

# Lab Report 1

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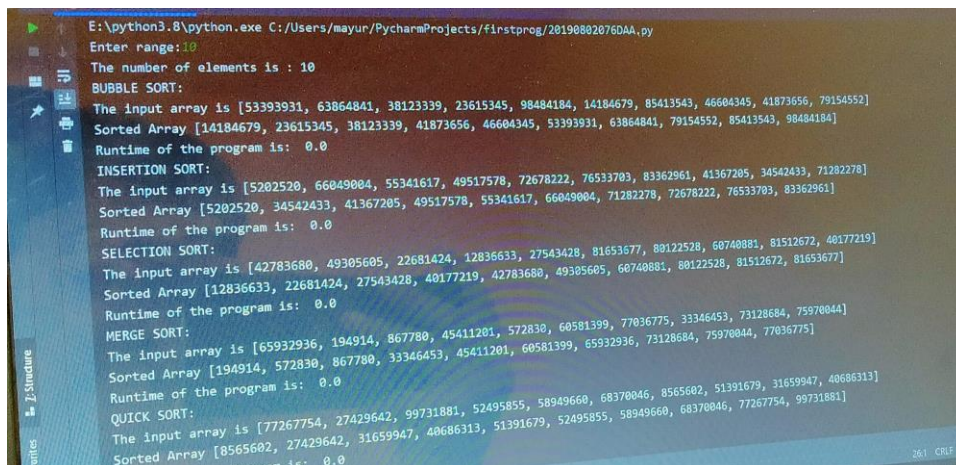
PRN-20180202076

**AIM** : SORTING ALGORITHMS, BY PERFORMING BUBBLE SORT, INSERTION SORT, SELECTION SORT, MERGE SORT AND QUICK SORT.

## EXPERIMENTS :

1. BUBBLE SORT: **Bubble sort**, is a simple sorting algorithm that repeatedly steps through the list, compares adjacent elements and swaps them if they are in the wrong order.
2. INSERTION SORT: **Insertion sort** is a simple sorting algorithm that builds the final sorted array.
3. SELECTION SORT: **selection sort** is an in-place comparison sorting algorithm.
4. MERGE SORT: Merge sort is a divide-conquer algorithm.
5. QUICK SORT: This is fastest algorithm , based on divide-conquer algorithm.

**OUTPUT : 1)** For n = 10:



```
E:\python3.8\python.exe C:/Users/mayur/PycharmProjects/firstprog/20190802076DAA.py
Enter range:10
The number of elements is : 10
BUBBLE SORT:
The input array is [53393931, 63864841, 38123339, 23615345, 98484184, 14184679, 85413543, 46604345, 41873656, 79154552]
Sorted Array [14184679, 23615345, 38123339, 41873656, 46604345, 53393931, 63864841, 79154552, 85413543, 98484184]
Runtime of the program is: 0.0
INSERTION SORT:
The input array is [5202520, 66049004, 55341617, 49517578, 72678222, 76533703, 83362961, 41367205, 34542433, 71282278]
Sorted Array [5202520, 34542433, 41367205, 49517578, 55341617, 66049004, 71282278, 72678222, 76533703, 83362961]
Runtime of the program is: 0.0
SELECTION SORT:
The input array is [42783680, 49305605, 22681424, 12836633, 27543428, 81653677, 80122528, 60740881, 81512672, 40177219]
Sorted Array [12836633, 22681424, 27543428, 40177219, 42783680, 49305605, 60740881, 80122528, 81512672, 81653677]
Runtime of the program is: 0.0
MERGE SORT:
The input array is [65932936, 194914, 867780, 45411201, 572830, 60581399, 77036775, 33346453, 73128684, 75970044]
Sorted Array [194914, 572830, 867780, 33346453, 45411201, 60581399, 65932936, 73128684, 75970044, 77036775]
Runtime of the program is: 0.0
QUICK SORT:
The input array is [77267754, 27429642, 99731881, 52495855, 58949660, 68370046, 8565602, 51391679, 31659947, 40686313]
Sorted Array [8565602, 27429642, 31659947, 40686313, 51391679, 52495855, 58949660, 68370046, 77267754, 99731881]
Runtime of the program is: 0.0
```

2) For n = 100 :

