Implementation of Quicksort:-

1. **Pivot_1: First element as pivot**
   Following are the functions used in the program:
   - partition(): This function takes an array and two integers(i.e p and q) as an argument. It always takes the first element in the array as the pivot. Then it places all elements less than the pivot to the left side and all elements greater than the pivot to the right side of the pivot. Finally, the pivot is placed in its correct position and its index is returned.

   - quicksort(): This function is called recursively on the subarrays to sort the given array in increasing order of its elements. It calls the partition function to get the index that will help divide the array into two halves, again quicksort() is called for both the subarrays.

   - main(): From the main function the program starts its execution. It takes input from the files and accordingly sorts the elements in the array, as per the choice of the user. It also prints the time it takes to execute the quicksort() function.

2. **Pivot_2: Random element as pivot**
   Following are the functions used in the program:
   - partition(): This function takes an array and two integers(i.e p and q) as an argument. It always takes the first element in the array as the pivot. Then it places all elements less than the pivot to the left side and all elements greater than the pivot to the right side of the pivot. Finally, the pivot is placed in its correct position and its index is returned.

   - rand_pivot(): This function is used to generate a random no from the array and return that. We use the random element as the pivot for sorting the array.

   - quicksort(): This function is called recursively on the subarrays to sort the given array in increasing order of its elements. It calls the partition function to get the index that will help divide the array into two halves, again quicksort() is called for both the subarrays.

   - main(): From the main function the program starts its execution. It takes input from the files and accordingly sorts the elements in the array, as per the choice of the user. It also prints the time it takes to execute the quicksort() function.

3. **Pivot_3: Median of {first, middle and last element} as a pivot**
   Following are the functions used in the program:
   - partition(): This function takes an array and two integers(i.e p and q) as an argument. It always takes the first element in the array as the pivot. Then it places all elements less than the pivot to the left side and all elements greater than the pivot to the right side of the pivot. Finally, the pivot is placed in its correct position and its index is returned.

   - m_pivot(): This function geneerates the median of {first, middle and last element}, which is then used as pivot.

- quicksort(): This function is called recursively on the subarrays to sort the given array in increasing order of its elements. It calls the partition function to get the index that will help divide the array into two halves, again quicksort() is called for both the subarrays.

- main(): From the main function the program starts its execution. It takes input from the files and accordingly sorts the elements in the array, as per the choice of the user. It also prints the time it takes to execute the quicksort() function.

4. Pivot_4: Median of {n/4th element, middle element, 3n/4th element} as pivot

Following are the functions used in the program:

- partition(): This function takes an array and two integers(i.e p and q) as an argument. It always takes the first element in the array as the pivot. Then it places all elements less than the pivot to the left side and all elements greater than the pivot to the right side of the pivot. Finally, the pivot is placed in its correct position and its index is returned.

- m_pivot(): This function geneerates the median of {n/4th element, middle element, 3n/4th element} , which is then used as pivot.

- quicksort(): This function is called recursively on the subarrays to sort the given array in increasing order of its elements. It calls the partition function to get the index that will help divide the array into two halves, again quicksort() is called for both the subarrays.

- main(): From the main function the program starts its execution. It takes input from the files and accordingly sorts the elements in the array, as per the choice of the user. It also prints the time it takes to execute the quicksort() function.

