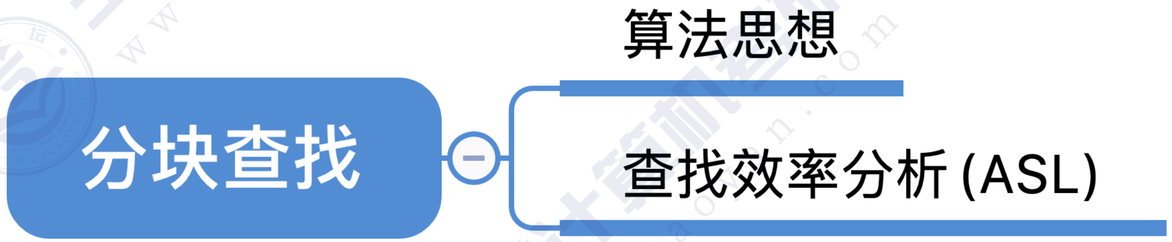
本节内容

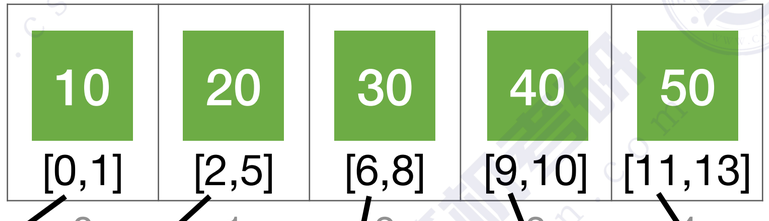
分块查找

知识总览

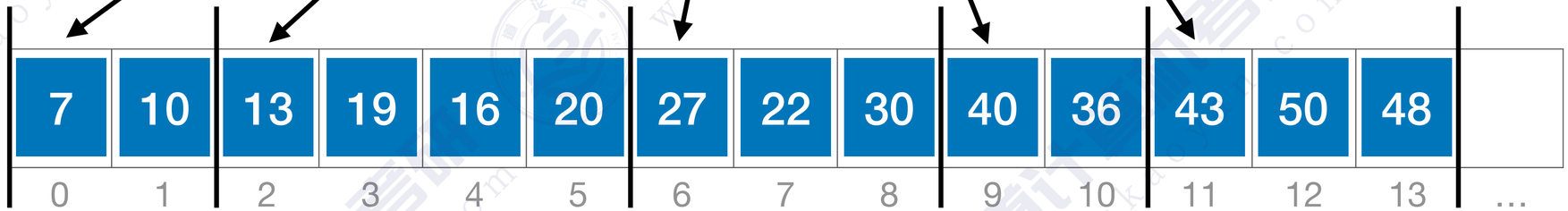


分块查找的算法思想

“索引表”中保存每个分块的最大关键字和分块的存储区间



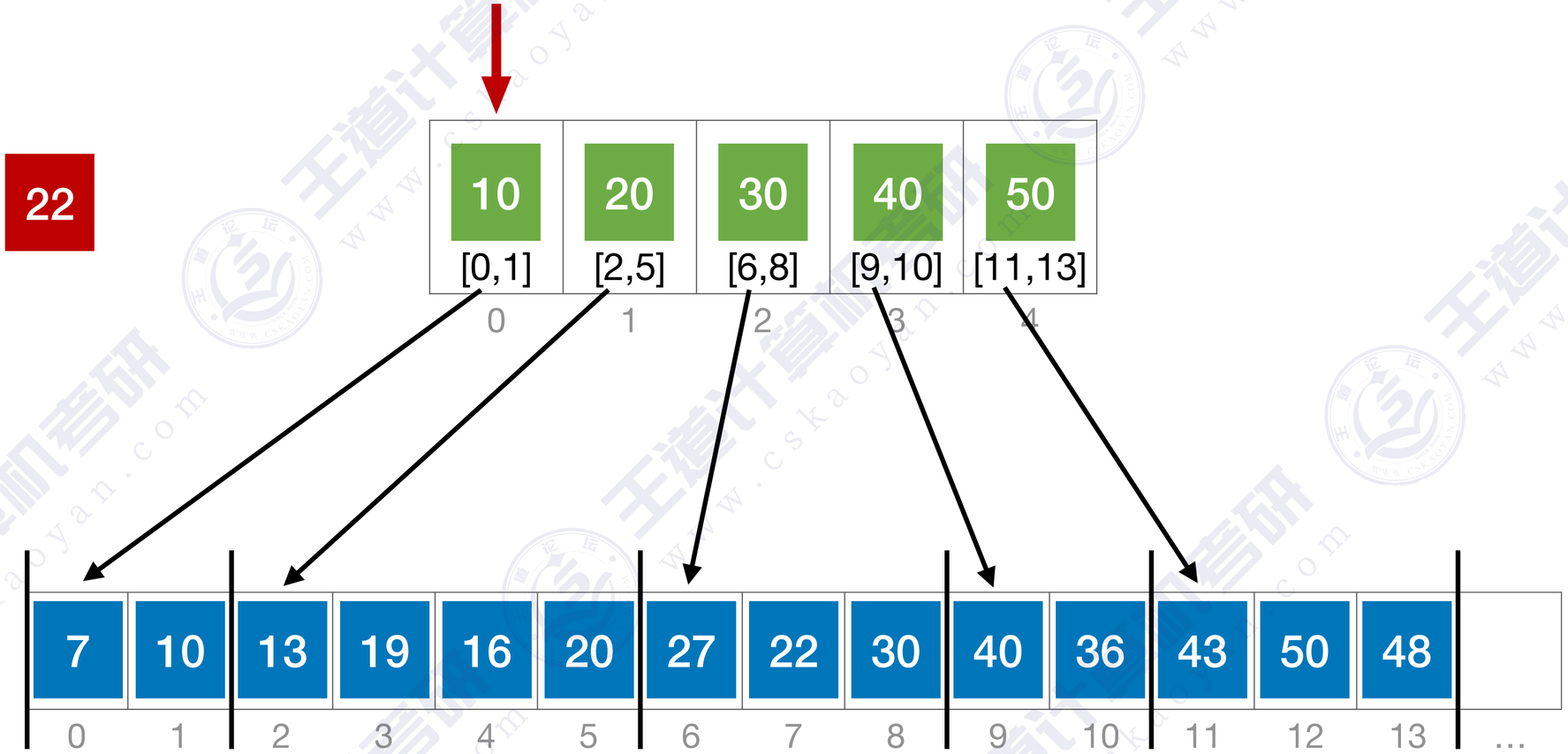

```
//索引表
typedef struct {
    ElemType maxValue;
    int low,high;
}Index;

//顺序表存储实际元素
ElemType List[100];
```



