# 第一天
# 字符串哈希

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初航我带你，远航靠自己

# 字符串哈希的基本思想

`Hash(s) != Hash(t)` **一定不**相等

`Hash(s) == Hash(t)` **不一定**相等

# 字符串哈希经典函数

$$Hash(s) = \sum_{i=0}^{n} s[i] * base^{n-i-1}$$

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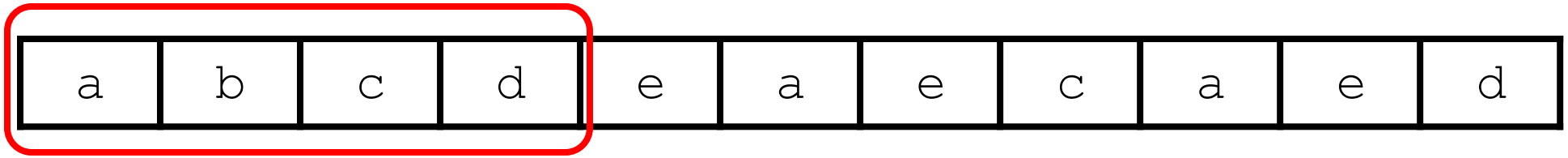
$$Hash(s) = \sum_{i=0}^{n} s[i] * base^{n-i-1}$$

$$a * base^2 + b * base^1 + c * base^0$$

# 求滑动窗口哈希值

$$Hash(s) = \sum_{i=0}^{n} s[i] * base^{n-i-1}$$




**Hash1**

# 求滑动窗口哈希值

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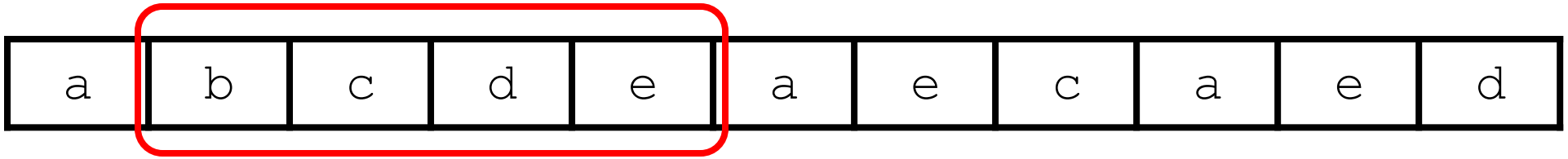

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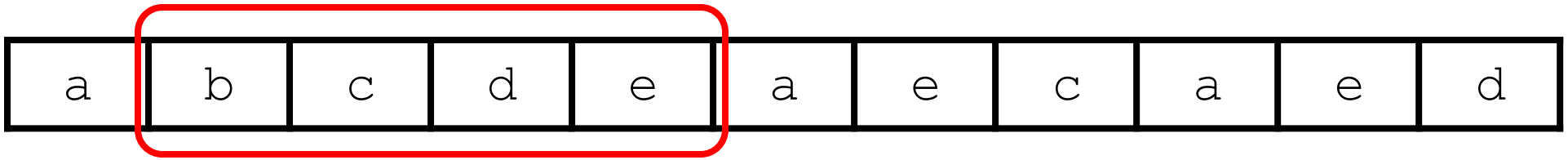


**Hash2**

**Hash1** = a*base$^3$+b*base$^2$+c*base$^1$+d*base$^0$

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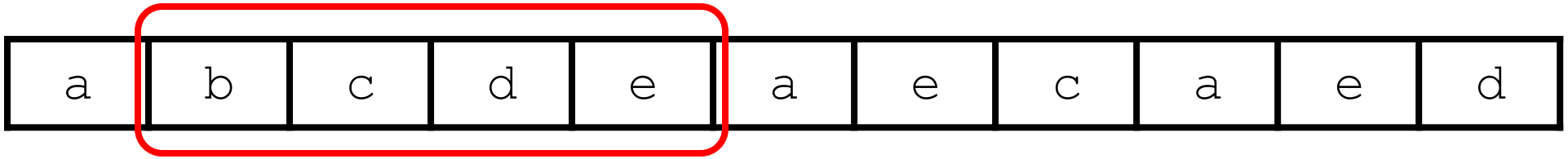