OUTPUT:

```
PS D:\Documents\DSP assignment\7> gcc -o q1 quicksort1.c
PS D:\Documents\DSP assignment\7> ./q1

Implementation of quicksort with first element as pivot.
------------------------------------------------------------
Enter choice:-
1. Random input
2. Sorted input
3. Sorted with 1% as random input
4. Exit
1

After sorting:-15 31 247 314 401 1472 1540 1653 1708 1786 2016 2381 2534 2814 2960 3222 3371 3394 3415 3493 3553 3609 3779 3850 4108 4630 4825 5244 5360 554
0 5596 5734 5763 5836 6715 6984 7034 7072 7307 7715 7845 7846 8546 8582 8583 8584 8682 8696 8697 9291 9295 9363 9460 9479 9683 9687 9784 9859 9942 10311 103
28 10332 10377 10424 10450 10727 10744 10921 11316 11704 11726 12196 12280 12678 12693 12939 13012 13071 13536 13570 13625 13921 13988 14102 14319 14561 147
94 15132 15289 15668 15669 15772 15779 15802 15836 16265 16402 16534 16671 16928 17077 17207 17271 17392 17590 17661 17768 17860 18212 18367 18409 18619 187
50 18763 18765 18779 18889 18943 18966 19391 19498 19529 19787 20118 20122 20129 20232 20300 20405 20498 21124 21258 21666 21894 21952 22023 22088 22138 226
34 22726 22976 23121 23158 23779 23968 24049 24122 24418 24472 24490 24756 24764 24806 25066 25156 25347 25375 25383 25568 25588 25698 25832 25880 26362 265
65 26709 27210 27237 27270 27398 27539 27563 27865 27941 28137 28255 28259 28528 28574 28862 29518 29660 29965 30041 30072 30162 30967 31030 31136 31195 312
85 31325 31329 31332 32055 32066 32391 32449 32489 32559

Total time of execution  = 0.015000, when array size = 200


Enter choice:-
1. Random input
2. Sorted input
3. Sorted with 1% as random input
4. Exit
2

After sorting:-0 0 0 0 0 1 1 1 2 2 2 2 3 3 3 3 3 3 3 3 3 4 4 4 6 7 7 7 8 8 8 8 9 9 9 10 10 10 11 11 12 12 12 14 14 14 14 15 15 15 16 17 17 17 17 17 18 19
19 19 20 20 20 20 20 21 21 21 22 22 22 23 23 23 24 24 25 25 27 28 28 28 29 29 30 30 30 31 31 31 31 31 32 32 32 32 32 33 34 34 35 35 35 35 35 36 36 36 36 37
37 38 38 39 39 39 39 39 40 40 40 41 41 41 42 42 43 43 43 44 44 44 44 45 45 46 46 46 46 46 47 48 48 49 49 50 50 50 51 51 52 53 53 53 53 53 54 54 54 55 55 55
56 56 56 57 57 58 58 58 58 58 59 59 60 60 60 60 61 61 61 61 61 61 61 62 62 62 62 63 63 63 64 64 64 64 64 65 65

Total time of execution  = 0.016000, when array size = 200
```

```
Windows PowerShell

Enter choice:-
1. Random input
2. Sorted input
3. Sorted with 1% as random input
4. Exit
2

After sorting:-0 0 0 0 0 1 1 1 2 2 2 2 3 3 3 3 3 3 3 3 3 4 4 4 6 7 7 7 8 8 8 8 9 9 9 10 10 10 11 11 12 12 12 14 14 14 14 15 15 15 16 17 17 17 17 17 18 19
19 19 20 20 20 20 20 21 21 21 22 22 22 23 23 23 24 24 25 25 27 28 28 28 29 29 30 30 30 31 31 31 31 31 32 32 32 32 32 33 34 34 35 35 35 35 35 36 36 36 36 37
37 38 38 39 39 39 39 39 40 40 40 41 41 41 42 42 43 43 43 44 44 44 44 45 45 46 46 46 46 46 46 47 48 48 49 49 50 50 50 51 51 52 53 53 53 53 53 54 54 54 55 55 55
56 56 56 57 57 58 58 58 58 58 59 59 60 60 60 60 61 61 61 61 61 61 61 62 62 62 62 63 63 63 64 64 64 64 64 65 65

Total time of execution  = 0.016000, when array size = 200


Enter choice:-
1. Random input
2. Sorted input
3. Sorted with 1% as random input
4. Exit
3

After sorting:-0 0 0 0 0 1 1 1 2 2 2 2 3 3 3 3 3 3 3 3 3 4 4 4 6 7 7 7 8 8 8 8 9 9 9 10 10 10 11 11 12 12 12 14 14 14 14 15 15 15 16 17 17 17 17 17 18 19
19 19 20 20 20 20 20 21 21 21 22 22 22 23 23 23 24 24 25 25 27 28 28 28 29 29 30 30 30 31 31 31 31 31 32 32 32 32 32 33 34 34 35 35 35 35 35 36 36 36 36 37
37 38 38 39 39 39 39 39 40 40 40 41 41 41 42 42 43 43 43 44 44 44 44 45 45 46 46 46 46 46 46 47 48 48 49 49 50 50 50 51 51 52 53 53 53 53 53 54 54 54 55 55 55
56 56 56 57 57 58 58 58 58 58 59 59 60 60 60 60 61 61 61 61 61 61 61 62 62 62 62 63 63 63 64 64 64 64 64 65 65

Total time of execution  = 0.016000, when array size = 200


Enter choice:-
1. Random input
2. Sorted input
3. Sorted with 1% as random input
4. Exit
4
PS D:\Documents\DSP assignment\7>
```

