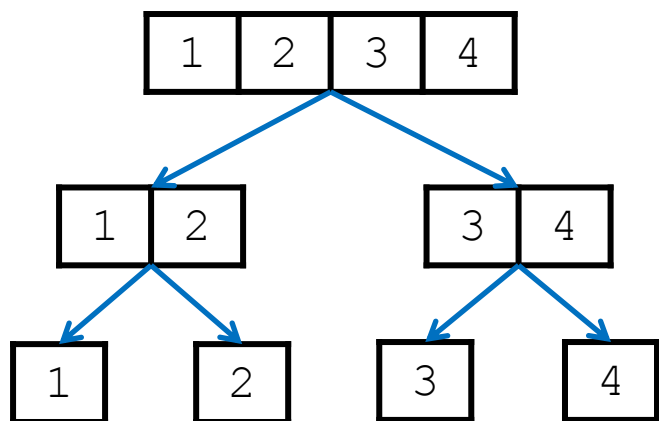


P3924：康娜的线段树

胡船长

初航我带你，远航靠自己

一、理解题目



$$\frac{1}{2^0} * (1 + 2 + 3 + 4)$$

$$\frac{1}{2^1} * (1 + 2)$$

$$\frac{1}{2^1} * (3 + 4)$$

$$\frac{1}{2^2} * 1$$

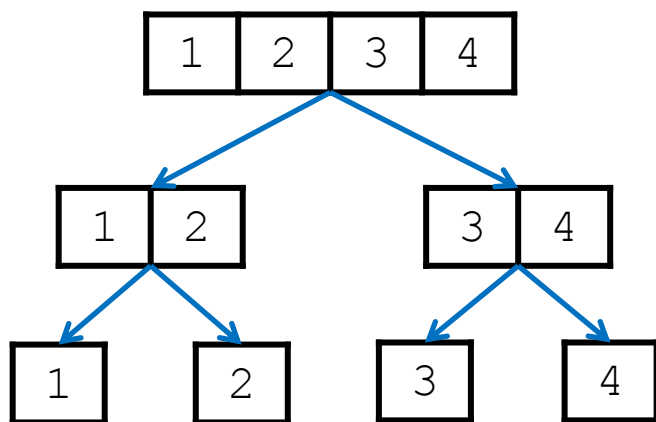
$$\frac{1}{2^2} * 2$$

$$\frac{1}{2^2} * 3$$

$$\frac{1}{2^2} * 4$$

一、理解题目

$$\frac{1}{2^0} * (1 + 2 + 3 + 4) + \frac{1}{2^1} * (1 + 2) + \frac{1}{2^1} * (3 + 4) + \frac{1}{2^2} * 1 + \frac{1}{2^2} * 2 + \frac{1}{2^2} * 3 + \frac{1}{2^2} * 4$$



二、变换公式

$$\frac{1}{2^0} * (1 + 2 + 3 + 4) + \frac{1}{2^1} * (1 + 2) + \frac{1}{2^1} * (3 + 4) + \frac{1}{2^2} * 1 + \frac{1}{2^2} * 2 + \frac{1}{2^2} * 3 + \frac{1}{2^2} * 4$$

二、变换公式

$$\frac{1}{2^0} * (1 + 2 + 3 + 4) + \frac{1}{2^1} * (1 + 2) + \frac{1}{2^1} * (3 + 4) + \frac{1}{2^2} * 1 + \frac{1}{2^2} * 2 + \frac{1}{2^2} * 3 + \frac{1}{2^2} * 4$$



$$1 * \left(\frac{1}{2^0} + \frac{1}{2^1} + \frac{1}{2^2} \right) + 2 * \left(\frac{1}{2^0} + \frac{1}{2^1} + \frac{1}{2^2} \right) + 3 * \left(\frac{1}{2^0} + \frac{1}{2^1} + \frac{1}{2^2} \right) + 4 * \left(\frac{1}{2^0} + \frac{1}{2^1} + \frac{1}{2^2} \right)$$