**Hash1** = a*base$^3$+b*base$^2$+c*base$^1$+d*base$^0$

**Hash2** = b*base$^3$+c*base$^2$+d*base$^1$+e*base$^0$

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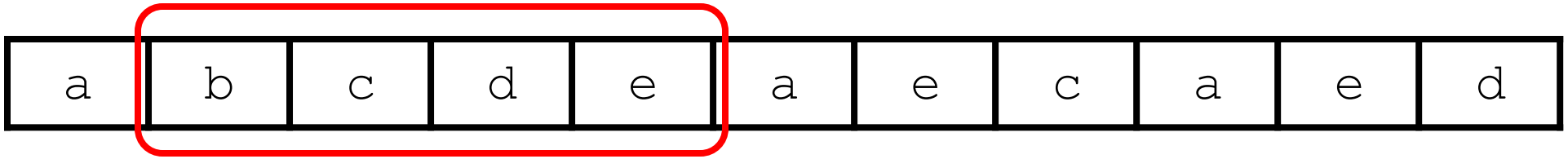


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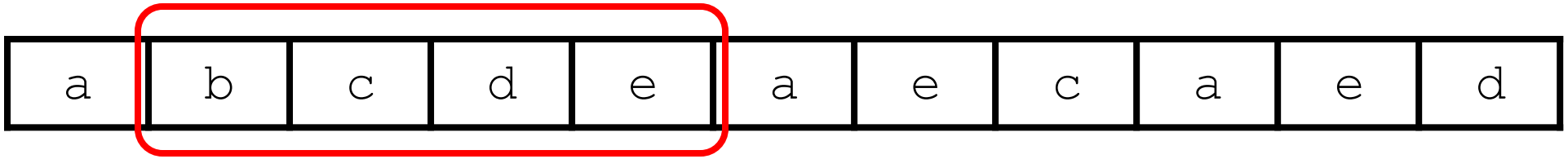


**Hash2 = Hash1***base+e*base$^0$-a*base$^4$

# 求滑动窗口哈希值

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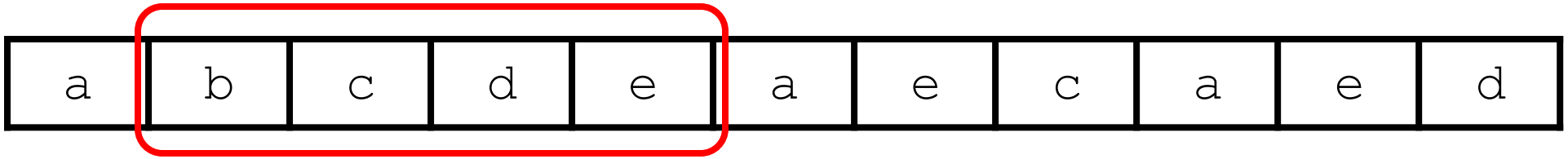
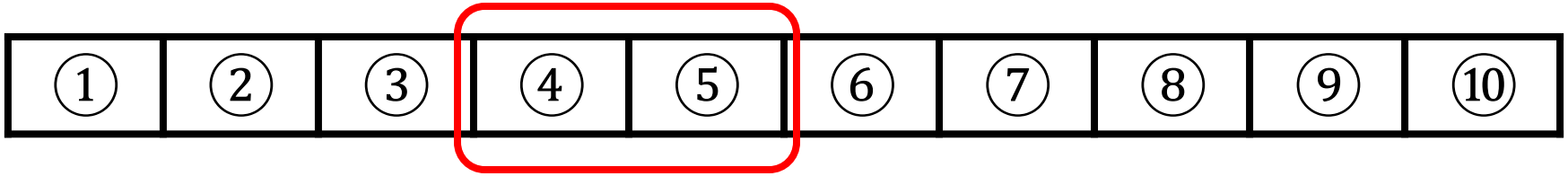



**Hash2 = Hash1***base+s[i]-s[i-n]*base$^n$

# 求区间哈希值

前缀哈希值：$Hash(s,i) = Hash(s,i-1) * \text{base} + s[i]$

区间哈希值：$Hash(s,i,j) = Hash(s,j) - Hash(s,i-1) * base^{j-i+1}$




$Hash_5 = ① * \text{base}^4 + ② * base^3 + ③ * base^2 + ④ * \text{base}^1 + ⑤ * \text{base}^0$

