Algorithm 12: MergeSort(A, ℓ, u)

    Input: array $A = (a_0, \ldots, a_{n-1})$, ℓ, u

1 **if** $\ell < u$ **then**
2      $m \leftarrow \left\lceil \frac{u-\ell}{2} \right\rceil$
3   MergeSort$(A, \ell, m-1)$
4   MergeSort(A, m, u)
5   Merge(A, ℓ, u, m)

Function Merge(A, ℓ, u, m)

    Input: array $A = (a_0, \ldots, a_{n-1})$, ℓ, u, m

1 $n_1 \leftarrow m - \ell$, $n_2 \leftarrow u - m + 1$
2 $L \leftarrow$ array of length $n_1 + 1$, $U \leftarrow$ array of length $n_2 + 1$
3 **for** $i \leftarrow 0, \ldots, n_1 - 1$ **do**
4      $L[i] \leftarrow A[\ell + i]$
5 **for** $i \leftarrow 0, \ldots, n_2 - 1$ **do**
6      $U[i] \leftarrow A[m + i]$
7 $L[n_1] \leftarrow \infty$, $U[n_2] \leftarrow \infty$
8 $i \leftarrow 0$, $j \leftarrow 0$
9 **for** $k \leftarrow \ell, \ldots, u$ **do**
10   **if** $L[i] \leq U[j]$ **then**
11        $A[k] \leftarrow L[i]$
12        $i \leftarrow i + 1$
13   **else**
14        $A[k] \leftarrow U[j]$
15        $j \leftarrow j + 1$

To sort an array $A = (a_0, \ldots, a_{n-1})$, call

$$\text{MergeSort}(A, 0, n - 1).$$