**DAA**

**LAB-2**

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**Aim:** Two implement two sorting algorithms ,quick sort and merge sort using iterative and recursive methods.and also compute and compare memory utilization and runtime.

**Quick sort:** It is a divide and conquer algorithm,It picks an element as pivot and partitions the given array around the picked pivot. There are many ways to pick the pivot the pivot in different ways.

1.First element as pivot.

2.Last element as pivot.

3.Random element as pivot.

4.Middle element as pivot.

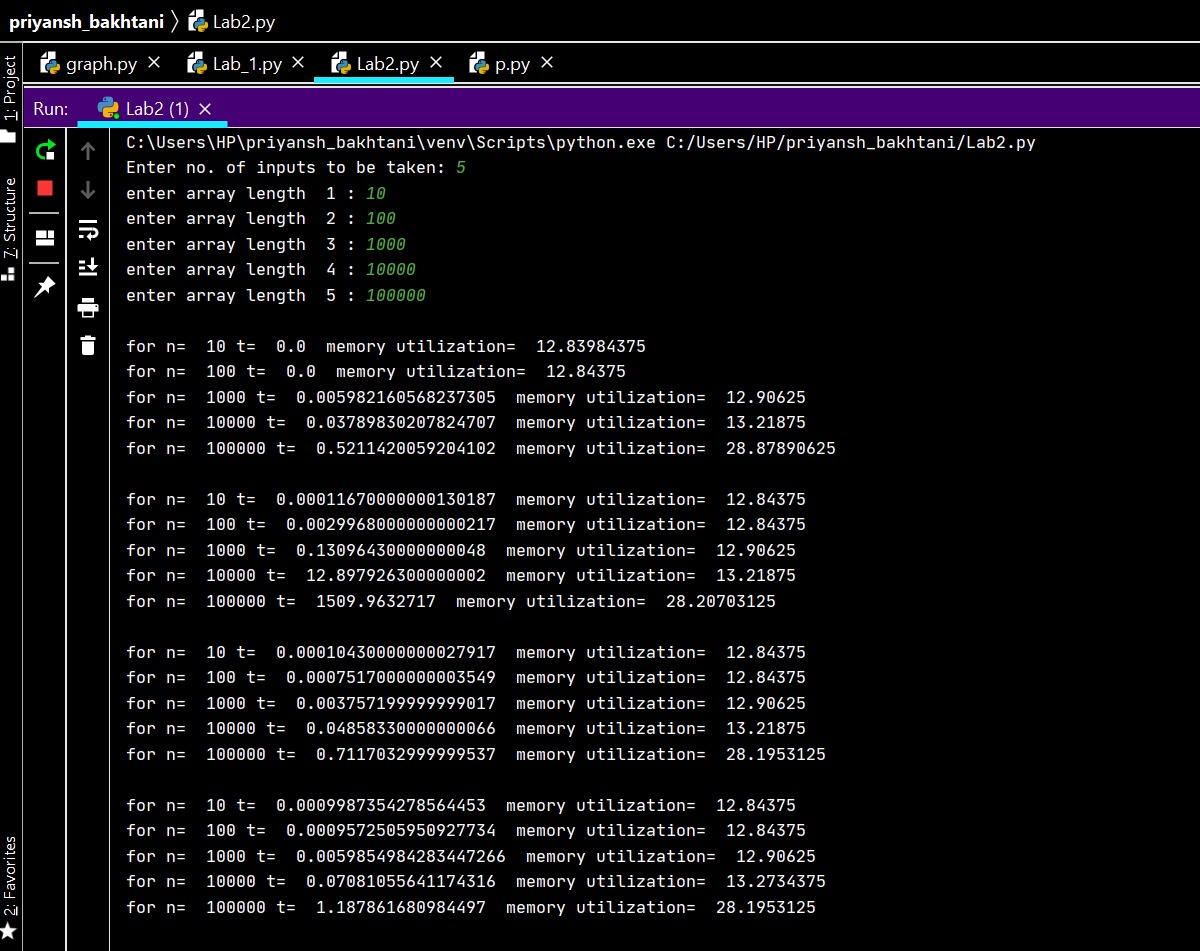
**Merge Sort:** This algorithm divides the array in two halves,call itselves for the two halves and merge the two sorted halves.

**Observation:**

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| --- | --- | --- | --- | --- | --- |
| Sorting  Algorithm | runtime  n=10 | n=100 | n=1000 | n=10000 | n=100000 |
| Quick sort(recursive) | 0.0 | 0.0 | 0.005982160568237305 | 0.03789830207824707 | 0.521142005920 |
| Quick sort(iterative) | 0.000000 | 0.00299 | 0.1309643000000 | 12.897926300000002 | 1509.9632717 |
| Merge sort (recursive) | 0.00010430 | 0.00075170 | 0.0037571 | 0.048583300 | 0.7117032 |
| Merge sort(iterative) | 0.000998735 | 0.000957 | 0.0059854984 | 0.07081055 | 1.18786168 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sorting  Algorithm | Memory utilization n=10 | n=100 | n=1000 | n=10000 | n=100000 |
| Quick sort(recursive) | 12.83984375 | 12.84375 | 12.90625 | 13.21875 | 28.87890625 |
| Quick sort(iterative) | 12.84375 | 12.84375 | 12.90625 | 13.21875 | 28.20703125 |
| Merge sort (recursive) | 12.84375 | 12.84375 | 12.90625 | 13.21875 | 28.1953125 |
| Merge sort(iterative) | 12.84375 | 12.84375 | 12.90625 | 13.2734375 | 28.1953125 |

**Output:**

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