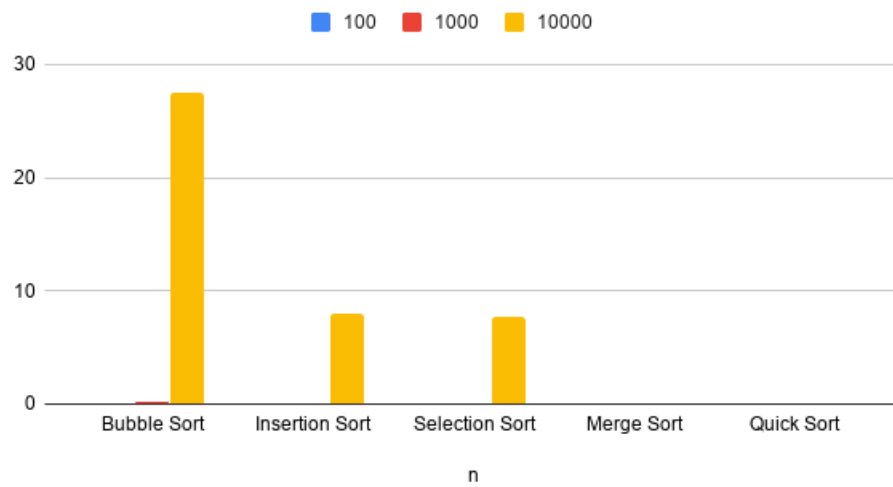
```
20190802076DAA
E:\python3.8\python.exe C:/Users/mayur/PycharmProjects/firstprog/20190802076DAA.py
Enter range:100
The number of elements is : 100
BUBBLE SORT:
The input array is [90201761, 19099378, 54107136, 11622852, 33577127, 26079173, 55376482, 61884670, 9227707, 897973, 7779936, 63379495, 49904171, 99658480,
Sorted Array [897973, 2687072, 3621215, 5387537, 6359149, 7779936, 8895408, 9227707, 9420539, 10954427, 11051052, 11622852, 13352870, 15705551, 16270562, 16
Runtime of the program is: 0.0019996166229248047
INSERTION SORT:
The input array is [20303290, 65478478, 23889561, 99830788, 49603420, 68006243, 41656771, 57822596, 46942375, 85495900, 90474654, 85339373, 86838331, 502272
Sorted Array [1031240, 1198916, 2222876, 2806376, 3072797, 7818023, 8569892, 10601685, 15495292, 16595161, 18658393, 18899465, 18997361, 19190545, 19661981,
Runtime of the program is: 0.001004695892339844
SELECTION SORT:
The input array is [26327538, 61578980, 36600931, 90133576, 81257546, 49634017, 2500186, 76930096, 11280135, 4433373, 14466014, 15484785, 6773209, 50742563
Sorted Array [978049, 2500186, 3742892, 4036341, 4433373, 4672908, 4853747, 4859047, 7282203, 7798411, 9256121, 9699568, 10542607, 10927093, 11280135, 11827
Runtime of the program is: 0.0009815692901611328
MERGE SORT:
The input array is [47263703, 30696568, 89695020, 34900990, 44219590, 32341869, 87224989, 90125603, 1265145, 31973257, 71085719, 78505791, 97750707, 76958689
Sorted Array [1265145, 1292958, 8725213, 9835485, 10340012, 10636722, 11290773, 14160717, 17574210, 18939047, 21631087, 22445045, 23337948, 24790301, 2614723
Runtime of the program is: 0.0
QUICK SORT:
The input array is [40816631, 58585673, 99707320, 65243832, 1116484, 88983122, 38624809, 69915317, 97496644, 76754001, 45047397, 65821686, 36810597, 35567416
Sorted Array [365848, 536969, 1116484, 2175776, 3923219, 4492707, 5724391, 6587476, 6809892, 7047239, 7223952, 8046508, 8419612, 8966348, 9753495, 11053903,
Runtime of the program is: 0.0
```

3) For n = 10000 :

```
20190802076DAA
E:\python3.8\python.exe C:/Users/mayur/PycharmProjects/firstprog/20190802076DAA.py
Enter range:10000
The number of elements is : 10000
BUBBLE SORT:
The input array is [6835449, 16281846, 85154200, 85300624, 68628969, 39920628, 46860493, 71409131, 67272208, 5462216, 67235204, 29795825, 95952501, 89182
Sorted Array [7516, 14906, 19693, 29181, 32240, 44479, 72463, 95339, 100876, 102881, 112825, 121292, 124092, 126642, 136414, 181405, 182946, 183651, 1874
Runtime of the program is: 27.556912183761597
INSERTION SORT:
The input array is [15889715, 14532052, 46642240, 15281354, 97090947, 61584552, 27484970, 63717388, 40419248, 84563150, 50034706, 42148156, 52873540, 990
Sorted Array [7598, 7881, 16167, 32751, 33785, 41362, 58655, 63043, 64332, 77326, 87534, 98076, 116192, 125685, 138000, 140815, 178671, 184568, 185746, 1
Runtime of the program is: 7.953908443450928
SELECTION SORT:
The input array is [43688920, 63102094, 87215458, 22220087, 86990816, 46930718, 93015469, 77015598, 46552508, 32227285, 50580912, 63846829, 74286166, 9614
Sorted Array [1657, 29722, 36257, 66160, 78141, 112950, 125014, 129963, 138249, 146234, 155779, 161313, 174926, 184724, 187526, 195566, 204000, 210722, 2
Runtime of the program is: 7.733491897583008
MERGE SORT:
The input array is [54857147, 41869528, 29683317, 70812520, 81969451, 38400322, 13934159, 8975490, 9337394, 24185500, 47754664, 98094578, 8518355, 40773
Sorted Array [5400, 17684, 18420, 40540, 43106, 45804, 72082, 74484, 82853, 102898, 106207, 127608, 148980, 173491, 176893, 184258, 208374, 224634, 22542
Runtime of the program is: 0.07097864151000977
QUICK SORT:
The input array is [41685301, 97187012, 75909529, 77504346, 16290328, 77085696, 37437837, 69430446, 27892427, 90828411, 81196362, 44884280, 78749450, 555
Sorted Array [2119, 16604, 37484, 40059, 51977, 55913, 56546, 90816, 92900, 94971, 103411, 136519, 137222, 156087, 171868, 175610, 177006, 188856, 191112,
```

Graph :

100, 1000 and 10000



CONCLUSION : THUS, ALL THE SORTED VERIFIED.