# Report Table for Homework 2

|  | Words | Time taken (in milliseconds) in HW1 | Symbol Table Time taken (in milliseconds) |
| --- | --- | --- | --- |
| input1 | 20 | 0 | 1 |
| input2 | 9895 | 16 | 941 |
| input3 | 19712 | 30 | 1474 |

**Small Input**: For input1 with only 20 words, the difference is negligible (0ms vs 1ms).

**Larger Inputs**: The difference becomes quite pronounced with larger inputs. For input2 and input3, the SymbolTable takes considerably longer (941ms vs 16ms and 1474ms vs 30ms, respectively).

This disparity in performance likely stems from the different data structures used and their associated characteristics:

* unordered\_map (HW1):
  + Average time complexity for search, insert, and delete operations is O(1).
  + Relies on hashing, which can be very efficient for lookups.
  + Generally less overhead in memory management.
* Red-Black Tree (SymbolTable):
  + Time complexity for search, insert, and delete operations is O(log n).
  + While efficient, logarithmic time can be slower than constant time for smaller inputs.
  + More complex data structure with potential overhead from tree balancing operations and memory management.