Task 2 – Analysis of Radix-Sort

Enoch Leow 30600022

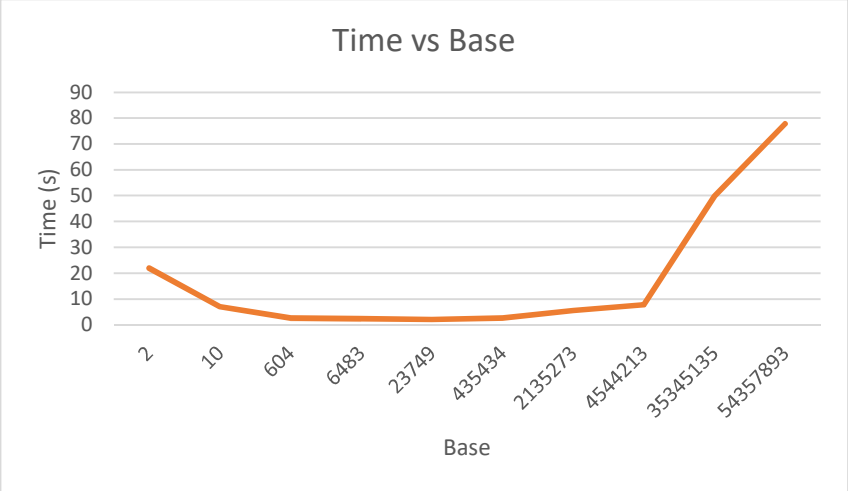
This document discusses the effects of using different bases on Radix-Sort's running time.

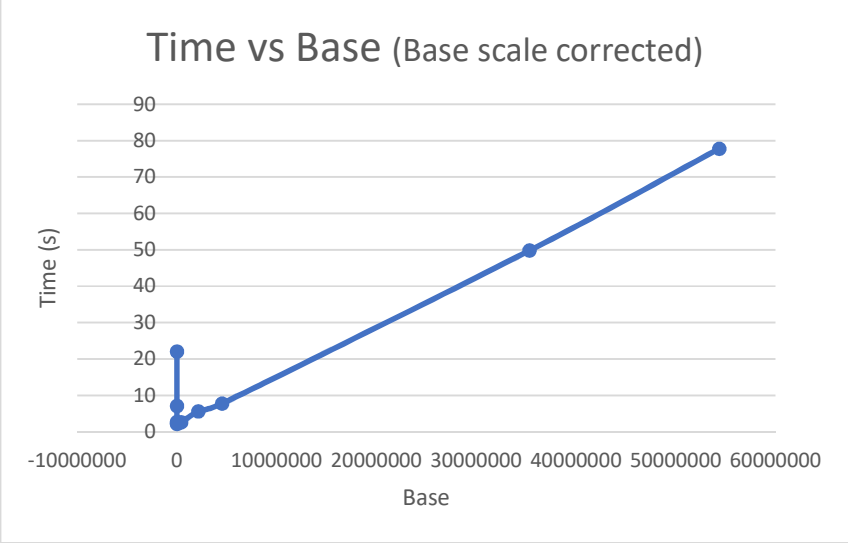
Selection of Bases

The specific bases were chosen in order to provide a wide range of data to analyse trends in its running time.
Bases were between 2 as Task 1 specified a base input in the range [2, inf), and 54357893 as anything above that produced a memory error.

Results

Base	Time (s)
2	22.05714
10	7.09411
604	2.738278
6483	2.417011
23749	2.119957
435434	2.645079
2135273	5.587925
4544213	7.771257
35345135	49.82946
54357893	77.8113





Analysis & Explanation

As seen in the graphs and table data, we see the best times (lowest) when the base is between 604 and 45434. We also see the worst (highest) times at the extreme ends when using low to very high bases.

According to the time complexity of Radix-Sort

O((N+b)M)

where
M= digits in max number when represented in base b,
b = Base,
N = number of elements in list

As we increase b, M decreases but as we decrease b, M increases.

As a result, when we use a low base, our M increases which greatly increases the functions running time.

Whereas when we use a large base, M decreases but b is high which also greatly increases the functions running time.

Therefore, we need a balance which is why quickest running time occurs when the base is between 604 and 45434