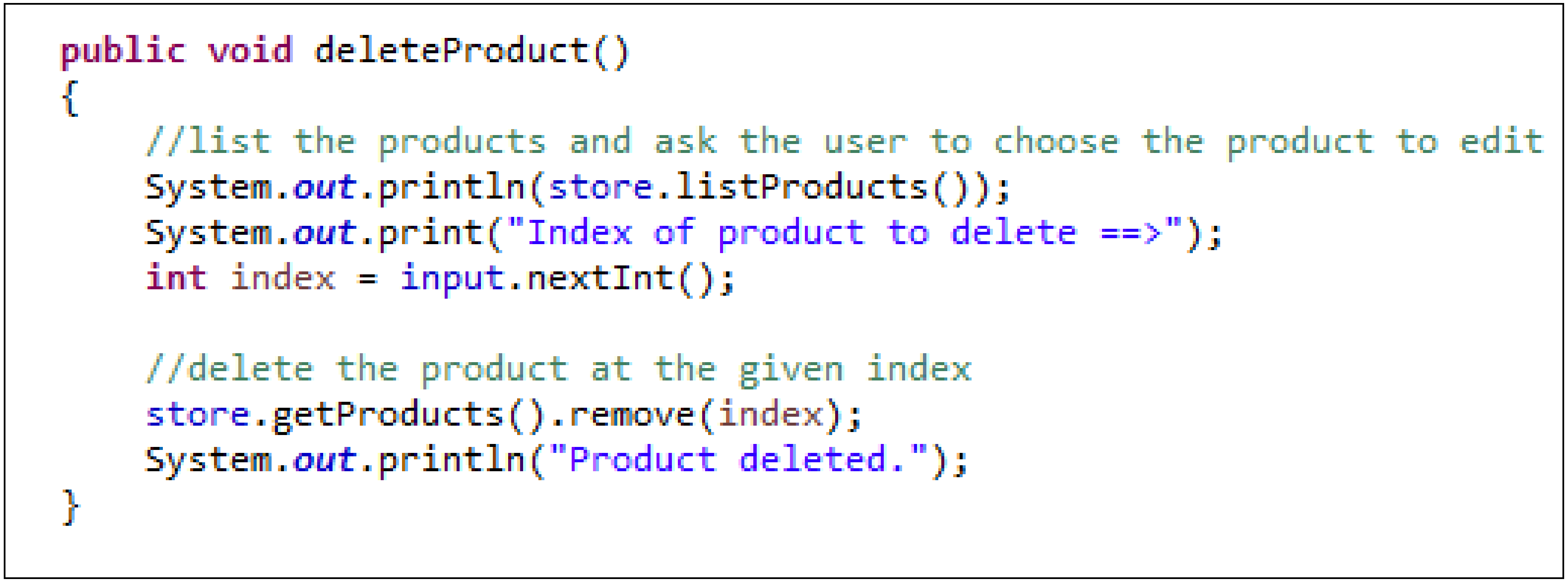


```
public void deleteProduct()
{
    //list the products and ask the user to choose the product to edit
    System.out.println(store.listProducts());
    System.out.print("Index of product to delete ==>");
    int index = input.nextInt();

    //delete the product at the given index
    store.getProducts().remove(index);
    System.out.println("Product deleted.");
}
```

The deleteProduct() method does not have any **validation**:

- What happens if there are no products in the ArrayList?
- What happens if the index number does not exist in the ArrayList?

