

Product of Array Except Itself

Given $\text{nums}[n]$, return an array answer , Such that $\text{answer}[i]$ is equal to the product of all elements of nums except $\text{nums}[i]$

$$\text{nums}[] = \{1, 2, 3, 4\} \Rightarrow \text{ans}[] = \{24, 12, 8, 6\}$$

* We have to multiple every index Value Other than Current index for each index

// Algo

① Initialize a variable "Suffix = 1"

② for ($n-1 \rightarrow 1$)

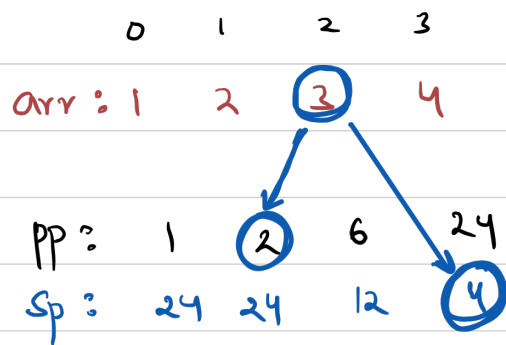
$$\text{prefixproduct}[i] = \text{prefixproduct}[i-1] * \text{suffix}$$

$$\text{suffix} = \text{suffix} * \text{arr}[i]$$

So, what is going there?

① Create a prefix product at starting itself

② Create SuffixProduct



for index: 2

$$\begin{aligned} \text{ans} &= 2 \times 4 \\ &= 8 \end{aligned}$$

At every index in between (1 to $n-2$)

$$\text{See} \rightarrow \text{PP}[i-1] \times \text{Sp}[i+1]$$

$$\text{if } (\text{index} == 0) \rightarrow \text{Sp}[i+1]$$

$$\text{if } (\text{index} == n-1) \rightarrow \text{PP}[i-1]$$

But... But... But...

Do we really need to maintain 2 arrays for prefix product & Suffix product

No

We can do the same logic with prefix product and a Variable

* Create a Suffix Variable
↳ Initializes to 1

* On every iteration update Suffix \Rightarrow By $\text{Suffix} * \text{arr}[i]$
($n-2$ to 1)

* Make ans for every index as $\Rightarrow \text{prefixproduct}[i] = \text{prefixproduct}[i-1] * \text{Suffix}$

* At last prefixproduct will be our answer

$arr[4] : \{ 1, 2, 3, 4 \}$

$prefixproduct[] : \{ 1, 2, 6, 24 \}$, $Suffix = 1$

$prefixproduct[i-1]$

$i \rightarrow$ traverse from $n-1$ to $\cancel{0}$ 1 (Edge case for $i=0$)

i

$Prefixproduct[i]$

$Suffix$

$(n-1) \rightarrow 3$

$$6 \times 1 = 6$$

$$1 \times arr[3] = 4$$

2

$$2 \times 4 = 8$$

$$4 \times arr[2] = 12$$

1

$$1 \times 12 = 12$$

$$12 \times arr[1] = 24$$

0

24

at $(i=0)$

$$prefixproduct[i] = Suffix$$