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Question 1:

The minimum key element in min-heap is found in root.

With the extract function, the root of the heap that is vehicle with the minimum speed is extracted, also this function returns the extracted vehicle, kind of like a pop operation.

The purpose of the decrease operation is to call the vehicle in the index entered without complying with the minimum heap priority. In order to call the vehicle, we want, the tool must be in root, so the time of the vehicle must be the smallest value in the heap. In order to achieve this, I reset the distance of given indexed vehicle. Therefore, the time was reset to 0 and the vehicle we wanted was placed in the root of the heap.

We add the vehicle, which we take as a parameter in the insert function, to the end after increasing the number of heap-size by 1. Then we place the last added vehicle in the correct position according to the heap in rule.

A heap of n size has depth is logn. The time complexity of the functions I explained all above is O(logn).
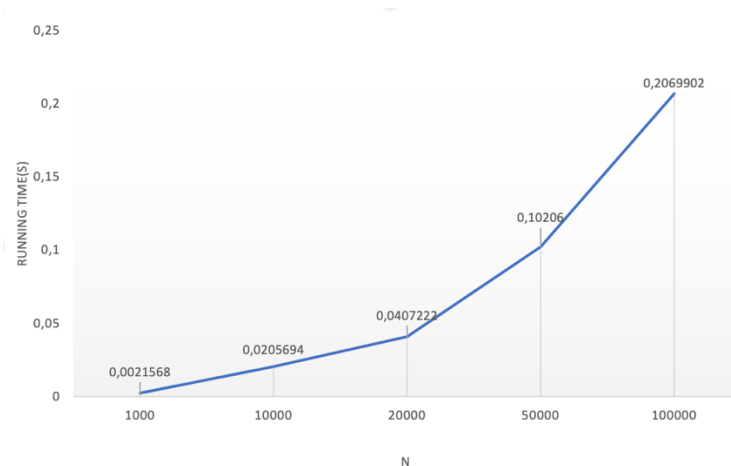
Question 2:

As we explained in the above question, the duration of an insert, extract or insert operation is T(n)=logn. In our code, N represents for the number of operations, and we were asked to write T(n) to give the duration of N operations. When we run our code for 1000, 10k, 20k, 50k and 100k and graph the times we get, the result is equal to nlog(n) graph. That is, n times log(n) operations.