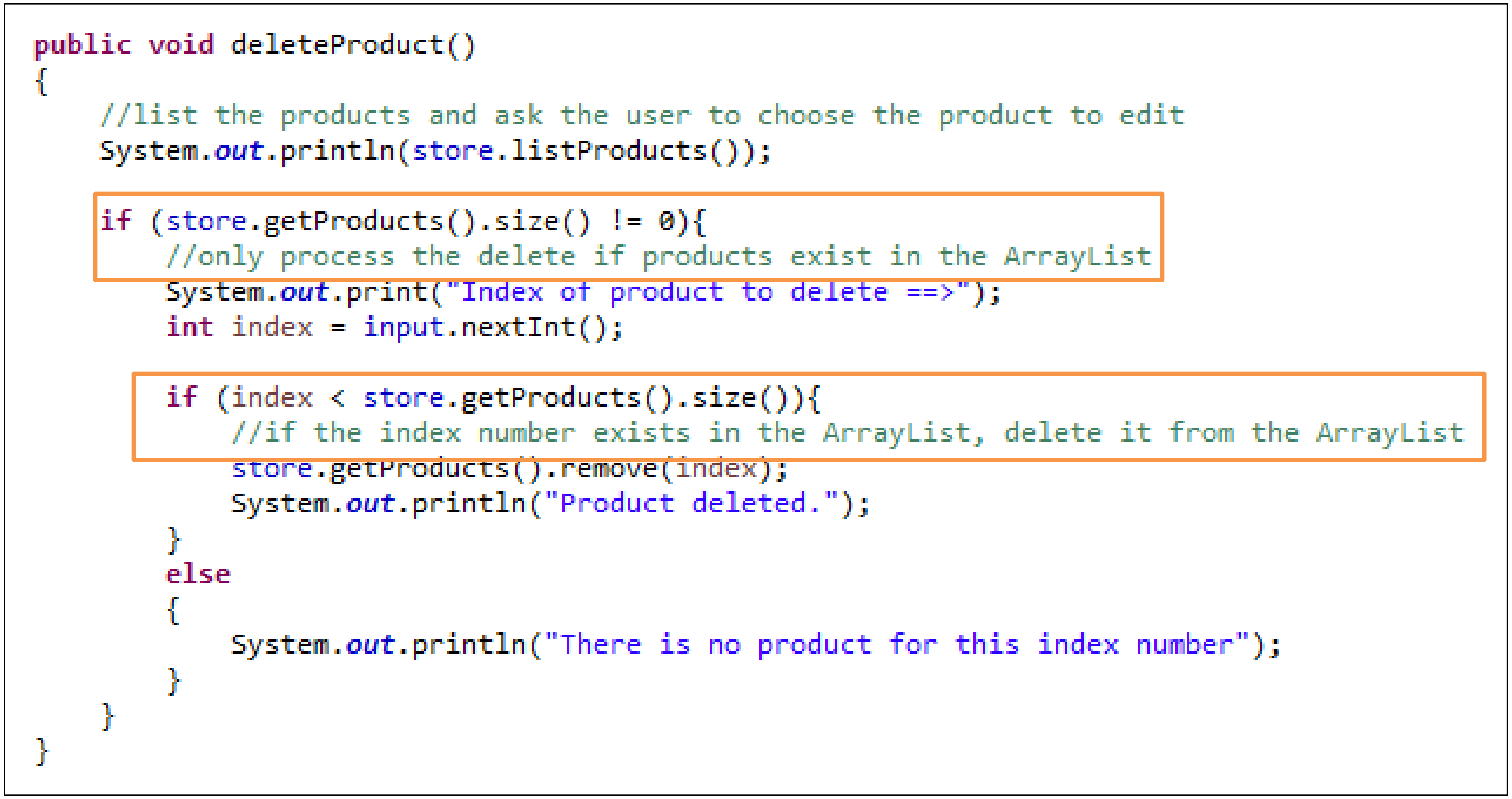


```java
public void deleteProduct()
{
    //list the products and ask the user to choose the product to edit
    System.out.println(store.listProducts());
    System.out.print("Index of product to delete ==>");
    int index = input.nextInt();

    //delete the product at the given index
    store.getProducts().remove(index);
    System.out.println("Product deleted.");
}
```

Validation:

- Only process the delete if there are products in the ArrayList and the number entered is less than the size of the ArrayList.



```java
public void deleteProduct()
{
    //list the products and ask the user to choose the product to edit
    System.out.println(store.listProducts());

    if (store.getProducts().size() != 0){
        //only process the delete if products exist in the ArrayList
        System.out.print("Index of product to delete ==>");
        int index = input.nextInt();

        if (index < store.getProducts().size()){
            //if the index number exists in the ArrayList, delete it from the ArrayList
            store.getProducts().remove(index);
            System.out.println("Product deleted.");
        }
        else
        {
            System.out.println("There is no product for this index number");
        }
    }
}
```

