

iv) { 50, 46, 35, 28, 65, 76, 9, 18, 42 }

50	50	09
46	42	18
35	35	28
28	65	35
65	46	42
76	76	46
09	28	50
18	18	65
42	09	76

Final sorted list: 9, 18, 28, 35, 42, 46, 50, 65, 76

v) { 102, 108, 101, 109, 117, 103, 120, 138, 128, 120 }

102	120	101	101
108	101	102	102
101	102	103	103
109	103	107	107
117	107	108	108
103	108	109	109
120	138	120	120
138	128	120	120
128	109	128	128
120	120	138	138

Final sorted list: 101, 102, 103, 107, 108, 109, 120, 120, 128, 138

ii) $\{18, 12, 9, 20, 15, 10, 8\}$

18	20	08
12	10	09
09	12	10
20	15	12
15	18	15
10	08	18
08	09	20

Final sorted list:

08, 09, 10, 12, 15, 18, 20

iii) $\{35, 38, 32, 39, 31, 33, 36, 40\}$

35	40	31
38	32	32
32	32	33
39	33	35
31	35	36
33	36	38
36	38	39
40	39	40

Final sorted list:

31, 32, 33, 35, 36, 38, 39, 40

$\{102, 108, 101, 109, 117, 103, 120, 138, 128, 130\}$

Pivot: 102

left: [101]

right: [108, 109, 117, 120, 138, 128, 130]

Sort:

left: 101

right: [108, 109, 117, 120, 128, 130, 138]

[101, 102, 108, 109, 117, 120, 128, 130, 138]

Final sorted list:

[101, 102, 108, 109, 117, 120, 128, 130, 138]

Radix Sorting:

1) $\{11, 1, 5, 4, 3, 2\}$

11	11	11	01
01	01	01	02
05	02	02	03
04	03	03	04
03	04	04	05
02	05	05	011

Final sorted list:

01, 02, 03, 04, 05, 11

Quick sorting:

i) $\{11, 1, 5, 4, 3, 2\}$

Pivot = 11

left: $[1, 5, 4, 3, 2]$

Right = $[]$

Sort:

Left: $[1, 3, 4, 5]$

right: $[]$

final mixed sort:

$[1, 2, 3, 4, 5, 11]$

ii) $\{18, 12, 9, 20, 15, 10, 8\}$

Pivot = 12

Left: $[12, 9, 15, 10, 8]$

Right: $[20]$

Sort:

Left: $[8, 9, 10, 12, 15]$

Right: $[20]$

$[8, 9, 10, 12, 15, 18, 20]$

final sorted list:

$[8, 9, 10, 12, 15, 18, 20]$

iii) $\{35, 37, 32, 39, 31, 33, 36\}$

Pivot: 35

left: $[32, 31, 33]$

right: $[37, 39, 36, 40]$

Sort:

left: $[31, 32, 33]$

right: $[36, 37, 39, 40]$

$[31, 32, 33, 35, 36, 37, 39, 40]$

final sorted list:

$[31, 32, 33, 35, 36, 37, 39, 40]$

iv) $\{50, 46, 35, 28, 65, 76, 9, 18, 42\}$

Pivot: 50

left: $[46, 35, 28, 9, 18, 42]$

right: $[65, 76]$

Sort:

left: $[9, 18, 28, 35, 42, 46]$

right: $[65, 76]$

$[9, 18, 28, 35, 42, 46, 50, 65, 76]$

final sorted list:

$[9, 18, 28, 35, 42, 46, 50, 65, 76]$

{50, 46, 35, 28, 65, 76, 9, 18, 42}

split:

left: [50, 46, 32, 28, 65]

Right: [76, 9, 18, 42]

Again split:

left: [50, 46], [32, 28] and [65]

right: [76, 9] and [18, 42]

further split:

left: [50], [46], [32], [28] and [65]

Right: [76], [9], [18] and [42]

Conquer:

Merge [50] and [46]: [46, 50]

Merge [32] and [28]: [28, 32]

Merge [65]: [65]

Merge [76] and [9]: [9, 76]

Merge [18] and [42]: [18, 42]

Merge [46, 50] and [28, 32] and [65]:

[28, 32, 46, 50, 65]

Merge [9, 76] and [18] and [42]:

[9, 18, 42, 76]

Merge [28, 32, 46, 50, 65] and

[9, 18, 42, 76]:

[9, 18, 28, 32, 42, 46, 50, 65, 76]

Final sorted list:

