Assignment 5: Longest Common Subsequence

In this assignment you have to implement an algorithm that can find the longest common subsequence between two input strings. There will be two parts of this assignment.

**Part 1:** Submit the code according to the direction during the lab class.

**Part 2:** Submit the code according to the problem statement on [**UVA Online Judge**](http://uva.onlinejudge.org/index.php?option=com_onlinejudge&Itemid=8&page=show_problem&problem=1346)**. (**You have to sign-up for an account first.)

## Direction:

Create a class named LCS that contains a static method named compute. This method will take two Strings as parameter and will return a String. The parameters are the strings whose LCS will be computed, the LCS is returned from the method as String. You can assume the length of the strings will be no more than 10000. The input strings will not contain any space character.

Try to achieve the status “Accepted” in online judge for the problem. Keep the submitted code with you. [Getting Started with UVA Online Judge](http://www.acmsolver.org/?p=588)

## Way to Solution

Follow the lectures and reading materials.

## Extra Credit

Say the smaller of the two input string has length equals to N. Implement the algorithm such a way that its space complexity becomes O(N). For this task, create another method named computeForExtraCredit which will take 2 Strings as compute method but will return an integer indicating the length of the longest common subsequence.

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## Sample Input/Output:

Some test cases are provided below. Two input strings are separated by an SPACE.

|  |  |
| --- | --- |
| **Sample Input** | **Sample Output\*\*** |
| abbsbkdsbba abbbdsofakssa | abbbdsa |
| ATATCGATCGAATCGGA CGATCGATTGAGATCCA | ATCGATGAATCA |
| abaab abab | abab |
| mnkfmnlslwommslqk hkfjmnderget | kfmn |

\*\*There may be more than one subsequence with largest length.

For verifying the code for Judge Submission, you can go here and generate sample test case.

<http://uvatoolkit.com/problemssolve.php>

In the search box type 10405.

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## Evaluation

Submission will be evaluated using following criteria (with distribution of marks)

|  |  |
| --- | --- |
| **Criteria** | **Marks** |
| Created necessary java files (according to directions) | 5 |
| Implementation of the algorithm | 60 |
| Online Judge Submission | 35 |
| **Total** | **100** |
| Extra Credit | 25 |

|  |  |
| --- | --- |
| Implementation of the algorithm (Incorrect)\* | 5-45 |
| **Online Judge Submission (Incorrect)\***   * Presentation Error * Wrong Answer * Runtime Error | **5-25**  25  15-20  5-15 |

**\*** Marking depends on evaluator.

***Notes on copying other’s code: If anybody found copying solution code from other student(s), all of them will be penalized. Penalty includes***

* ***Assigning ZERO as mark for the solution submitted***
* ***Assigning ZERO as mark for the best submission among all other submissions. (assigned at the end of semester)***

***Copying solutions from the Internet will also incur similar penalties.***

## Submission & Contact:

|  |  |
| --- | --- |
| **Submission Type** | Individual |
| **Submission Deadline (Final):** | July 13, 2014 |

Students are encouraged to use Google Group for contacting to resolve their issues (instead of personal mails.)

Group Address: <https://groups.google.com/forum/#!forum/algorithmfiesta2014>

## Reading Materials

* *Introduction to Algorithms*, By Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein. ISBN: 9780262033848 **Page-350**
* <http://www.cs.umd.edu/~meesh/351/mount/lectures/lect25-longest-common-subseq.pdf>