Java Programming

3-3: Collections – Part 2

Practice Activities

Lesson Objectives:

- Implement a HashMap
- Implement a stack by using a deque
- Define a link list
- Define a queue
- Implement a comparable interface

Vocabulary:

Identify the vocabulary word for each definition below.

	A double-ended queue; a queue that can add and remove elements to the front or back of the list.
	The links of a LinkedList.
	An interface used to define a group of objects. This includes lists and sets.
	Maps that link a Key to a Value and may have duplicate Keys but cannot have duplicate Values.
	A list of elements that is dynamically stored.
	A list of elements with a first in first out ordering.

Try It/Solve It:

1. What is the difference between a Queue and a Stack? Give an example of each.

2. Below is a user implementation of a Stack using an ArrayList, create its implementation!
    a. Create a project named genericstack
    b. Create a class named GenericStackException that extends RuntimeException
        - Create a public constructor that accepts a String message parameter that gets passed to the super constructor.
    c. Create a class named GenericStack that uses the generic T as its parameter.
        - It has 2 local fields the ArrayList of T named items and an int variable top that keeps track of the top element in the list.
        - Create a single constructor that accepts no parameters and sets top to zero.

d. Create the following methods in the GenericStack class:

   - **isEmpty** – a private method that returns a Boolean value of true if the Stack is empty (top is zero).
   - **push** - adds an item to the Stack and increments the value of top.
   - **pop** - removes an item from the stack and updates the value of top.
     - if pop attempts to remove from an empty stack (use the method that you created earlier to check this) then the custom exception GenericStackException should be thrown to display the message "Underflow Error" to the console.
     - If the stack is not empty, then the item at the top of the stack should be returned and the value of top should be decremented. This should be done in a single return statement.

e. Create a driver class called StackDriver that Includes a main method that will add 1, 2, 3 and 4 to the stack and then attempt 5 pops. Each pop should be displayed to screen.

3. Is it possible to add nodes to the beginning of a LinkedList? If so, how? What about adding a node to the end of a LinkedList? If this can be done, what method would be used?

4. What is the purpose of implementing the Comparable interface in one of our classes?

5. You are going to use a collection to store courses and their codes. Using the most appropriate collection to store the following information.

Code	**Course**
CIT	Computing and Information Technology
CHI	Childcare and Early Education
MVS	Motor Vehicle Systems
BTH	Beauty Therapy
GDE	Graphic Design

   a. Print out the list of courses.

   b. Use the get method on one of the course codes to get the course name.