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Part 4 Writeup

Analysis of best case:

The best case for a RAL with 10,514 items is when both the level 1 and level 2 arrays have sizes equal to $\sqrt{10,514}$, or approximately 102.

Analysis of worst case:

The worst-case scenario is harder to calculate, but after testing it in code, I found that the level 1 array has a size of 166. The average level 2 array has a size of 63.3, but there are big outliers, with the smallest having only 2 elements and the largest having 188.

This makes sense, because if you're adding the elements in pre-sorted order (the worst possible case), once a level 2 array is split it's never changed again since all elements are added to the end. This is why the first level 2 array has only two elements.