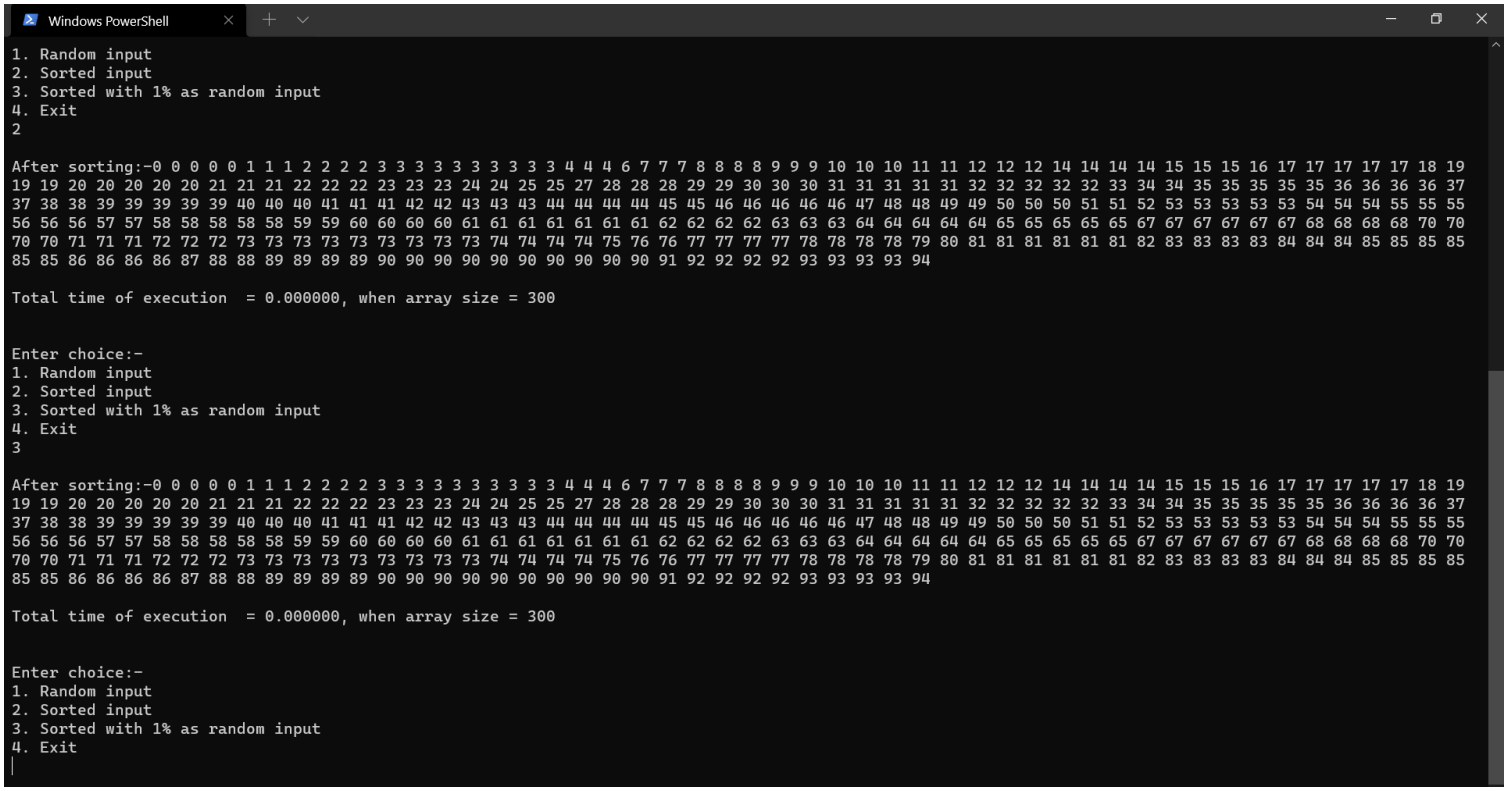
```
Windows PowerShell

PS D:\Documents\DSP assignment\7> gcc -o q2 quicksort2.c
PS D:\Documents\DSP assignment\7> ./q2

Implementation of quicksort with random element as pivot.
--------------------------------------------------------------------------------
Enter choice:-
1. Random input
2. Sorted input
3. Sorted with 1% as random input
4. Exit
1

After sorting:-15 31 247 307 314 401 413 854 1424 1428 1472 1524 1540 1653 1708 1786 1858 2016 2237 2381 2387 2534 2720 2814 2960 3222 3371 3394 3415 3493 3
553 3609 3676 3779 3788 3850 3909 4063 4108 4213 4508 4630 4825 5159 5244 5293 5309 5360 5369 5437 5540 5596 5734 5763 5804 5836 6174 6715 6984 7034 7072 71
49 7184 7203 7226 7307 7400 7635 7677 7715 7832 7845 7846 8546 8582 8583 8584 8682 8696 8697 9046 9291 9295 9363 9460 9479 9683 9687 9784 9801 9849 9859 994
2 10013 10311 10328 10332 10377 10424 10450 10727 10744 10921 11316 11480 11704 11726 11827 11841 12196 12280 12304 12673 12678 12693 12909 12939 13012 1302
6 13071 13088 13215 13536 13570 13625 13921 13988 14102 14319 14422 14561 14619 14794 14850 15122 15132 15289 15642 15660 15668 15669 15772 15779 15802 1583
6 15997 16140 16265 16402 16534 16589 16671 16795 16813 16928 17063 17065 17077 17207 17271 17392 17535 17590 17641 17661 17768 17860 17954 17954 18212 1836
1 18367 18409 18619 18750 18763 18765 18779 18889 18943 18966 19391 19498 19529 19588 19787 19842 20118 20122 20129 20166 20232 20300 20405 20498 20647 2112
4 21187 21258 21274 21595 21666 21894 21952 22023 22077 22088 22138 22188 22497 22510 22514 22628 22634 22705 22726 22976 23121 23158 23316 23541 23749 2377
9 23968 24049 24101 24122 24176 24418 24472 24490 24756 24764 24806 24998 25008 25041 25066 25156 25347 25375 25383 25568 25588 25698 25741 25832 25880 2605
9 26362 26494 26565 26709 26730 27210 27237 27270 27398 27539 27563 27662 27865 27941 28137 28255 28259 28528 28574 28862 28899 28981 29333 29518 29660 2996
5 30041 30072 30162 30171 30576 30723 30797 30967 30984 31030 31136 31195 31218 31285 31325 31329 31332 31413 32055 32066 32391 32449 32489 32559 32702

Total time of execution  = 0.000000, when array size = 300


Enter choice:-
1. Random input
2. Sorted input
3. Sorted with 1% as random input
4. Exit
2

After sorting:-0 0 0 0 0 1 1 1 2 2 2 2 3 3 3 3 3 3 3 3 3 4 4 4 6 7 7 7 8 8 8 8 9 9 9 10 10 10 11 11 12 12 12 14 14 14 14 15 15 15 16 17 17 17 17 17 18 19
19 19 20 20 20 20 20 21 21 21 22 22 22 23 23 23 24 24 25 25 27 28 28 28 29 29 30 30 30 31 31 31 31 31 32 32 32 32 32 33 34 34 35 35 35 35 35 36 36 36 36 37
