Assignment-1: C& data structures

* please code as per one of the coding standards posted.
* Posted on 5th Aug 14.
* last date for submission: 23rd Aug.
* Weightage: 5 marks

Note:

* You must use optimal data structure for space and time.
* Code should be modular
* Follow coding standards
* All exceptions to be trapped.

1. Fetch a string from console. Reverse the string and display.
2. Fetch a name from console. Count the words and display. Assume that the words are isolated by one or more “space” and/or “tab” characters.
3. Design a circular queue of constant size with max capacity to store 1000 integers. Design modules for necessary operations.
4. Modify the code of circular queue (ex 3) to a normal queue whose capacity is dynamic.
5. A road has to be digitized and stored in memory. As you do not have a digitizer, you will get the start point, an end point and a sequence of points from console. Each point has X and Y coordinates as integers. You will also capture and store the road name. After capturing a road, you will compute the road length and display.
6. Study “sliding window protocol”. This is to be implemented in a simplified manner. The receiver receives frames with each frame having a sequence number. The frames can reach the receiver out of sequence. Say 4,8,2,3.. etc. The receiver has a window size of 10. (i.e) it accepts 10 frames out of sequence. Once it finds some frames reaching in sequence, the window advances. Implement the protocol. Example given below.

|  |  |  |
| --- | --- | --- |
| Frame received. | Current sequence in window | Window position |
| 2 | 2 | 1-10 |
| 3 | 2,3 | 1-10 |
| 5 | 2,3,5 | 1-10 |
| 1 | 1,2,3,5 | 4-14 |
| 8 | 5,8 | 4-14 |

1. There are 6 triangles in the below diagram. This is a generic structure with one triangle surrounded by three triangles. Represent this graphical information in a data structure.
   1. From the data structure one should be able to get
   2. The vertices of any given triangle
   3. Given a vertex what are the triangles use this vertex.
   4. Give a triangle what are its sides
   5. Given a triangle what are its adjacent triangles?



1. There are N cities (shown as node below). Some of them are directly connected by a road. Represent this information as a data structure. From this data one should be able to get:
   1. Given a city , what are the cities to which it is directly connected by a road.
   2. Given a road which cities it is connecting?
2. EEE department wants to list all the courses it is offering . Some courses have pre-requisite courses have to be done. Define a data structure to maintain this. From this structure, one should be able to get answers;
   1. What are the immediate pre requisite courses for a given course?
   2. What are all the courses , one should do to take up study the given course?
3. An image of 1024 by 1024 pixels is to be represented. One way is to segment the image into four quadrants and represent each recursively. Study this approach and represent the structure. Write code and decode methods to do the same.