



Name : Rajat Disawal	Class/Roll No. : 13	Grade :
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Title of Experiment : To implement merge sort in python.

<div>PAGE NO. : DATE : / / 20</div> <p align="center">EXPERIMENT - 2a</p> <p>AIM: To comprehend and implement the Merge Sort algorithm in Python</p> <p>Objective: To create a python program that sorts a given list of elements using the merge sort algorithm.</p> <p>Theory: Merge sort is a comparison-based sorting algorithm that follows the divide-and-conquer paradigm. The algorithm divides the input list into two halves, recursively sort each half, and then merges them. Sorted halves are merged to produce a fully sorted list. Merge sort is known for its stability and consistent $O(n \log n)$ time complexity, making it suitable for large datasets.</p> <p>The key steps in Merge Sort include dividing the array, sorting the subarray, and merging them. Understanding merge sort provides insights into efficient and reliable sorting techniques used in various applications.</p> <p>Algorithm</p> <ol style="list-style-type: none">1) Divide: Split the unsorted list into two halves.2) Conquer: Recursively sort each half.3) Merge: Merge the sorted halves to produce a fully sorted list. <p align="left">Amar KRISH</p> <p align="right">Teacher's Signature _____</p>
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Subject/Odd Sem 2023-23/Experiment 1

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Conclusion: In conclusion, merge sort is a robust sorting algorithm known for its efficiency and stability.



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Algorithm/ Pseudo Code / Flowchart (whichever is applicable)

Program code: Merge sort

```
def mergeSort(arr):
if len(arr) > 1:
mid = len(arr)//2
L = arr[:mid]
R = arr[mid:]
mergeSort(L)
mergeSort(R)
i = j = k = 0
while i < len(L) and j < len(R):
if L[i] <= R[j]:
arr[k] = L[i]
i += 1
else:
arr[k] = R[j]
j += 1
k += 1
while i < len(L):
arr[k] = L[i]
i += 1
k += 1
while j < len(R):
arr[k] = R[j]
j += 1
k += 1
def printList(arr):
for i in range(len(arr)):
print(arr[i], end=" ")
print()
if __name__ == '__main__':
arr = [12, 11, 13, 5, 6, 7]
print("Given array is")
printList(arr)
mergeSort(arr)
print("\nSorted array is ")
printList(arr)
```



Program :

1.	<p>Programs on Basic programming constructs like branching and looping.</p> <p>Output Screenshots :</p> <pre>Given array is 12 11 13 5 6 7 Sorted array is 5 6 7 11 12 13 ...Program finished with exit code 0 Press ENTER to exit console.</pre>
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Results and Discussions : Thus we have successfully executed merge sort program in python language.