

```
import random, time

def mergeSort(alist):
    if len(alist)>1:
        mid = len(alist)//2
        lefthalf = alist[:mid]
        righthalf = alist[mid:]

        mergeSort(lefthalf)
        mergeSort(righthalf)

        i=0
        j=0
        k=0
        while i < len(lefthalf) and j < len(righthalf):
            if lefthalf[i] < righthalf[j]:
                alist[k]=lefthalf[i]
                i=i+1
            else:
                alist[k]=righthalf[j]
                j=j+1
            k=k+1

        while i < len(lefthalf):
            alist[k]=lefthalf[i]
            i=i+1
            k=k+1

        while j < len(righthalf):
            alist[k]=righthalf[j]
```

```
j=j+1
```

```
k=k+1
```

```
def bubbleSort(alist):
```

```
    for passnum in range(len(alist)-1,0,-1):
```

```
        for i in range(passnum):
```

```
            if alist[i]>alist[i+1]:
```

```
                temp = alist[i]
```

```
                alist[i] = alist[i+1]
```

```
                alist[i+1] = temp
```

```
alist = []
```

```
numofnums = 0
```

```
while (numofnums != -1):
```

```
    log = open('SortLog.txt', 'a+')
```

```
    numofnums = int(input('How many numbers in the list (enter -1 to end): '))
```

```
    for i in range(0, numofnums):
```

```
        alist.append(random.randint(1,10000))
```

```
blist = alist
```

```
starttime1 = time.time()
```

```
bubbleSort(alist)
```

```
bubbletime = time.time() - starttime1
```

```
starttime2 = time.time()
```

```
mergeSort(blist)
```

```
mergetime = time.time() - starttime2
```

```
writethis = str(numofnums) + ' Bubbletime: ' + str(bubbletime) + ' Mergetime: ' + str(mergetime) + '\n'
```

```
if (numofnums != -1):
```

```
    log.write(writethis)
```

```
log.close()  
exit()
```

```
10 Bubbletime: 0.0 Mergetime: 0.0010001659393310547  
100 Bubbletime: 0.0010006427764892578 Mergetime: 0.0  
1000 Bubbletime: 0.12609028816223145 Mergetime: 0.004002571105957031  
5000 Bubbletime: 4.480252504348755 Mergetime: 0.02701854705810547  
9876 Bubbletime: 26.546775579452515 Mergetime: 0.07906103134155273  
35000 Bubbletime: 281.8498480319977 Mergetime: 0.327223539352417  
10 Bubbletime: 0.0 Mergetime: 0.0  
100 Bubbletime: 0.0020029544830322266 Mergetime: 0.0010085105895996094  
1000 Bubbletime: 0.1471083164215088 Mergetime: 0.004004001617431641  
3000 Bubbletime: 1.754300594329834 Mergetime: 0.0170135498046875  
5000 Bubbletime: 8.176910638809204 Mergetime: 0.04102897644042969  
9876 Bubbletime: 35.52402973175049 Mergetime: 0.10107231140136719  
30000 Bubbletime: 98.69518756866455 Mergetime: 0.19113421440124512  
50000 Bubbletime: 287.789324760437 Mergetime: 0.2812533378601074  
70000 Bubbletime: 564.6877353191376 Mergetime: 0.40624141693115234
```