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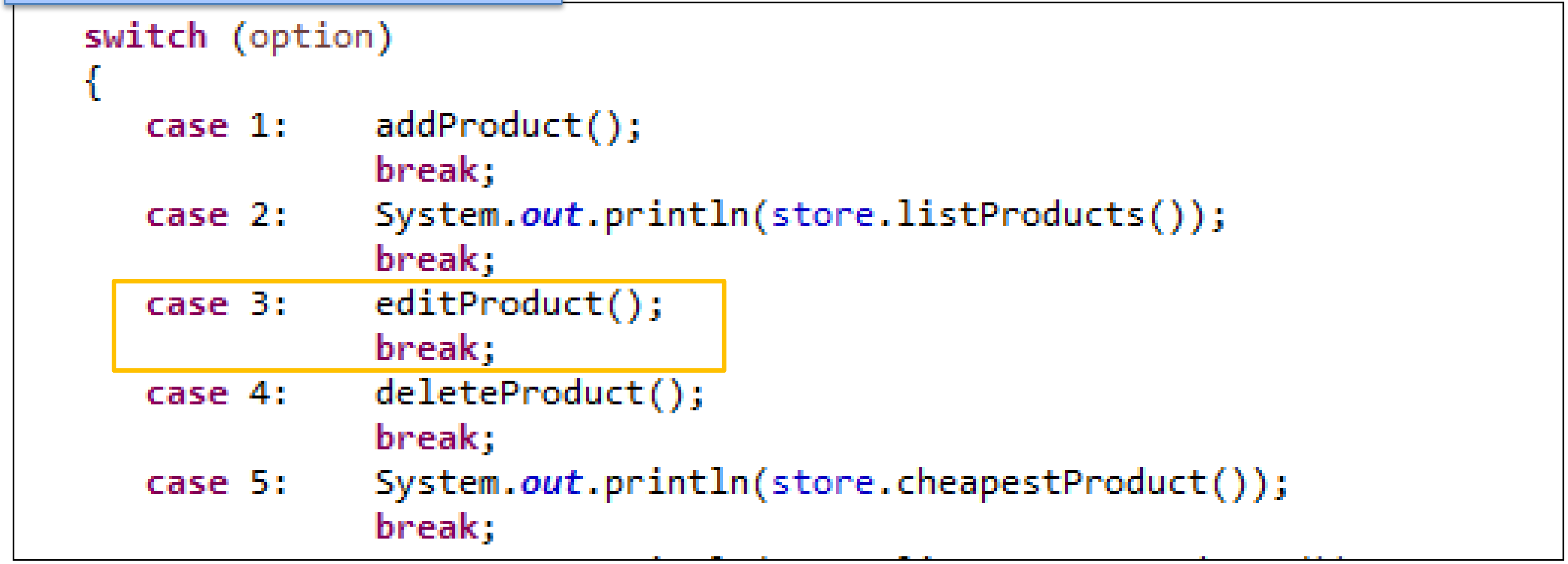
Coding case 3: Updating a Product

Driver.java code:



```
switch (option)
{
   case 1:    addProduct();
              break;
   case 2:    System.out.println(store.listProducts());
              break;
   case 3:    editProduct();
              break;
   case 4:    deleteProduct();
              break;
   case 5:    System.out.println(store.cheapestProduct());
              break;
```

Driver.java code:

