

3. MergeSort is application of "Divide and Conquer". It is a sorting technique the sequence data by continuously merging items in the list. Every single item in the original unordered list is merged with another, creating groups of two.

Every two-item group is merged, creating groups of four and so on until there is one ordered list.

By Merge sorting, it divides the data into short list recursively, and the recursion exit is a short list containing one element or two lists which should be conquered.

It may be found that the list wouldn't be changed when there's only one element or two equivalent elements, so this must not damage the stability.

It is sure that if ahead (two) elements are equivalent, the list may be saved before the sequence list. this way has proved the stability  
 $\Rightarrow$  MergeSort is stable.