Practical Object oriented design
(Command & Iterator)

Solve the following problems.

Problem1: Text Editor

Design a simple text editor that support only one open document(for an example, you can represent it as stringbuffer) and operations like insert, delete, cut, paste and copy operations. The editor must also support infinite undo for all the operations except copy operation. You might need to create singleton Clipboard object for cut and paste operations. The clipboard object needs a method to load a string and a method to get a copy of the string it holds. Here are the details of operations that need to be supported:

InsertText: Insert operation allows the user to insert text in a document. It will take cursor position and text as input parameters and inserts the text at cursor position inside document. For example, if the document contained the text "012345" and the parameters were 2 and "abc" the result should be "012abc345". Be careful about undo; the text I'm inserting may also be elsewhere in the buffer, so be sure you delete it from the same place it was inserted.

DeleteText: Delete operation allows the user to select a region of the text and delete it. It will take two integers which are the positions of the first and last characters to be deleted (assuming the positions are numbered from zero). For example, if my document contains "0123456789" and the parameters to DeleteText are 2 and 4, the document should end up containing "0156789". Be careful about undo to be sure that things get put back together correctly.

Cut: Cut operation allows the user to cut a selected region of text in a document and place it in the clipboard. It's parameters and its effect on the document are the same as DeleteText, but it also loads the text into the Clipboard so we can use it later.

Paste: Paste operation allows the user to get stuff out of the clipboard onto document. It's parameters and its effect on the document are the same as InsertText, but it should get the string to be inserted from the clipboard.

Copy: Copy operation allows the user to select a region of text and paste it another place. Like in most real systems there is nothing to undo for this operation.

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Problem2: Race Replay

Suppose we have a game that allows us to race with a car. The user can perform the following actions: go faster, go slower, go left and go right. Provide an object oriented design for adding functionality to record a whole race such that we can replay the recorded race.

Problem3: Car iterator

As part of this problem, we have to maintain car collection and we want to be able to iterate through our collection of cars. The implemented collection can simply add some cars for the moment. For each car, keep track of the brand, model, color, year, mileage, price and availability. We would like to be able to iterate through the collection in terms of brand, mileage, price, year and the whole collection. Design an application that allows us to traverse the car collection in an uniform way for a given iterable attribute name and value combination.