37 38 38 39 39 39 39 39 40 40 40 41 41 41 42 42 43 43 43 44 44 44 44 45 45 46 46 46 46 46 46 47 48 48 49 49 50 50 50 51 51 52 53 53 53 53 53 54 54 54 55 55 55
56 56 56 57 57 58 58 58 58 58 59 59 60 60 60 60 61 61 61 61 61 61 61 62 62 62 62 63 63 63 64 64 64 64 64 65 65 65 65 65 67 67 67 67 67 67 68 68 68 68 70 70
70 70 71 71 71 72 72 72 73 73 73 73 73 73 73 73 73 73 74 74 74 74 75 76 76 77 77 77 77 78 78 78 78 79 80 81 81 81 81 81 81 82 83 83 83 83 84 84 84 85 85 85 85
```

```
Windows PowerShell
1. Random input
2. Sorted input
3. Sorted with 1% as random input
4. Exit
2

After sorting:-0 0 0 0 0 1 1 1 2 2 2 2 3 3 3 3 3 3 3 3 4 4 4 6 7 7 7 8 8 8 8 9 9 9 10 10 10 11 11 12 12 12 14 14 14 14 15 15 15 16 17 17 17 17 17 18 19
19 19 20 20 20 20 20 21 21 21 22 22 22 23 23 23 24 24 25 25 27 28 28 28 29 29 30 30 30 31 31 31 31 31 32 32 32 32 32 33 34 34 35 35 35 35 35 36 36 36 36 37
37 38 38 39 39 39 39 39 40 40 40 41 41 41 42 42 43 43 43 44 44 44 44 45 45 46 46 46 46 46 47 48 48 49 49 50 50 50 51 51 52 53 53 53 53 53 54 54 54 55 55 55
56 56 56 57 57 58 58 58 58 58 59 59 60 60 60 60 61 61 61 61 61 61 61 62 62 62 62 63 63 63 64 64 64 64 64 65 65 65 65 65 67 67 67 67 67 67 68 68 68 68 70 70
70 70 71 71 71 72 72 72 73 73 73 73 73 73 73 73 73 73 74 74 74 74 75 76 76 77 77 77 77 78 78 78 78 79 80 81 81 81 81 81 81 82 83 83 83 83 84 84 84 85 85 85 85
85 85 86 86 86 86 87 88 88 89 89 89 89 90 90 90 90 90 90 90 90 90 90 91 92 92 92 92 93 93 93 93 94

Total time of execution  = 0.000000, when array size = 300


Enter choice:-
1. Random input
2. Sorted input
3. Sorted with 1% as random input
4. Exit
3

After sorting:-0 0 0 0 0 1 1 1 2 2 2 2 3 3 3 3 3 3 3 3 4 4 4 6 7 7 7 8 8 8 8 9 9 9 10 10 10 11 11 12 12 12 14 14 14 14 15 15 15 16 17 17 17 17 17 18 19
19 19 20 20 20 20 20 21 21 21 22 22 22 23 23 23 24 24 25 25 27 28 28 28 29 29 30 30 30 31 31 31 31 31 32 32 32 32 32 33 34 34 35 35 35 35 35 36 36 36 36 37
37 38 38 39 39 39 39 39 40 40 40 41 41 41 42 42 43 43 43 44 44 44 44 45 45 46 46 46 46 46 47 48 48 49 49 50 50 50 51 51 52 53 53 53 53 53 54 54 54 55 55 55
56 56 56 57 57 58 58 58 58 58 59 59 60 60 60 60 61 61 61 61 61 61 61 62 62 62 62 63 63 63 64 64 64 64 64 65 65 65 65 65 67 67 67 67 67 67 68 68 68 68 70 70
70 70 71 71 71 72 72 72 73 73 73 73 73 73 73 73 73 73 74 74 74 74 75 76 76 77 77 77 77 78 78 78 78 79 80 81 81 81 81 81 81 82 83 83 83 83 84 84 84 85 85 85 85
85 85 86 86 86 86 87 88 88 89 89 89 89 90 90 90 90 90 90 90 90 90 90 91 92 92 92 92 93 93 93 93 94

Total time of execution  = 0.000000, when array size = 300


Enter choice:-
1. Random input
2. Sorted input
3. Sorted with 1% as random input
4. Exit
```

```
Windows PowerShell
