

## Lab 9 Activities

### Activity 1.

Suppose we want to have an object-oriented design for an invoicing system, that includes invoices, one or more line items in each invoice, address of the invoice, list of products, etc. Try to design this system by indicating the required classes, responsibilities of each class, and the collaborating classes to fulfill each responsibility, and draw the CRC cards as well as UML diagram of the classes and their relationships. Then, indicate the methods of each class, provide Java documentation for each method, and then implement the classes. Beside any methods you realize, make sure you have the following functionalities for this system:

- A method to format the invoice and return it as a String.
- A method to compute and return the amount due of an invoice.
- A method to add one LineItem object to the invoice.
- A method to format a given LineItem object and return it as a String.
- A method to format the Address object and return it as a String.
- Two methods to change/set the values of description and unit price of the Product object.

### Activity 2.

In the previous activity, you completed the invoice creation and print tasks. Now, suppose that you want an extra functionality into the requirements as follows: You are asked to keep the available quantity of every product, and at the time of creating a new line item, you should check if enough number of quantity of the given product is available. Otherwise, you should change a flag for that product that indicates “OutOfStock” and ignore adding the new line item into the invoice.

Try to modify the corresponding classes to fulfill this new requirement.

### Activity 3.

Complete the generic class Pair, that we had in the class, by providing all the required setter and getter methods. Also, override the toString method to have a nice string representation of a given instance object of this class. Override the equals method as well. In a tester class, first test the methods you have provided for this class. Then, create an ArrayList of a Pair with the first element as String and the second element as an ArrayList of String. Then, use this ArrayList to keep some English words and their synonyms. Also, try to list the content of the list, alphabetically sorted.