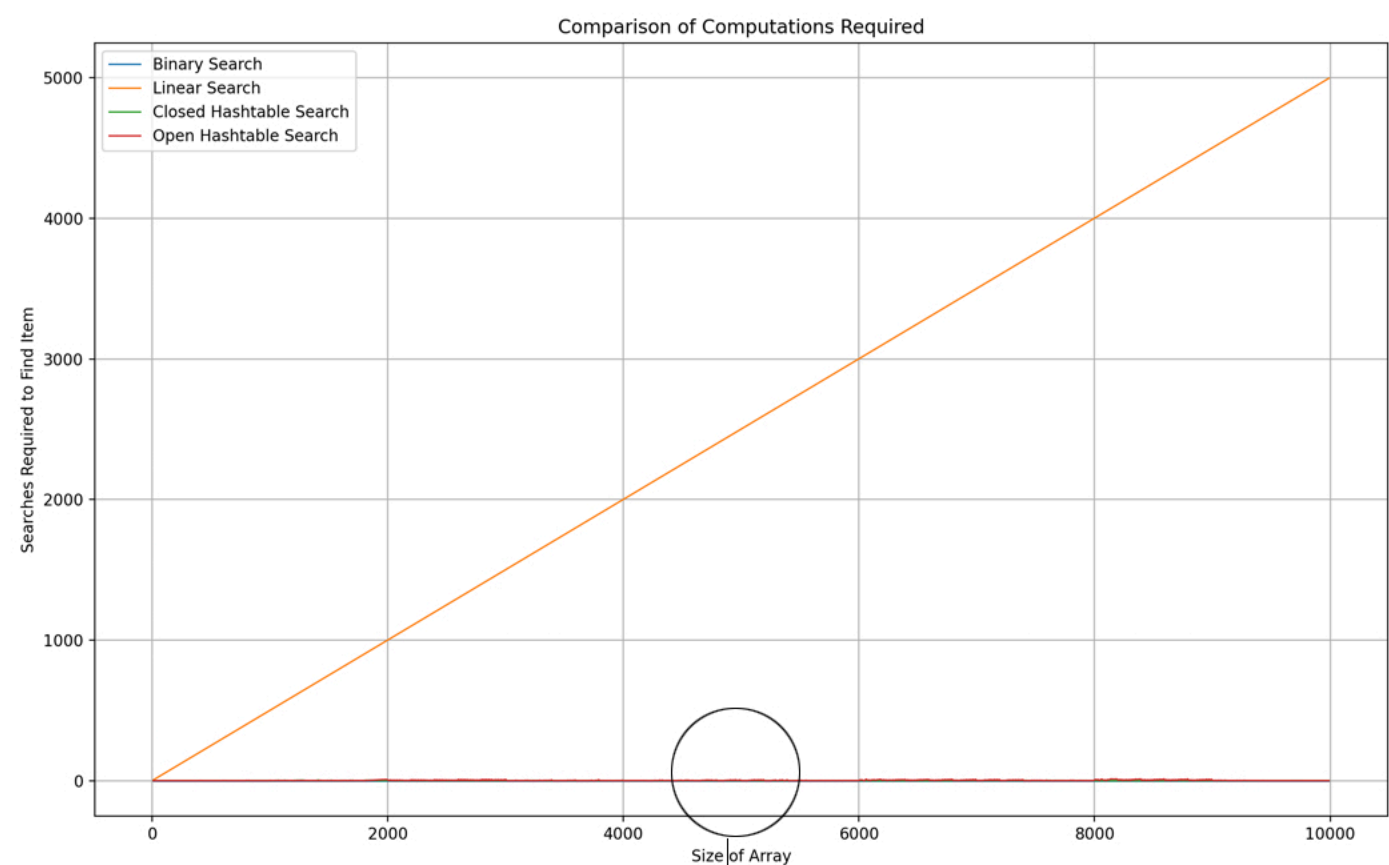


Item at middle

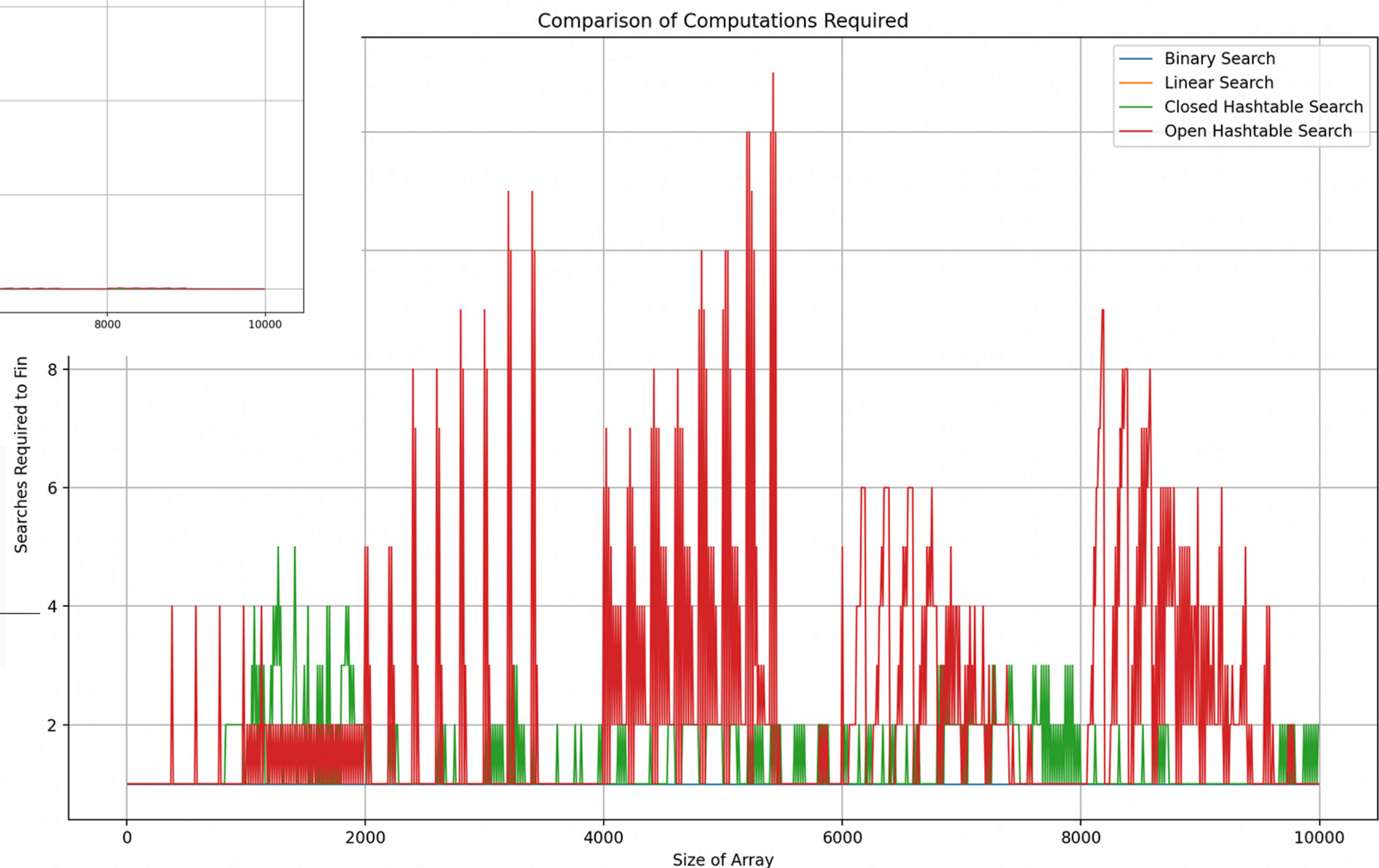


Benchmarking with problem size of 9990
Linear search time: 0.000022
Linear Search Comparisons: 4996

Binary search time: 0.000001
Binary Search Comparisons: 1

Open Hash search time: 0.000000
Open Hash Search Comparisons: 1

Closed Hash search time: 0.000002
Closed Hash Search Comparisons: 2



When searching for an item in the middle of an ordered array, the linear search algorithm will always perform at $O(N)/2$, traversing the entirety of a list before finding its item. Binary search will perform at its best case, $O(1)$, as shown by its flat line here. Ideally, both maps will perform near $O(1)$. As shown in the zoomed in selection, both maps perform fairly well, with clustering maxing out at 12 items for the open map and 3 for the closed map. Adjusting the resize amount (e.g. increasing memory used) reduces the clustering. This graph shows the result of a 50% increase rate and a .75 load factor threshold for both maps. The hashing algorithm will also have an effect on where the clustering occurs.