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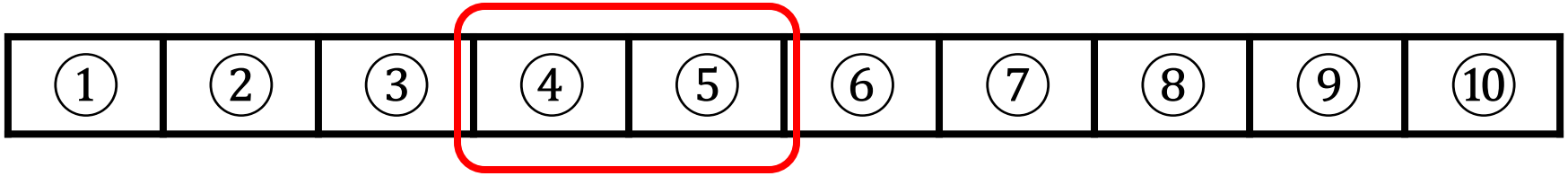


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$Hash_3 = ① * \text{base}^2 + ② * \text{base}^1 + ③ * \text{base}^0$

$Hash_3 * base^2 = ① * \text{base}^4 + ② * base^3 + ③ * base^2$

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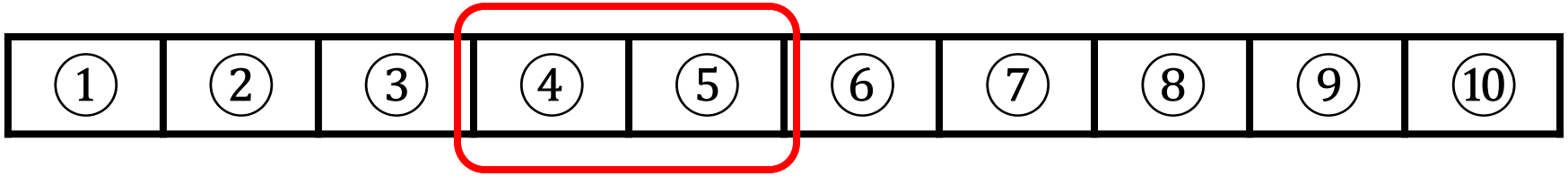


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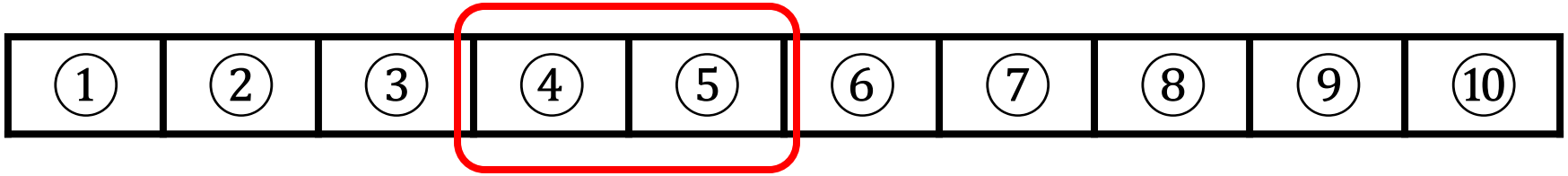


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$Hash_3 * base^2 = ① * \text{base}^4 + ② * base^3 + ③ * base^2$

$Hash_{4-5} = Hash_5 - Hash_3 * base^2$

# 题目列表：字符串哈希

1. **P3370 【模板】字符串哈希**
2. **LC1044. 最长重复子串**
3. **LC1367. 二叉树中的链表**
4. **LC2261. 含最多 K 个可整除元素的子数组**
5. **LC1297. 子串的最大出现次数**
6. **LC1316. 不同的循环子字符串**
7. **LC187. 重复的DNA序列**
8. **LC28. 找出字符串中第一个匹配项的下标**
9. **P10468 兔子与兔子**
10. LC3292. 目标字符串需要的最少字符串数 II