[9, 18, 28, 32, 42, 46, 50, 65, 76]

v) {102, 108, 101, 109, 117, 120, 138, 123, 139}

Divide:

left: [102, 108, 101, 109, 117]

Right: [103, 120, 138, 128, 130]

Again split:

left: [102, 108] and [101, 109, 117]

right: [103, 120] and [138, 128, 130]

Further split:

left: [102], [108], [101], [109], [117]

Right: [103], [120], [138], [128], [130]

Conquer:

Merge [102] and [108]: [102, 108]

Merge [101], [109] and [117]: [101, 109, 117]

Merge [103], [120]: [103, 120]

Merge [138], [128] and [130]: [128, 130, 138]

Merge [102, 108] and [101, 109, 117]:

[101, 102, 108, 109, 117]

Merge [103, 120] and [128, 130, 138]:

[103, 120, 128, 130, 138]

Merge [101, 102, 108, 109, 117] and

[103, 120, 128, 130, 138]:

[101, 102, 103, 108, 109, 117, 120, 128, 130, 138, 139]

Final sorted list:

[101, 102, 103, 108, 109, 117, 120, 128, 130, 138]

{ 50, 46, 35, 28, 65, 76, 9, 18, 42 }

50, 46, 35, 28, 65, 76, 9, 18, 42

46, 50, 35, 28, 65, 76, 9, 18, 42

35, 46, 50, 28, 65, 76, 9, 18, 42

28, 35, 46, 50, 65, 76, 9, 18, 42

28, 35, 46, 50, 65, 78, 9, 18, 42

28, 35, 46, 50, 65, 76, 9, 18, 42

9, 28, 35, 46, 50, 65, 76, 18, 42

9, 18, 28, 35, 46, 50, 65, 76, 42

9, 18, 28, 35, 42, 46, 50, 65, 76

v) { 102, 108, 101, 109, 117, 103, 120, 138, 128, 130 }

102, 108, 101, 109, 117, 103, 120, 138, 128, 130

102, 108, 101, 109, 117, 103, 120, 138, 128, 130

101, 102, 108, 109, 117, 103, 120, 138, 128, 130

101, 102, 108, 109, 117, 103, 120, 138, 128, 130

101, 102, 108, 109, 117, 103, 120, 138, 128, 130

101, 102, 103, 108, 109, 117, 120, 138, 128, 130

101, 102, 103, 108, 109, 117, 120, 138, 128, 130

101, 102, 103, 108, 109, 117, 120, 138, 128, 130

101, 102, 103, 108, 109, 117, 120, 138, 128, 130

101, 102, 103, 108, 109, 117, 120, 128, 130, 138

Insertion Sorting

i) $\{11, 1, 5, 4, 3, 2\}$

1, 1, 5, 4, 3, 2

1, 1, 5, 4, 3, 2

1, 5, 1, 4, 3, 2

1, 4, 5, 1, 3, 2

1, 3, 4, 5, 1, 2

1, 2, 3, 4, 5, 11

i) $\{18, 12, 9, 20, 15, 10, 8\}$

18, 12, 9, 20, 15, 10, 8

12, 18, 9, 20, 15, 10, 8

9, 12, 18, 20, 15, 10, 8

9, 12, 18, 20, 15, 10, 8

9, 12, 15, 18, 20, 10, 8

9, 10, 12, 15, 18, 20, 8

8, 9, 10, 12, 15, 18, 20

ii) $\{35, 37, 32, 39, 31, 33, 36, 40\}$

35, 37, 32, 39, 31, 33, 36, 40

35, 37, 32, 39, 31, 33, 36, 40

32, 35, 37, 39, 31, 33, 36, 40

32, 35, 37, 39, 31, 33, 36, 40

31, 32, 35, 37, 39, 33, 36, 40

31, 32, 33, 35, 37, 39, 36, 40

31, 32, 33, 35, 36, 37, 39, 40

31, 32, 33, 35, 36, 37, 39, 40

Iteration 6:

28, 35, 42, 46, 50, 76, 65

Iteration 7:

1, 18, 28, 35, 42, 46, 50, 65, 76

$\{102, 108, 101, 109, 117, 103, 120, 138, 128, 130\}$

Iteration 1:

102, 108, 101, 109, 117, 103, 120, 138, 128, 130

101, 102, 108, 109, 117, 103, 120, 138, 128, 130

Iteration 2:

101, 102, 103, 109, 117, 108, 120, 138, 128, 130

Iteration 3:

