

Binary Search Playlist

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Hard

Easy with Dry Run...

Median Of Two Sorted Arrays (PART-2)

Watch PART-1 → (i) Brute Force $O(m+n)$ Space
(ii) $O(1)$ Space

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4. Median of Two Sorted Arrays

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Given two sorted arrays `nums1` and `nums2` of size `m` and `n` respectively, return **the median** of the two sorted arrays

The overall run time complexity should be $O(\log(m+n))$.

Best Approach

$nums1 = \{ 2, 4, 9 \}$, $m = 3$
 $nums2 = \{ 8, 12, 19, 20 \}$, $n = 4$

2 4 8 9 12 19 20

nums2 = b1, b2, b3, b4, n = 4

$P_x = 3$ $num_1 \rightarrow$ $\begin{matrix} 2 & 4 & 9 \\ a_1, a_2, a_3 \end{matrix}$ $a_3 = 9$
 $(m+n+1)/2 - P_x$ $num_2 \rightarrow$ $\begin{matrix} 8 \\ b_1 \end{matrix}$ $b_1 = 8$
 $\begin{matrix} 12 & 19 & 20 \\ b_2, b_3, b_4 \end{matrix}$
 $\begin{matrix} 4 & 3 \end{matrix}$
 $\rightarrow (m+n+1)/2$

$$a_1, a_2, a_3$$

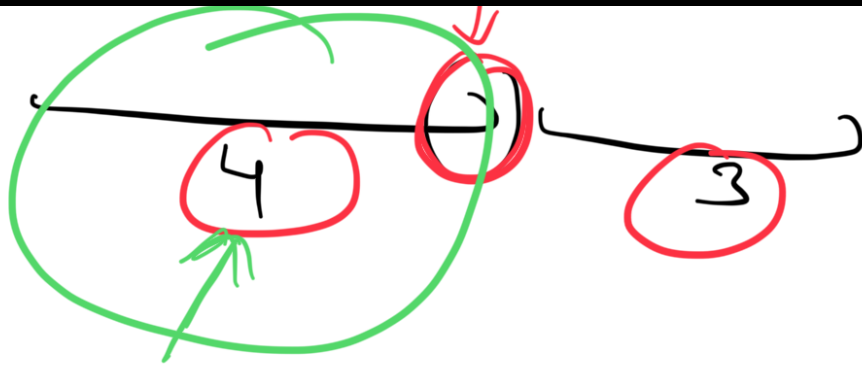
$$b_1, b_2, b_3, b_4$$

$$m+n=6$$

↓
even

$$m+n=7$$

$$\begin{aligned} &\leftarrow (m+n)/2 \\ &(m+n+1)/2 \\ &= (6+1)/2 = \end{aligned}$$



$$\begin{aligned} &= 3 \\ &(m+n)/2 \\ &= (m+n+1)/2 \\ &= 4 \end{aligned}$$

$$(m+n+1)/2$$

$$\text{nums1} = \{2, 4, 9\} \quad m = 3$$

$$\text{nums2} = \{8, 10, 12\} \quad n = 3$$

$$\begin{aligned} &(m+n+1)/2 \\ &= 7/2 = 3 \end{aligned}$$

$$\text{nums1} \rightarrow p_x = 2 \quad \begin{array}{c} x_1 \\ 2, 4 \end{array}$$

$$\begin{array}{c} \text{nums2} \rightarrow \\ p_y = 1 \end{array}$$

$$\begin{array}{c} x_2 \\ 8 \end{array}$$

$$\begin{array}{c} x_3 \\ 9 \\ x_4 \\ 10, 12 \end{array}$$



$$x_1 \leq x_4 \quad \& \quad x_2 \leq x_3$$

$$x_1 = \text{nums1}[p_x - 1]; \quad // 4$$

$$x_2 = \text{nums2}[p_y - 1]; \quad // 8$$

$x_3 = \text{nums1}[P_x] ; // 9$

$x_4 = \text{nums2}[P_y] ; // 10$

if $((m+n) \cdot 0.2 = 2)$

~~$\rightarrow (\max(x_1, x_2) + \min(x_3, x_4)) / 2$~~

$=$

return $\max(x_1, x_2) ;$

Binary Search

$\text{nums1} \rightarrow P_x$ 0 ✓
 1 ✓

$$l=0$$

$$r=m$$

2 ✓

$$mid = l + (r-l)/2$$

3 ✓

=

$$\underline{p_x} = l + (r-l)/2;$$

$$p_y = (m+n+1)/2 - p_x$$

..... x1

..... x2

x3

x4