

AP COMPUTER SCIENCE A – RECURSIVE MERGE SORT

The file `RecursiveMergeSort.java` performs a merge sort on a list of integers with a recursive algorithm. When a list of ten numbers is sorted, the methods `recursion` (lines 82 through 94) and `merge` (lines 96 through 112) are called in the order below with the argument values `b`, `m`, and `e` as indicated:

```
line 44: recursion called with (b,e) = (0,9)
line 90: recursion called with (b,e) = (0,4)
line 90: recursion called with (b,e) = (0,2)
line 90: recursion called with (b,e) = (0,1)
line 90: recursion called with (b,e) = (0,0)
line 91: recursion called with (b,e) = (1,1)
line 92: merge called with (b,m,e) = (0,0,1)
line 91: recursion called with (b,e) = (2,2)
line 92: merge called with (b,m,e) = (0,1,2)
line 91: recursion called with (b,e) = (3,4)
line 90: recursion called with (b,e) = (3,3)
line 91: recursion called with (b,e) = (4,4)
line 92: merge called with (b,m,e) = (3,3,4)
line 92: merge called with (b,m,e) = (0,2,4)
line 91: recursion called with (b,e) = (5,9)
line 90: recursion called with (b,e) = (5,7)
line 90: recursion called with (b,e) = (5,6)
line 90: recursion called with (b,e) = (5,5)
line 91: recursion called with (b,e) = (6,6)
line 92: merge called with (b,m,e) = (5,5,6)
line 91: recursion called with (b,e) = (7,7)
line 92: merge called with (b,m,e) = (5,6,7)
line 91: recursion called with (b,e) = (8,9)
line 90: recursion called with (b,e) = (8,8)
line 91: recursion called with (b,e) = (9,9)
line 92: merge called with (b,m,e) = (8,8,9)
line 92: merge called with (b,m,e) = (5,7,9)
line 92: merge called with (b,m,e) = (0,4,9)
```

As is seen, `merge` is called nine times. Below is the state of the array `list` before and after each of the nine calls. Note that the first column shows `list` as it was originally read in, and that the symbol “>” in the table indicates that the two adjoining lists are being merged.

b	b	b	b	b	b	b	b	b	b
m	m	m	m	m	m	m	m	m	m
e	e	e	e	e	e	e	e	e	e
=	=	=	=	=	=	=	=	=	=
0	0	3	0	5	5	8	5	0	
0	1	3	2	5	6	8	7	4	
1	2	4	4	6	7	9	9	9	
8	5	1	1	0	0	0	0	0	0
>									
5	8	5	5	1	1	1	1	1	1
>									
1	1	8	8	3	3	3	3	3	2
>									
0	0	0	0	5	5	5	5	5	3
>									
3	3	3	3	8	8	8	8	8	4
>									
6	6	6	6	6	6	2	2	2	5
>									
9	9	9	9	9	9	6	6	4	6
>									
2	2	2	2	2	2	9	9	6	7
>									
7	7	7	7	7	7	7	4	7	8
>									
4	4	4	4	4	4	4	7	9	9