Coding case 3: Updating a Product

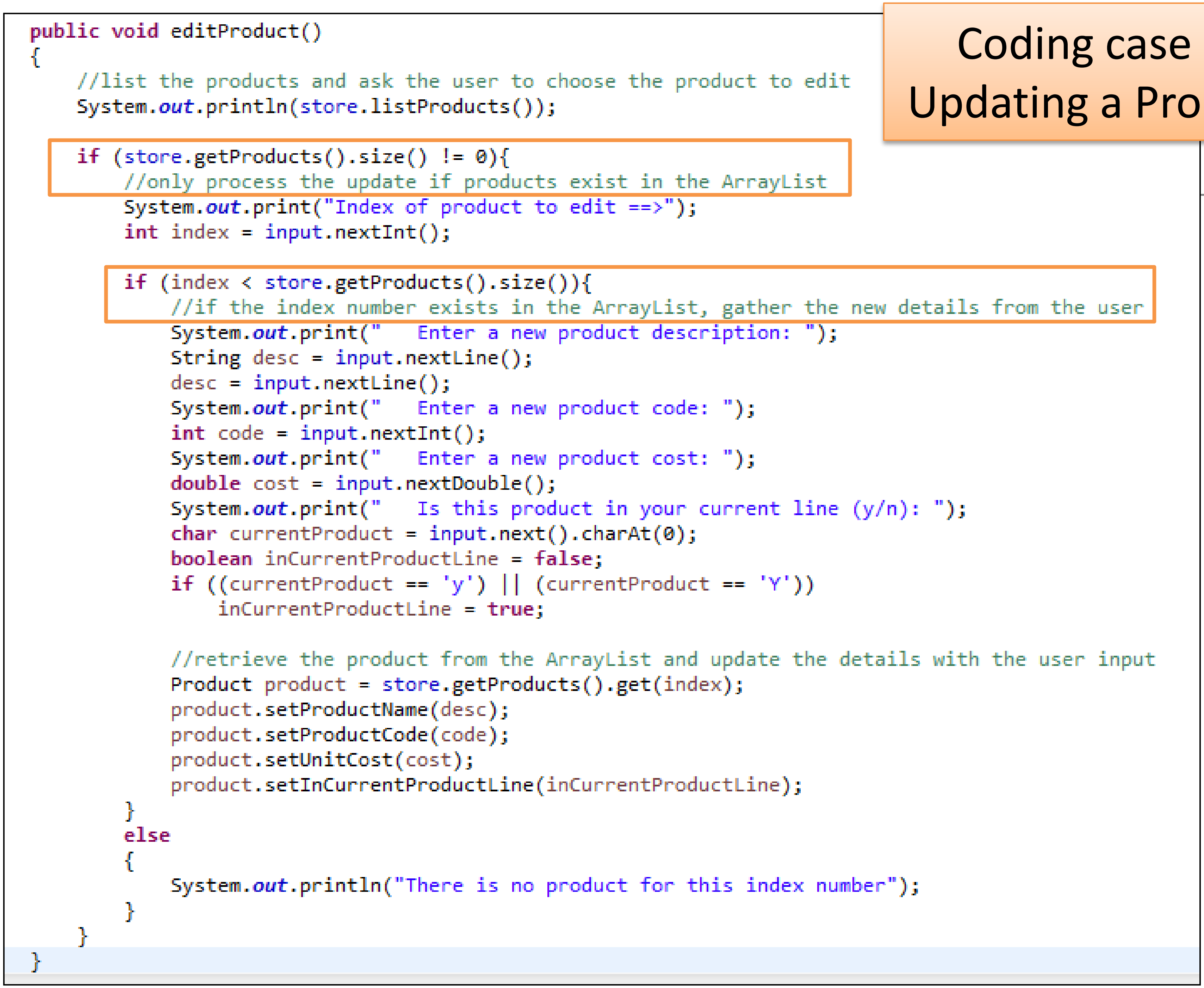
```java
public void editProduct()
{
    //list the products and ask the user to choose the product to edit
    System.out.println(store.listProducts());
    System.out.print("Index of product to edit ==>");
    int index = input.nextInt();

    //gather the new details from the user
    System.out.print("   Enter a new product description: ");
    String desc = input.nextLine();
    desc = input.nextLine();
    System.out.print("   Enter a new product code: ");
    int code = input.nextInt();
    System.out.print("   Enter a new product cost: ");
    double cost = input.nextDouble();
    System.out.print("   Is this product in your current line (y/n): ");
    char currentProduct = input.next().charAt(0);
    boolean inCurrentProductLine = false;
    if ((currentProduct == 'y') || (currentProduct == 'Y'))
        inCurrentProductLine = true;

    //retrieve the product from the ArrayList and update the details with the user input
    Product product = store.getProducts().get(index);
    product.setProductName(desc);
    product.setProductCode(code);
    product.setUnitCost(cost);
    product.setInCurrentProductLine(inCurrentProductLine);
}
```

The editProduct() method does not have any **validation** in it:

- What happens if there are no products in the ArrayList?
- What happens if the index number does not exist in the ArrayList?

Coding case 3: Updating a Product

Coding case 3: Updating a Product



```java
public void editProduct()
{
    //list the products and ask the user to choose the product to edit
    System.out.println(store.listProducts());

    if (store.getProducts().size() != 0){
        //only process the update if products exist in the ArrayList
        System.out.print("Index of product to edit ==>");
        int index = input.nextInt();

        if (index < store.getProducts().size()){
            //if the index number exists in the ArrayList, gather the new details from the user
            System.out.print("    Enter a new product description: ");
            String desc = input.nextLine();
            desc = input.nextLine();
            System.out.print("    Enter a new product code: ");
            int code = input.nextInt();
            System.out.print("    Enter a new product cost: ");
            double cost = input.nextDouble();
            System.out.print("    Is this product in your current line (y/n): ");
            char currentProduct = input.next().charAt(0);
            boolean inCurrentProductLine = false;
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                inCurrentProductLine = true;

            //retrieve the product from the ArrayList and update the details with the user input
            Product product = store.getProducts().get(index);
            product.setProductName(desc);
            product.setProductCode(code);
            product.setUnitCost(cost);
            product.setInCurrentProductLine(inCurrentProductLine);
        }
        else
        {
            System.out.println("There is no product for this index number");
        }
    }
}
```

Any Questions?

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