高级搜索树

B-树：缓存

$\theta 8 - B2$

To my mind the most interesting thing in art is the personality of artists; and if that is singular, I am willing to excuse a thousand faults.

He has given signs of himself which are visible to those who seek him, and not to those who do not seek him.
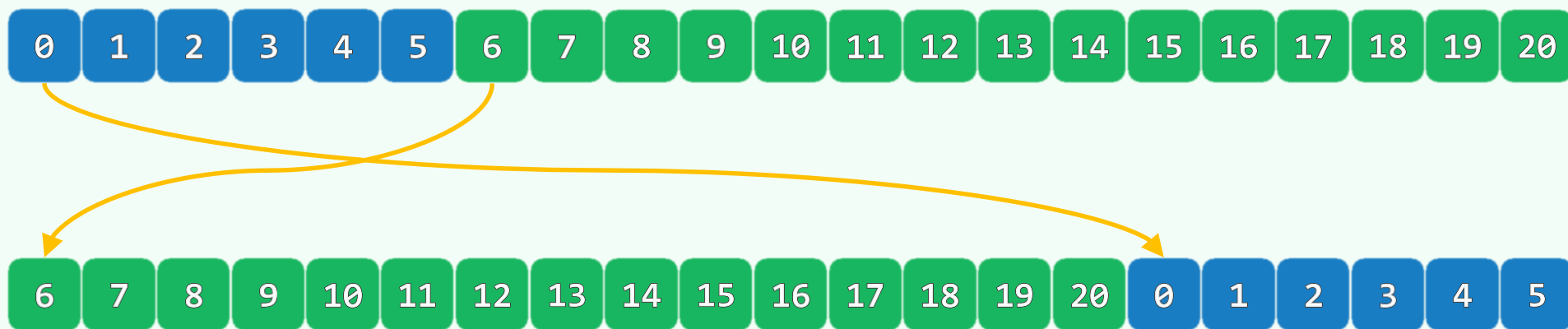
邓俊辉