101, 102, 103, 108, 117, 109, 120, 138, 128, 130

Iteration 4:

101, 102, 103, 108, 109, 117, 120, 138, 128, 130

Iteration 5:

101, 102, 103, 108, 109, 120, 117, 138, 128, 130

Iteration 6:

101, 102, 103, 108, 109, 120, 128, 138, 130

Iteration 7:

101, 102, 103, 108, 109, 120, 128, 130, 138

Final sorted list:

101, 102, 103, 108, 109, 120, 128, 130, 138

10

ii) $\{35, 37, 32, 39, 31, 33, 36, 40\}$

Iteration 1:

31, 37, 32, 39, 35, 33, 36, 40

Iteration 2:

31, 32, 37, 39, 35, 33, 36, 40

Iteration 3:

31, 32, 33, 39, 35, 37, 36, 40

Iteration 4:

31, 32, 33, 35, 39, 37, 36, 40

Iteration 5:

31, 32, 33, 35, 36, 37, 39, 40

Iteration 6:

31, 32, 33, 35, 36, 37, 39, 40

Final sorted list:

31, 32, 33, 35, 36, 37, 39, 40

iv) $\{50, 46, 35, 28, 65, 76, 9, 18, 42\}$

Iteration 1:

9, 46, 35, 28, 65, 76, 50, 18, 42

Iteration 2:

9, 18, 35, 28, 65, 76, 50, 46, 42

Iteration 3:

9, 18, 28, 35, 65, 76, 50, 46, 42

Iteration 4:

9, 18, 28, 35, 65, 76, 50, 46, 42

Iteration 5:

9, 18, 28, 35, 42, 76, 50, 46, 65

4:
102, 103, 108, 109, 117, 120, 128, 130, 138
102, 103, 108, 109, 117, 120, 128, 130, 138
1, 102, 103, 108, 109, 117, 120, 128, 130, 138

Final sorted list: 101, 102, 103, 108, 109, 117, 120, 128, 130, 138

Selection Sorting:

i) {11, 1, 5, 4, 3, 2}

Iteration 1:

11, 1, 5, 4, 3, 2
1, 11, 5, 4, 3, 2

Iteration 2:

1, 2, 5, 4, 3, 11

Iteration 3:

1, 2, 3, 4, 5, 11

Final sorted list:

1, 2, 3, 4, 5, 11

ii) {18, 12, 9, 20, 15, 10, 8}

Iteration 1:

18, 12, 9, 20, 15, 10, 8
8, 12, 9, 20, 15, 10, 18

Iteration 2:

8, 9, 12, 20, 15, 10, 18

Iteration 3:

8, 9, 10, 20, 15, 12, 18

Iteration 4:

8, 9, 10, 12, 15, 20, 18

Iteration 5:

8, 9, 10, 12, 15, 18, 20

Final sorted list:

8, 9, 10, 12, 15, 18, 20

Final sorted list: 9, 18, 28, 35, 42, 46, 50, 65, 76

v) {102, 108, 101, 109, 117, 103, 120, 138, 128, 130}

Iteration 1:

102, 108, 101, 109, 117, 103, 120, 138, 128, 130

102, 101, 108, 109, 117, 103, 120, 138, 128, 130

102, 101, 108, 109, 117, 103, 120, 138, 128, 130

102, 101, 108, 109, 117, 103, 120, 138, 128, 130

102, 101, 108, 109, 103, 117, 120, 138, 128, 130

102, 101, 108, 109, 103, 117, 120, 138, 128, 130

102, 101, 108, 109, 103, 117, 120, 138, 128, 130

102, 101, 108, 109, 103, 117, 120, 128, 138, 130

102, 101, 108, 109, 103, 117, 120, 128, 138, 130

Iteration 2:

102, 101, 108, 109, 103, 117, 120, 128, 130, 138

101, 102, 108, 109, 103, 117, 120, 128, 130, 138

101, 102, 108, 109, 103, 117, 120, 128, 130, 138

101, 102, 108, 109, 103, 117, 120, 128, 130, 138

101, 102, 108, 103, 109, 117, 120, 128, 130, 138

101, 102, 108, 103, 109, 117, 120, 128, 130, 138

101, 102, 108, 103, 109, 117, 120, 128, 130, 138

101, 102, 108, 103, 109, 117, 120, 128, 130, 138

101, 102, 108, 103, 109, 117, 120, 128, 130, 138

101, 102, 108, 103, 109, 117, 120, 128, 130, 138

101, 102, 103, 108, 109, 117, 120, 128, 130, 138

101, 102, 103, 108, 109, 117, 120, 128, 130, 138

101, 102, 103, 108, 109, 117, 120, 128, 130, 138

101, 102, 103, 108, 109, 117, 120, 128, 130, 138

101, 102, 103, 108, 109, 117, 120, 128, 130, 138

101, 102, 103, 108, 109, 117, 120, 128, 130, 138

101, 102, 103, 108, 109, 117, 120, 128, 130, 138

101, 102, 103, 108, 109, 117, 120, 128, 130, 138

101, 102, 103, 108, 109, 117, 120, 128, 130, 138

101, 102, 103, 108, 109, 117, 120, 128, 130, 138

8, 46, 50, 9, 18, 65, 42, 76

, 28, 46, 50, 9, 18, 42, 65, 76

Iteration 3:

35, 28, 46, 50, 9, 18, 42, 65, 76

28, 35, 46, 50, 9, 18, 42, 65, 76

28, 35, 46, 50, 9, 18, 42, 65, 76

28, 35, 46, 50, 9, 18, 42, 65, 76

28, 35, 46, 9, 50, 18, 42, 65, 76

28, 35, 46, 9, 18, 50, 42, 65, 76

28, 35, 46, 9, 18, 42, 50, 65, 76

Iteration 4:

28, 35, 46, 9, 18, 42, 50, 65, 76

28, 35, 46, 9, 18, 42, 50, 65, 76

28, 35, 9, 46, 18, 42, 50, 65, 76

28, 35, 9, 18, 46, 42, 50, 65, 76

28, 35, 9, 18, 42, 46, 50, 65, 76

Iteration 5:

28, 35, 9, 18, 42, 46, 50, 65, 76

28, 9, 35, 18, 42, 46, 50, 65, 76

28, 9, 18, 35, 42, 46, 50, 65, 76

Iteration 6:

28, 9, 18, 35, 42, 46, 50, 65, 76

9, 28, 18, 35, 42, 46, 50, 65, 76

9, 18, 28, 35, 42, 46, 50, 65, 76

Iteration 4:

32, 31, 33, 35, 36, 37, 39, 40

31, 32, 33, 35, 36, 37, 39, 40

31, 32, 33, 35, 36, 37, 39, 40

Final sorted list: 31, 32, 33, 35, 36, 37, 39, 40

iv) { 50, 46, 35, 28, 65, 76, 9, 18, 42 }

Iteration 1:

50, 46, 35, 28, 65, 76, 9, 18, 42

46, 50, 35, 28, 65, 76, 9, 18, 42

46, 35, 50, 28, 65, 76, 9, 18, 42

46, 35, 28, 50, 65, 76, 9, 18, 42

46, 35, 28, 50, 65, 76, 9, 18, 42

46, 35, 28, 50, 65, 76, 9, 18, 42

46, 35, 28, 50, 65, 9, 76, 18, 42

46, 35, 28, 50, 65, 9, 18, 76, 42

46, 35, 28, 50, 65, 9, 18, 42, 76

Iteration 2:

49, 35, 28, 50, 65, 9, 18, 42, 76

35, 46, 28, 50, 65, 9, 18, 42, 76

35, 28, 46, 50, 65, 9, 18, 42, 76

35, 28, 46, 50, 65, 9, 18, 42, 76

35, 28, 46, 50, 65, 9, 18, 42, 76

35, 28, 46, 50, 9, 68, 18, 42, 76

{35, 37, 32, 39, 31, 33, 36, 40}

Iteration 1:

35, 37, 32, 39, 31, 33, 36, 40

35, 32, 37, 39, 31, 33, 36, 40

35, 32, 37, 39, 31, 33, 36, 40

35, 32, 37, 31, 33, 39, 36, 40

35, 32, 37, 31, 33, 39, 36, 40

35, 32, 37, 31, 33, 36, 39, 40

35, 32, 37, 31, 33, 36, 39, 40

Iteration 2:

35, 32, 37, 31, 33, 36, 39, 40

32, 35, 37, 31, 33, 36, 39, 40

32, 35, 31, 37, 33, 36, 39, 40

32, 35, 31, 33, 37, 36, 39, 40

32, 35, 31, 33, 36, 37, 39, 40

32, 35, 31, 33, 36, 37, 39, 40

Iteration 3:

32, 35, 31, 33, 36, 37, 39, 40

32, 31, 35, 33, 36, 37, 39, 40

32, 31, 33, 35, 36, 37, 39, 40

32, 31, 33, 35, 36, 37, 39, 40

ii)

$$\{18, 12, 9, 20, 15, 10, 8\}$$

Iteration 1:

18, 12, 9, 20, 15, 10, 8

12, 18, 9, 20, 15, 10, 8

12, 9, 18, 20, 15, 10, 8

12, 9, 18, 20, 15, 10, 8

12, 9, 18, 15, 20, 10, 8

12, 9, 18, 15, 10, 20, 8

12, 9, 18, 15, 10, 8, 20

Iteration 2:

12, 9, 18, 15, 10, 8, 20

9, 12, 18, 15, 10, 8, 20

9, 12, 18, 15, 10, 8, 20

9, 12, 15, 18, 10, 8, 20

9, 12, 15, 10, 18, 8, 20

9, 12, 15, 10, 8, 18, 20

Iteration 3:

9, 12, 15, 10, 8, 18, 20

9, 12, 10, 15, 8, 18, 20

9, 12, 10, 8, 15, 18, 20

Iteration 4:

9, 12, 10, 8, 15, 18, 20

9, 10, 12, 8, 15, 18, 20

9, 10, 12, 8, 15, 18, 20

9, 10, 8, 12, 15, 18, 20

Iteration 5:

9, 10, 8, 12, 15, 18, 20

9, 8, 10, 12, 15, 18, 20

Iteration 6:

9, 9, 10, 12, 15, 18, 20

8, 9, 10, 12, 15, 18, 20

Final sorted list:

8, 9, 10, 12, 15, 18, 20

Bubble sorting:

i) $\{11, 1, 5, 4, 3, 2\}$

Iteration 1:

11, 1, 5, 4, 3, 2
1, 11, 5, 4, 3, 2

1, 5, 11, 4, 3, 2

1, 5, 4, 11, 3, 2

1, 5, 4, 3, 11, 2

1, 5, 4, 3, 2, 11

Iteration 2:

1, 5, 4, 3, 2, 11

1, 4, 5, 3, 2, 11

1, 4, 3, 5, 2, 11

1, 4, 3, 2, 5, 11

1, 4, 3, 2, 5, 11

Iteration 3:

1, 4, 3, 2, 5, 11

1, 3, 4, 2, 5, 11

1, 3, 2, 4, 5, 11

1, 3, 2, 4, 5, 11

Iteration 3:

1, 3, 2, 4, 5, 11

1, 2, 3, 4, 5, 11

Final sorted list:

1, 2, 3, 4, 5, 11

Quick sorting:

- 1) Start with number of elements
- 2) Pick a pivot element (can be first, middle or last)
- 3) Partition the list:
 - Elements less than pivot are on left.
 - Elements greater than pivot are on right.Return the position of the pivot after partition.
- 4) Recursively applying Quick sort to the left and right sublists.
- 5) End with sorted list.

Radix sorting:

- 1) Find maximum number in the list to determine the number of digits.
- 2) For each digit position (starting from the least significant digit to the most significant digits).
 - a. Group the numbers into buckets based on current digits.
 - b. Collect the numbers from buckets in order.
- 3) Repeat step 2 until all digits positions have been processed.
- 4) End with sorted list.

Insertion Sorting:

- 1) Start from list of numbers.
- 2) Take the current element and compare it with the elements before it.
- 3) Shift all elements greater than the key one position to the right.
- 4) Insert key in the correct position.
- 5) Repeat process for all elements until entire list is sorted.

Merge sorting:

- 1) Start with list of numbers.
- 2) Divide the list into two halves:
 - left half
 - Right half.
- 3) Merge the two sorted halves:
 - 1) Compare the smallest elements of both halves.
 - 2) Add smaller element to the merged list.
 - 3) Repeat until all elements are added.
- 4) Return the merged list.

Pseudocode:

Bubble sorting:

- 1) Start with list of numbers.
- 2) Repeat the following steps for $(n-1)$ Time, where n is the length of the list:
 - a) For each pair of adjacent element in the list:
 - i) If the current element is greater than the next element, swap them.
 - ii) Otherwise leave them as they are.
- 3) Continue until no swaps are needed.
- 4) End with a sorted list.

Selection sorting:

- 1) Start with list of numbers.
- 2) Find the smallest number in the unsorted list.
- 3) Swap the smallest element found with the first unsorted element.
- 4) Move To the next unsorted element and repeat steps until entire list is sorted.
- 5) End with a sorted list.

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