二、变换公式

$$\frac{1}{2^0} * (1 + 2 + 3 + 4) + \frac{1}{2^1} * (1 + 2) + \frac{1}{2^1} * (3 + 4) + \frac{1}{2^2} * 1 + \frac{1}{2^2} * 2 + \frac{1}{2^2} * 3 + \frac{1}{2^2} * 4$$



$$1 * \left(\frac{1}{2^0} + \frac{1}{2^1} + \frac{1}{2^2} \right) + 2 * \left(\frac{1}{2^0} + \frac{1}{2^1} + \frac{1}{2^2} \right) + 3 * \left(\frac{1}{2^0} + \frac{1}{2^1} + \frac{1}{2^2} \right) + 4 * \left(\frac{1}{2^0} + \frac{1}{2^1} + \frac{1}{2^2} \right)$$



$$\sum_{i=1}^n a_i * \left(2 - \frac{1}{2^{d_i}} \right)$$

三、区间修改

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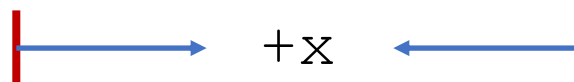
$$a_1 * s_1 + a_2 * s_2 + a_3 * s_3 + a_4 * s_4 + \cdots + a_l * s_l + \cdots + a_r * s_r + \cdots + \cdots + a_n * s_n$$

三、区间修改

$$\sum_{i=1}^n a_i * (2 - \frac{1}{2^{d_i}})$$



$$a_1 * s_1 + a_2 * s_2 + a_3 * s_3 + a_4 * s_4 + \cdots + a_l * s_l + \cdots + a_r * s_r + \cdots + \cdots + a_n * s_n$$



三、区间修改

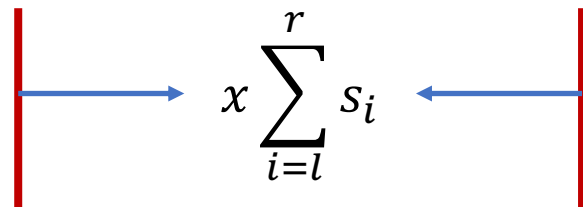
$$\sum_{i=1}^n a_i * (2 - \frac{1}{2^{d_i}})$$



$$a_1 * s_1 + a_2 * s_2 + a_3 * s_3 + a_4 * s_4 + \cdots + a_l * s_l + \cdots + a_r * s_r + \cdots + \cdots + a_n * s_n$$

$$x \sum_{i=l}^r s_i$$

四、最终解法

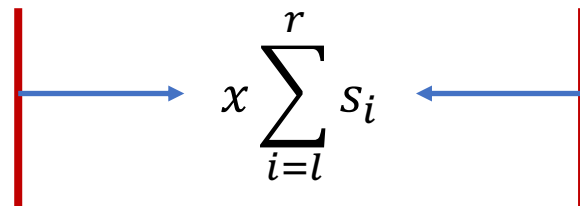


The diagram illustrates a range update operation. It features two vertical red lines representing the boundaries of an interval. A blue arrow points from the left red line to the right red line, passing through the mathematical expression $x \sum_{i=l}^r s_i$. This indicates that the value x is being applied to the sum of the s_i values over the interval from l to r .

$$a_1 * s_1 + a_2 * s_2 + a_3 * s_3 + a_4 * s_4 + \cdots + a_l * s_l + \cdots + a_r * s_r + \cdots + \cdots + a_n * s_n$$