deng@tsinghua.edu.cn
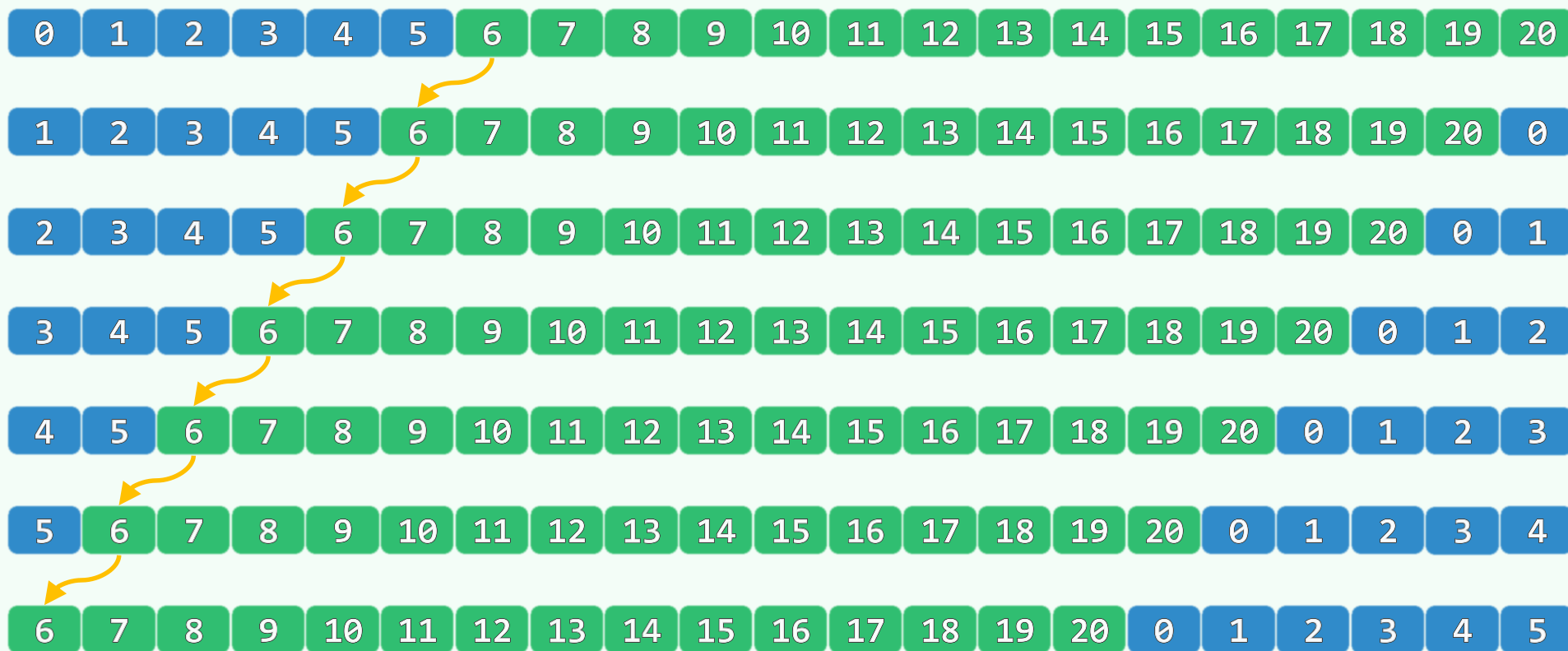
就地循环位移

❖ **仅用 $O(1)$ 辅助空间，将数组A[0，n)中的元素向左循环移动k个单元**

   void shift(int * A, int n, int k);
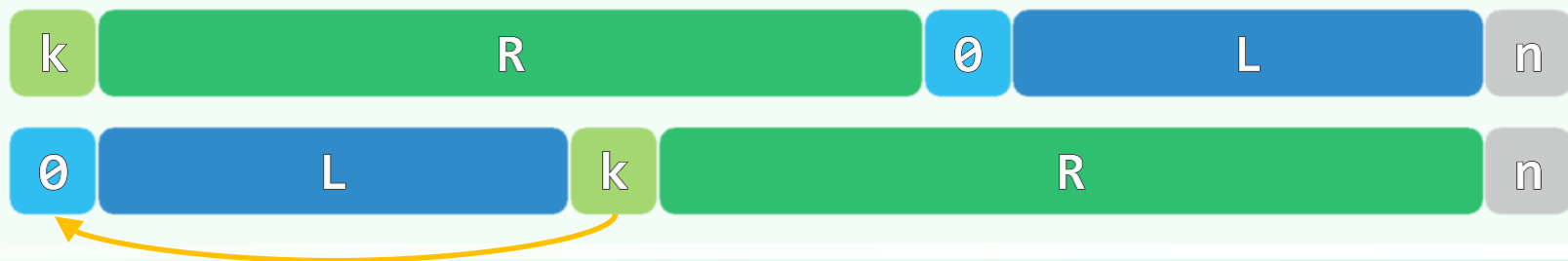
❖ **比如**: shift(A, 21, 6);

蛮力版

```
void shift0( int * A, int n, int k ) //反复以1为间距循环左移
```

```
   { while ( k-- ) shift( A, n, 0, 1 ); } //共迭代k次, O(n*k)
```
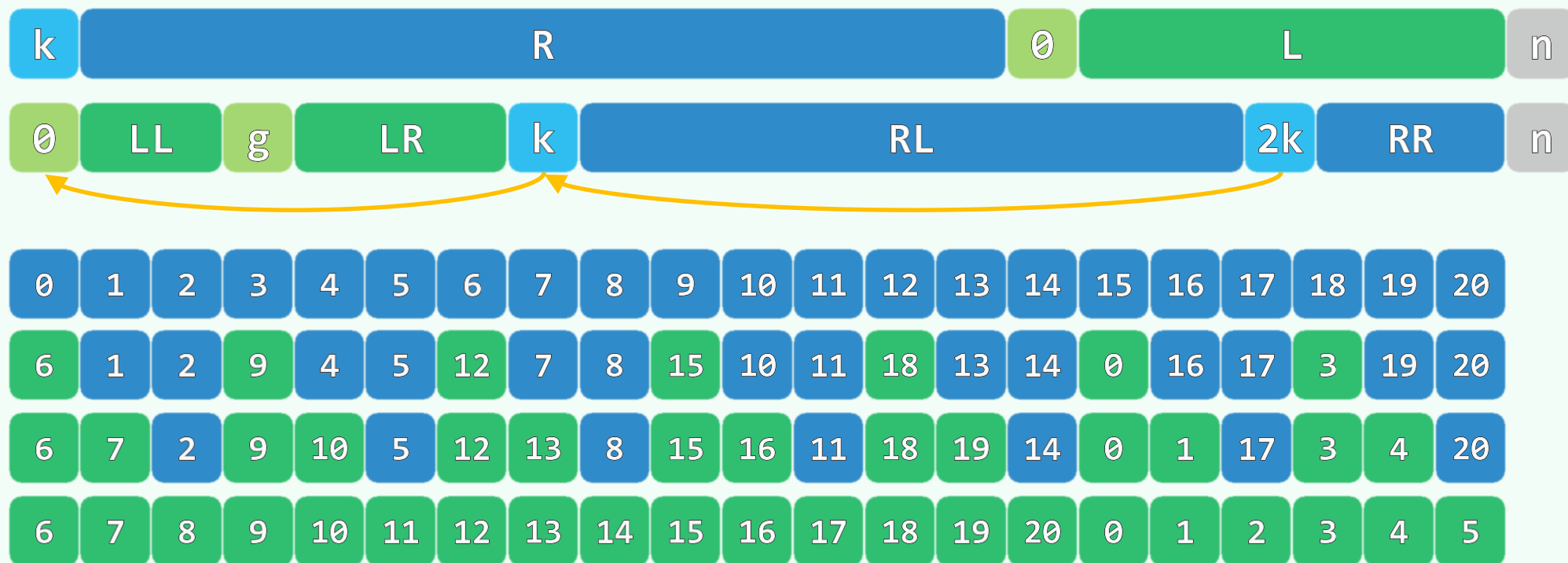
迭代版：Stride-k Reference Pattern (1/2)

```
int shift( int * A, int n, int s, int k ) { // O( n / GCD(n, k) )

   int b = A[s]; int i = s, j = (s + k) % n; int mov = 0; //mov记录移动次数

   while ( s != j ) //从A[s]出发，以k为间隔，依次左移k位

      { A[i] = A[j]; i = j; j = (j + k) % n; mov++; }

   A[i] = b; return mov + 1; //最后，起始元素转入对应位置

} //[0，n)由关于k的g = GCD(n，k)个同余类组成，shift(s，k)能够且只能够使其中之一就位
```

其它的同余类呢...

k	R	0	L	n

0	L	k	R	n

```
void shift1(int* A, int n, int k) { //经多轮迭代，实现数组循环左移k位，累计O(n+g)

    for (int s = 0, mov = 0; mov < n; s++) //O(g) = O(GCD(n, k))

        mov += shift(A, n, s, k);

}
```

倒置版: Stride-1 Reference Pattern

```
void shift2( int * A, int n, int k ) {

    reverse( A, k ); //O(3k/2)

    reverse( A + k, n - k ); //O(3(n-k)/2)



    reverse( A, n ); //O(3n/2)

} //O(3n)
```