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CSE 373 Homework 10 Write-Up

1. Using Quick Sort, with the median pivot rule (pick the median of: data[lo], data[hi - 1], and data[(hi + lo) / 2]), sort the following list of numbers. Show your work by drawing the tree of partitions and pivots (as seen in the lecture slides) with the partition rules discussed in lecture (swapping the pivot to index lo and doing swaps to complete the partitions). Apply a cutoff of 3 elements and sort with any sorting method.

**Data= [5, 7, 9, 1, 3, 4, 6, 8, 2]**

Select pivot value 🡪 lo = 5, mid = 3, hi = 2 🡪 mid = 3 is median

Move pivot to index 0 🡪 swap values 5 and 3

**Data= [3, 7, 9, 1, 5, 4, 6, 8, 2]**

Place pointers at the data[1] and end of array and move inwards

**Data= [3, 7, 9, 1, 5, 4, 6, 8, 2]**

Swap values 7 and 2 because they’re both in the wrong partition

**Data= [3, 2, 9, 1, 5, 4, 6, 8, 7]**

**Data= [3, 2, 9, 1, 5, 4, 6, 8, 7]**

**Data= [3, 2, 9, 1, 5, 4, 6, 8, 7]**

**Data= [3, 2, 9, 1, 5, 4, 6, 8, 7]**

**Data= [3, 2, 9, 1, 5, 4, 6, 8, 7]**

**Data= [3, 2, 9, 1, 5, 4, 6, 8, 7]**

Swap values 9 and 1 because they’re both in the wrong partition

**Data= [3, 2, 1, 9, 5, 4, 6, 8, 7]**

Divide current array into left partition, pivot, and right partition

**Left = [2, 1] Pivot = 3 Right = [9, 5, 4, 6, 8, 7]**

Left partition is cut off and sorted using another method because it is under 3 elements

**Left= [1, 2]**

Continue quick sort on right partition

**Right = [9, 5, 4, 6, 8, 7]**

Select pivot value 🡪 lo = 9, mid = 4, hi = 7 🡪 hi = 7 is median

Move pivot to index 0 🡪 swap values 7 and 9

**Right = [7, 5, 4, 6, 8, 9]**

Place pointers at the data[1] and end of array and move inwards

**Right = [7, 5, 4, 6, 8, 9]**

**Right = [7, 5, 4, 6, 8, 9]**

**Right = [7, 5, 4, 6, 8, 9]**

Divide current array into left partition, pivot, and right partition

**Left = [5, 4, 6] Pivot = 7 Right = [8, 9]**

Both partitions are cut off and sorted using another method because they are under 3 elements

**Left = [4, 5, 6] Right = [8, 9]**

Combine left partition, pivot, and right partition

**Combined = [4, 5, 6, 7, 8, 9]**

Combine left partition, pivot, and right partition again

**[1, 2, 3, 4, 5, 6, 7, 8, 9]**

**Final answer: [1, 2, 3, 4, 5, 6, 7, 8, 9]**

1. Using Radix Sort with a radix of 6 (letters: a, b, c, d, e, f) to alphabetically sort the following strings, draw contents of each bucket at the end of each radix 'digit' iteration pass.   
   Strings = (abc, da, ffff, defcd, abebd, ca, b, fef, dfe)

|  |  |
| --- | --- |
| / | abc//, da///, ffff/, ca///, b////, fef//, dfe// |
| A |  |
| B |  |
| C |  |
| D | defcd, abebd, |
| E |  |
| F |  |

Strings = (abc, da, ffff, ca, b, fef, dfe, defcd, abebd)

|  |  |
| --- | --- |
| / | abc//, da///, ca///, b////, fef//, dfe// |
| A |  |
| B | abebd, |
| C | defcd, |
| D |  |
| E |  |
| F | ffff/ |

Strings = (abc, da, ca, b, fef, dfe, abebd, defcd, ffff)

|  |  |
| --- | --- |
| / | da///, ca///, b////, |
| A |  |
| B |  |
| C | abc//, |
| D |  |
| E | dfe//, abebd, |
| F | fef//, defcd, ffff/, |

Strings = (da, ca, b, abc, dfe, abebd, fef, defcd, ffff)

|  |  |
| --- | --- |
| / | b////, |
| A | da///, ca///, |
| B | abc//, abebd, |
| C |  |
| D |  |
| E | fef//, defcd, |
| F | dfe//, ffff/, |

Strings = (b, da, ca, abc, abebd, fef, defcd, dfe, ffff)

|  |  |
| --- | --- |
| / |  |
| A | abc//, abebd, |
| B | b////, |
| C | ca///, |
| D | da///, defcd, dfe//, |
| E |  |
| F | fef//, ffff/, |

Strings = (abc, abebd, b, ca, da, defcd, dfe, fef, ffff)

1. If you did any above and beyond for extra credit, describe what you did.

Nope, I didn’t do any extra credit.