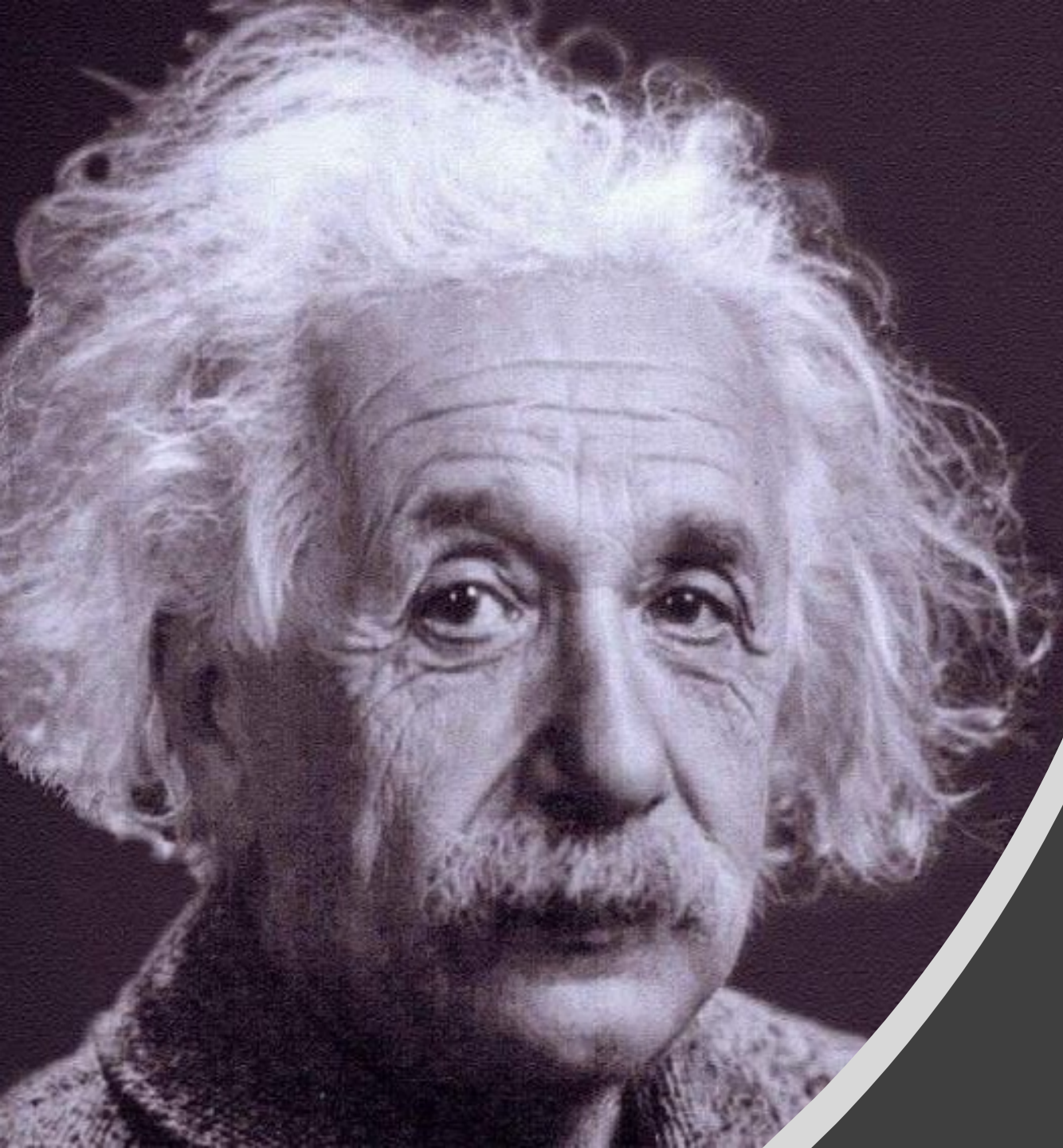
1. 计算 $s_1 \sim s_n$ 的值
2. 初始化 $ans = a_1 * s_1 + a_2 * s_2 + a_3 * s_3 + \cdots$
3. 维护 S 数组, 为 s 数组的前缀和
4. 面对区间修改 $[l, r] \rightarrow x$, 修改 $ans += x * (s_r + s_{l-1})$

五、写在最后


$$\left| \longrightarrow x \sum_{i=l}^r s_i \longleftarrow \right|$$

$$a_1 * s_1 + a_2 * s_2 + a_3 * s_3 + a_4 * s_4 + \cdots + a_l * s_l + \cdots + a_r * s_r + \cdots + \cdots + a_n * s_n$$

$$s_i = \underbrace{\left(2 - \frac{1}{2^{d_i}}\right)}_{\text{浮点数}} \Rightarrow s'_i = \underbrace{\left(2 - \frac{1}{2^{d_i}}\right) * 2^{maxd}}_{\text{整数}}$$



为什么
会出一样的题目？