CSP2348/CSP5243 Data Structures

Tutorial 10: Abstract Data Types (ADTs) (2): Queues and Lists

Related Objectives from Unit Outline:

- Describe the concept, application, and specification of an abstract data type (ADT) and employ Java classes to encapsulate ADTs

Objectives:

1. To become familiar with the concepts and applications of Queues and Lists, their implementation using alternative data structures, and existing implementation in Java classes;
2. To demonstrate the awareness of the principles of algorithms behind the Java implementations of Queues and Lists.

Tasks:

Complete the following.

Task 1: Test the Java implementation of a `Queue Class` given in ArrayQueue.java using the class tester in WS1001 (Download the Java code from Blackboard)

    a. Explain the structure of this program;
    b. Observe the behaviours of this program by running it a few times.

Task 2: Test the Java implementation of the `ArrayList Class` given in WS1002. (Note that it takes Cities.txt as input text file)
(Download the Java code from Blackboard)

    a. Notice the invocation of `add()` and `remove()` methods provided by the `ArrayList Class`;
    b. Execute this program and analyse the results corresponding to individual method invocations in the program.

Task 3: Test the Java program WS1003 to observe the behaviors of the `list Iterator` (download the Java code from Blackboard)

    a. Analyse the potential behaviours of running this program;
    b. Execute this program and compare your analysis with the executed results.

Task 4: Devise an alternative Java implementation of WS1004 using the `LinkedList Class` (Download the Java code WS1004 from Blackboard <u>ONLY IF</u> you could not devise an alternative program).

    a. Execute your program;
    b. Discuss the results obtained from running these two programs.