 30440 30453 30454 30454 30457 30463 30463 30465 30471 30473 30475 30489 30503 30503 30504 30511 30517 30517 30518 30519 30520 30521 30522 30524 30524 30530
PS D:\Documents\DSP assignment\7> gcc -o q3 quicksort3.c
PS D:\Documents\DSP assignment\7> ./q3

Implementation of quicksort with median of {first, middle and last element} as pivot.
--------------------------------------------------------------------------------
Enter choice:-
1. Random input
2. Sorted input
3. Sorted with 1% as random input
4. Exit
1

After sorting:-15 31 247 307 314 401 413 854 1424 1428 1472 1524 1540 1653 1708 1786 1858 2016 2237 2381 2387 2534 2720 2814 2960 3222 3371 3394 3415 3493 3
553 3609 3676 3779 3788 3850 3909 4063 4108 4213 4508 4630 4825 5159 5244 5293 5309 5360 5369 5437 5540 5596 5734 5763 5804 5836 6174 6715 6984 7034 7072 71
49 7184 7203 7226 7307 7400 7635 7677 7715 7832 7845 7846 8546 8582 8583 8584 8682 8696 8697 9046 9291 9295 9363 9460 9479 9683 9687 9784 9801 9849 9859 994
2 10013 10311 10328 10332 10377 10424 10450 10727 10744 10921 11316 11480 11704 11726 11827 11841 12196 12280 12304 12673 12678 12693 12909 12939 13012 1302
6 13071 13088 13215 13536 13570 13625 13921 13988 14102 14319 14422 14561 14619 14794 14850 15122 15132 15289 15642 15660 15668 15669 15772 15779 15802 1583
6 15997 16140 16265 16402 16534 16589 16671 16795 16813 16928 17063 17065 17077 17207 17271 17392 17535 17590 17641 17661 17768 17860 17954 17954 18212 1836
1 18367 18409 18619 18750 18763 18765 18779 18889 18943 18966 19391 19498 19529 19588 19787 19842 20118 20122 20129 20166 20232 20300 20405 20498 20647 2112
4 21187 21258 21274 21595 21666 21894 21952 22023 22077 22088 22138 22188 22497 22510 22514 22628 22634 22705 22726 22976 23121 23158 23316 23541 23749 2377
9 23968 24049 24101 24122 24176 24418 24472 24490 24756 24764 24806 24998 25008 25041 25066 25156 25347 25375 25383 25568 25588 25698 25741 25832 25880 2605
9 26362 26494 26565 26709 26730 27210 27237 27270 27398 27539 27563 27662 27865 27941 28137 28255 28259 28528 28574 28862 28899 28981 29333 29518 29660 2996
5 30041 30072 30162 30171 30576 30723 30797 30967 30984 31030 31136 31195 31218 31285 31325 31329 31332 31413 32055 32066 32391 32449 32489 32559 32702

Total time of execution  = 0.015000, when array size = 300


Enter choice:-
1. Random input
2. Sorted input
3. Sorted with 1% as random input
4. Exit
2

After sorting:-0 0 0 0 0 1 1 1 2 2 2 2 3 3 3 3 3 3 3 3 4 4 4 6 7 7 7 8 8 8 8 9 9 9 10 10 10 11 11 12 12 12 14 14 14 14 15 15 15 16 17 17 17 17 17 18 19
19 19 20 20 20 20 20 21 21 21 22 22 22 23 23 23 24 24 25 25 27 28 28 28 29 29 30 30 30 31 31 31 31 31 32 32 32 32 32 33 34 34 35 35 35 35 35 36 36 36 36 37
