Let $A = A[1], A[2], \ldots, A[n]$ be an unsorted array of $n$ distinct integers. For any index $i$ between 1 and $n$, define $B[i]$ to be the smallest index $j$ such that $A[j] > A[i]$ and $i < j \leq n$, if such an index exists. Otherwise, $B[i] = n + 1$. Design an efficient algorithm that constructs the array $B$ for a given array $A$.

Example: If $A = [8, 3, 34, 13, 1, 2, 21, 5]$ then $B = [3, 3, 9, 7, 6, 7, 9, 9]$.

What is the worst-case number of comparisons made by your algorithm? Justify the correctness and complexity of your algorithm.

It is recommended not to write codes. You should better use words to describe your algorithm.
If you are not sure about your previous algorithm, describe any (possibly not efficient) correct algorithm that solves the problem. What is the worst-case number of comparisons made by your algorithm? Justify the correctness and complexity of your algorithm.