BUCKET SORT

- In this sorting algorithm, buckets are created to put elements into them.
- Then we apply some sorting algorithm (insertion sort) to sort the elements in each bucket
- Finally take out and join them to sorted array

Bucket Sort

- Assumption: input elements are uniformly distributed over [0, 1]

- n inputs dropped into n equal-sized subintervals of [0, 1].

| 0.78 | 0.17 | 0.39 | 0.26 | 0.72 | 0.94 | 0.21 | 0.12 | 0.23 | 0.68 |

Consider total no. of elements are n=10. So we create 10 buckets.

Bucket array looks like

0
1
2
3
4
5
6
7
8
9

Now insert the values from the original array into the bucket array according to:
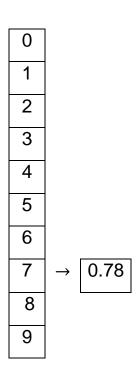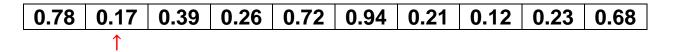
$$bucket[n * arr[i]]$$
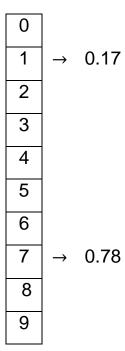
Where n = 10 then

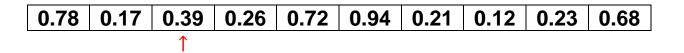If $arr[i] = 0.78$, then this value will be sorted on

$bucket[10 * 0.78]$ that would be $10 * 0.78 = 7.8$ take digit before decimal (NOTE do not round off)

0.78	0.17	0.39	0.26	0.72	0.94	0.21	0.12	0.23	0.68

↑

0
1
2
3
4
5
6
7
8
9

7 → 0.78

| 0.78 | 0.17 | 0.39 | 0.26 | 0.72 | 0.94 | 0.21 | 0.12 | 0.23 | 0.68 |

↑

$now\ a[i] = 0.17$ will sort in the bucket of 1

0	
1	→ 0.17
2	
3	
4	
5	
6	
7	→ 0.78
8	
9	

| 0.78 | 0.17 | 0.39 | 0.26 | 0.72 | 0.94 | 0.21 | 0.12 | 0.23 | 0.68 |

↑

now $a[i] = 0.39$ will sort in the bucket of 1

0	
1	→ 0.17
2	
3	→ 0.39
4	
5	
6	
7	→ 0.78
8	
9	

| 0.78 | 0.17 | 0.39 | 0.26 | 0.72 | 0.94 | 0.21 | 0.12 | 0.23 | 0.68 |

↑

$now\ a[i] = 0.39$ will sort in the bucket of 1

0	
1	→ 0.17
2	→ 0.26
3	→ 0.39
4	
5	
6	
7	→ 0.78
8	
9	

| 0.78 | 0.17 | 0.39 | 0.26 | 0.72 | 0.94 | 0.21 | 0.12 | 0.23 | 0.68 |

↑

$now\ a[i] = 0.39$ will sort in the bucket of 1

0	
1	→ 0.17
2	→ 0.26
3	→ 0.39
4	
5	
6	
7	→ 0.78 → 0.72
8	
9	

| 0.78 | 0.17 | 0.39 | 0.26 | 0.72 | 0.94 | 0.21 | 0.12 | 0.23 | 0.68 |

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$now\ a[i] = 0.39$ will sort in the bucket of 1

0	
1	→ 0.17
2	→ 0.26
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6	
7	→ 0.78 → 0.72
8	
9	→ 0.94

| 0.78 | 0.17 | 0.39 | 0.26 | 0.72 | 0.94 | 0.21 | 0.12 | 0.23 | 0.68 |

↑

now $a[i] = 0.39$ will sort in the bucket of 1

0	
1	→ 0.17
2	→ 0.26 → 0.21
3	→ 0.39
4	
5	
6	
7	→ 0.78 → 0.72
8	
9	→ 0.94

| 0.78 | 0.17 | 0.39 | 0.26 | 0.72 | 0.94 | 0.21 | 0.12 | 0.23 | 0.68 |

↑

$now\ a[i] = 0.39$ will sort in the bucket of 1

0	
1	→ 0.17 → 0.12
2	→ 0.26 → 0.21
3	→ 0.39
4	
5	
6	
7	→ 0.78 → 0.72
8	
9	→ 0.94

0.78	0.17	0.39	0.26	0.72	0.94	0.21	0.12	0.23	0.68

↑

$now\ a[i] = 0.39$ will sort in the bucket of 1

0	
1	→ 0.17 → 0.12
2	→ 0.26 → 0.21 → 0.23
3	→ 0.39
4	
5	
6	
7	→ 0.78 → 0.72
8	
9	→ 0.94

| 0.78 | 0.17 | 0.39 | 0.26 | 0.72 | 0.94 | 0.21 | 0.12 | 0.23 | 0.68 |

↑

now $a[i] = 0.39$ will sort in the bucket of 1

0	
1	→ 0.17 → 0.12
2	→ 0.26 → 0.21 → 0.23
3	→ 0.39
4	
5	
6	→ 0.68
7	→ 0.78 → 0.72
8	
9	→ 0.94

Now sort each bucket individually using insertion sort we get

0	
1	→ 0.12 → 0.17
2	→ 0.21 → 0.23 → 0.26
3	→ 0.39
4	
5	
6	→ 0.68
7	→ 0.72 → 0.78
8	
9	→ 0.94

Now, concatenate each bucket in the array, or you may use a link list for that.

Lab-Task-11: write a code for Bucket Sort.