37 38 38 39 39 39 39 39 40 40 40 41 41 41 42 42 43 43 43 44 44 44 44 45 45 46 46 46 46 46 47 48 48 49 49 50 50 50 51 51 52 53 53 53 53 53 54 54 54 55 55 55
56 56 56 57 57 58 58 58 58 58 59 59 60 60 60 60 61 61 61 61 61 61 61 62 62 62 62 63 63 63 64 64 64 64 64 65 65 65 65 65 67 67 67 67 67 67 68 68 68 68 70 70
```

```
Windows PowerShell
2. Sorted input
3. Sorted with 1% as random input
4. Exit
2

After sorting:-0 0 0 0 0 1 1 1 2 2 2 2 3 3 3 3 3 3 3 3 3 4 4 4 6 7 7 7 8 8 8 8 9 9 9 10 10 10 11 11 12 12 12 14 14 14 14 15 15 15 16 17 17 17 17 17 18 19
19 19 20 20 20 20 20 21 21 21 22 22 22 23 23 23 24 24 25 25 27 28 28 28 29 29 30 30 30 31 31 31 31 31 32 32 32 32 32 33 34 34 35 35 35 35 35 36 36 36 36 37
37 38 38 39 39 39 39 39 40 40 40 41 41 41 41 42 42 43 43 43 44 44 44 44 44 45 45 46 46 46 46 46 47 48 48 49 49 50 50 50 51 51 52 53 53 53 53 53 54 54 54 55 55 55
56 56 56 57 57 58 58 58 58 58 59 59 60 60 60 60 61 61 61 61 61 61 61 62 62 62 62 63 63 63 64 64 64 64 64 65 65 65 65 65 67 67 67 67 67 67 68 68 68 68 70 70
70 70 71 71 71 72 72 72 73 73 73 73 73 73 73 73 73 73 74 74 74 74 75 76 76 77 77 77 77 78 78 78 78 79 80 81 81 81 81 81 81 82 83 83 83 83 84 84 84 85 85 85 85
85 85 86 86 86 86 87 88 88 89 89 89 89 90 90 90 90 90 90 90 90 90 90 90 91 92 92 92 92 93 93 93 93 94

Total time of execution  = 0.000000, when array size = 300


Enter choice:-
1. Random input
2. Sorted input
3. Sorted with 1% as random input
4. Exit
3

After sorting:-0 0 0 0 0 1 1 1 2 2 2 2 3 3 3 3 3 3 3 3 3 4 4 4 6 7 7 7 8 8 8 8 9 9 9 10 10 10 11 11 12 12 12 14 14 14 14 15 15 15 16 17 17 17 17 17 18 19
19 19 20 20 20 20 20 21 21 21 22 22 22 23 23 23 24 24 25 25 27 28 28 28 29 29 30 30 30 31 31 31 31 31 32 32 32 32 32 33 34 34 35 35 35 35 35 36 36 36 36 37
37 38 38 39 39 39 39 39 40 40 40 41 41 41 42 42 43 43 43 44 44 44 44 44 45 45 46 46 46 46 46 47 48 48 49 49 50 50 50 51 51 52 53 53 53 53 53 54 54 54 55 55 55
56 56 56 57 57 58 58 58 58 58 59 59 60 60 60 60 61 61 61 61 61 61 61 62 62 62 62 63 63 63 64 64 64 64 64 65 65 65 65 65 67 67 67 67 67 67 68 68 68 68 70 70
70 70 71 71 71 72 72 72 73 73 73 73 73 73 73 73 73 73 74 74 74 74 75 76 76 77 77 77 77 78 78 78 78 79 80 81 81 81 81 81 81 82 83 83 83 83 84 84 84 85 85 85 85
85 85 86 86 86 86 87 88 88 89 89 89 89 90 90 90 90 90 90 90 90 90 90 90 91 92 92 92 92 93 93 93 93 94

Total time of execution  = 0.000000, when array size = 300


Enter choice:-
1. Random input
2. Sorted input
3. Sorted with 1% as random input
4. Exit
4
PS D:\Documents\DSP assignment\7>
```

```
Windows PowerShell
2. Sorted input
PS D:\Documents\DSP assignment\7> gcc -o q4 quicksort4.c
