Algorithm 1 Parallel Partition

Input: test

1: **if** $g < 2$ **then**
2: serialPartition A
3: **else**
4: **for** $i \in \{0, 1, \ldots, s-1\}$ **do**
5: $X[i] \leftarrow$ a random integer from $[0, g-1]$
6: **end for**
7: **for all** $y \in \{0, 1, \ldots, g\}$ in parallel **do**
8: – Now we perform a serial partition on U_y
9: – Initialize ALowIdx to be the index of the first element in U_y
10: ALowIdx $\leftarrow ((X[0] + y) \bmod g) \cdot b$
11: – Initialize AHighIdx to be the index of the last element in U_y
12: AHighIdx $\leftarrow n - g \cdot b + ((X[s-1] + y) \bmod g) \cdot b + b - 1$
13: **while** ALowIdx $<$ AHighIdx **do**
14: **while** A[ALowIdx] $\leq$ pivotValue **do**
15: ALowIdx $\leftarrow$ ALowIdx+1
16: **if** ALowIdx on block boundary **then**
17: – We perform a block increment
18: $i \leftarrow$ # of block increments so far (including this one)
19: – Increase ALowIdx to start of block i of G_y
20: ALowIdx $\leftarrow ((X[i] + y) \bmod g) \cdot b + i \cdot b \cdot g$
21: **end if**
22: **end while**
23: **while** A[high] $>$ pivotValue **do**
24: AHighIdx $\leftarrow$ AHighIdx-1
25: **if** AHighIdx on block boundary **then**
26: – We perform a block decrement
27: $i \leftarrow$ # of block decrements so far (including this one)
28: – Decrease AHighIdx to end of block $s-1-i$ of G_y
29: AHighIdx $\leftarrow ((X[s-1-i]+y) \bmod g) \cdot b + i \cdot b \cdot g + b - 1$
30: **end if**
31: **end while**
32: Swap A[ALowIdx] and A[AHighIdx]
33: **end while**
34: Store v_i: the index of the first successor in U_y
35: **end for**
36: Compute $v_{min} = \min v_i, v_{max} = \max v_i$
37: Recurse on $A[v_{min}], \ldots, A[v_{max} - 1]$
38: **end if**