PS D:\Documents\DSP assignment\7> ./q4

Implementation of quicksort with {n/4th , middle & 3n/4th element} as pivot.
------------------------------------------------------------
Enter choice:-
1. Random input
2. Sorted input
3. Sorted with 1% as random input
4. Exit

1

After sorting:-15 31 247 307 314 401 413 854 1424 1428 1472 1524 1540 1653 1708 1786 1858 2016 2237 2381 2387 2534 2720 2814 2960 3222 3371 3394 3415 3493 3
553 3609 3676 3779 3788 3850 3909 4063 4108 4213 4508 4630 4825 5159 5244 5293 5309 5360 5369 5437 5540 5596 5734 5763 5804 5836 6174 6715 6984 7034 7072 71
49 7184 7203 7226 7307 7400 7635 7677 7715 7832 7845 7846 8546 8582 8583 8584 8682 8696 8697 9046 9291 9295 9363 9460 9479 9683 9687 9784 9801 9849 9859 994
2 10013 10311 10328 10332 10377 10424 10450 10727 10744 10921 11316 11480 11704 11726 11827 11841 12196 12280 12304 12673 12678 12693 12909 12939 13012 1302
6 13071 13088 13215 13536 13570 13625 13921 13988 14102 14319 14422 14561 14619 14794 14850 15122 15132 15289 15642 15660 15668 15669 15772 15779 15802 1583
6 15997 16140 16265 16402 16534 16589 16671 16795 16813 16928 17063 17065 17077 17207 17271 17392 17535 17590 17641 17661 17768 17860 17954 17954 18212 1836
1 18367 18409 18619 18750 18763 18765 18779 18889 18943 18966 19391 19498 19529 19588 19787 19842 20118 20122 20129 20166 20232 20300 20405 20498 20647 2112
4 21187 21258 21274 21595 21666 21894 21952 22023 22077 22088 22138 22188 22497 22510 22514 22628 22634 22705 22726 22976 23121 23158 23316 23541 23749 2377
9 23968 24049 24101 24122 24176 24418 24472 24490 24756 24764 24806 24998 25008 25041 25066 25156 25347 25375 25383 25568 25588 25698 25741 25832 25880 2605
9 26362 26494 26565 26709 26730 27210 27237 27270 27398 27539 27563 27662 27865 27941 28137 28255 28259 28528 28574 28862 28899 28981 29333 29518 29660 2996
5 30041 30072 30162 30171 30576 30723 30797 30967 30984 31030 31136 31195 31218 31285 31325 31329 31332 31413 32055 32066 32391 32449 32489 32559 32702

Total time of execution  = 0.015000, when array size = 300


Enter choice:-
1. Random input
2. Sorted input
3. Sorted with 1% as random input
4. Exit
2

After sorting:-0 0 0 0 0 1 1 1 2 2 2 2 3 3 3 3 3 3 3 3 3 4 4 4 6 7 7 7 8 8 8 8 9 9 9 10 10 10 11 11 12 12 12 14 14 14 14 15 15 15 16 17 17 17 17 17 18 19
19 19 20 20 20 20 20 21 21 21 22 22 22 23 23 23 24 24 25 25 27 28 28 28 29 29 30 30 30 31 31 31 31 31 32 32 32 32 32 33 34 34 35 35 35 35 35 36 36 36 36 37
37 38 38 39 39 39 39 39 40 40 40 41 41 41 42 42 43 43 43 44 44 44 44 44 45 45 46 46 46 46 46 47 48 48 49 49 50 50 50 51 51 52 53 53 53 53 53 54 54 54 55 55 55
```


Windows PowerShell
1. Random input
2. Sorted input
3. Sorted with 1% as random input
4. Exit
2
After sorting:-0 0 0 0 0 1 1 1 2 2 2 2 3 3 3 3 3 3 3 3 3 4 4 4 6 7 7 7 8 8 8 8 9 9 9 10 10 10 11 11 12 12 12 14 14 14 14 15 15 15 16 17 17 17 17 17 18 19
19 19 20 20 20 20 20 21 21 21 22 22 22 23 23 23 24 24 25 25 27 28 28 28 29 29 30 30 30 31 31 31 31 31 32 32 32 32 32 33 34 34 35 35 35 35 35 36 36 36 36 37
37 38 38 39 39 39 39 39 40 40 40 41 41 41 42 42 43 43 43 44 44 44 44 44 45 45 46 46 46 46 46 47 48 48 49 49 50 50 50 51 51 52 53 53 53 53 53 54 54 54 55 55 55
56 56 56 57 57 58 58 58 58 58 58 59 59 60 60 60 60 60 61 61 61 61 61 61 61 62 62 62 62 63 63 63 64 64 64 64 64 65 65 65 65 65 67 67 67 67 67 67 68 68 68 68 70 70
70 70 71 71 71 72 72 72 73 73 73 73 73 73 73 73 73 73 74 74 74 74 75 76 76 77 77 77 77 78 78 78 78 79 80 81 81 81 81 81 81 82 83 83 83 83 84 84 84 85 85 85 85
85 85 86 86 86 86 87 88 88 89 89 89 89 90 90 90 90 90 90 90 90 90 90 91 92 92 92 92 93 93 93 93 94
Total time of execution = 0.000000, when array size = 300
Enter choice:-
1. Random input
2. Sorted input
3. Sorted with 1% as random input
4. Exit
3
After sorting:-0 0 0 0 0 1 1 1 2 2 2 2 3 3 3 3 3 3 3 3 3 4 4 4 6 7 7 7 8 8 8 8 9 9 9 10 10 10 11 11 12 12 12 14 14 14 14 15 15 15 16 17 17 17 17 17 18 19
19 19 20 20 20 20 20 21 21 21 22 22 22 23 23 23 24 24 25 25 27 28 28 28 29 29 30 30 30 31 31 31 31 31 32 32 32 32 32 33 34 34 35 35 35 35 35 36 36 36 36 37
37 38 38 39 39 39 39 39 40 40 40 41 41 41 42 42 43 43 43 44 44 44 44 44 45 45 46 46 46 46 46 47 48 48 49 49 50 50 50 51 51 52 53 53 53 53 53 54 54 54 55 55 55
56 56 56 57 57 58 58 58 58 58 58 59 59 60 60 60 60 60 61 61 61 61 61 61 61 62 62 62 62 63 63 63 64 64 64 64 64 65 65 65 65 65 67 67 67 67 67 67 68 68 68 68 70 70
70 70 71 71 71 72 72 72 73 73 73 73 73 73 73 73 73 73 74 74 74 74 75 76 76 77 77 77 77 78 78 78 78 79 80 81 81 81 81 81 81 82 83 83 83 83 84 84 84 85 85 85 85
85 85 86 86 86 86 87 88 88 89 89 89 89 90 90 90 90 90 90 90 90 90 90 91 92 92 92 92 93 93 93 93 94
Total time of execution = 0.000000, when array size = 300
Enter choice:-
1. Random input
2. Sorted input
3. Sorted with 1% as random input
4. Exit