特点：块内无序、块间有序

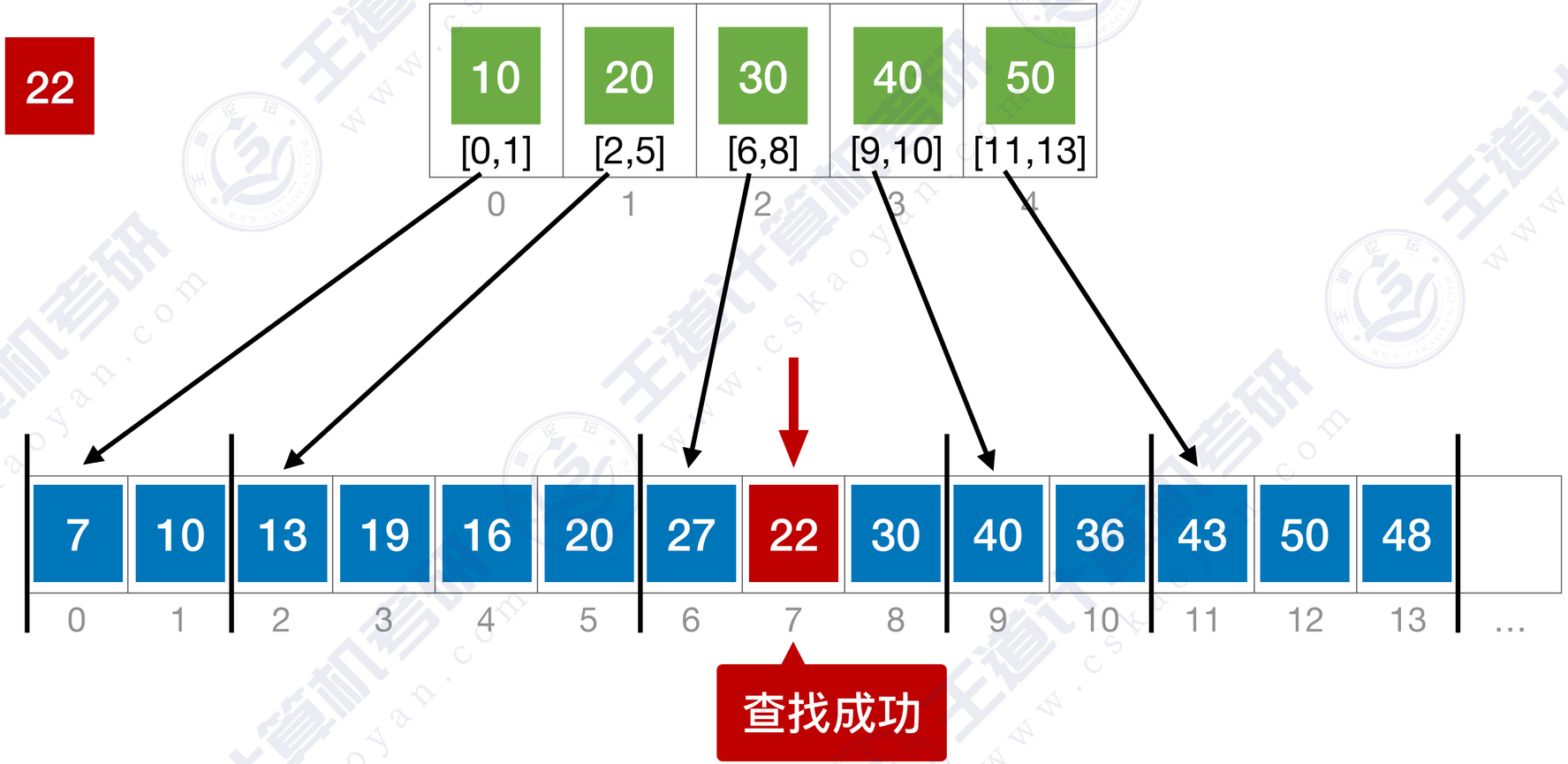
分块查找的算法思想

查找目标：22



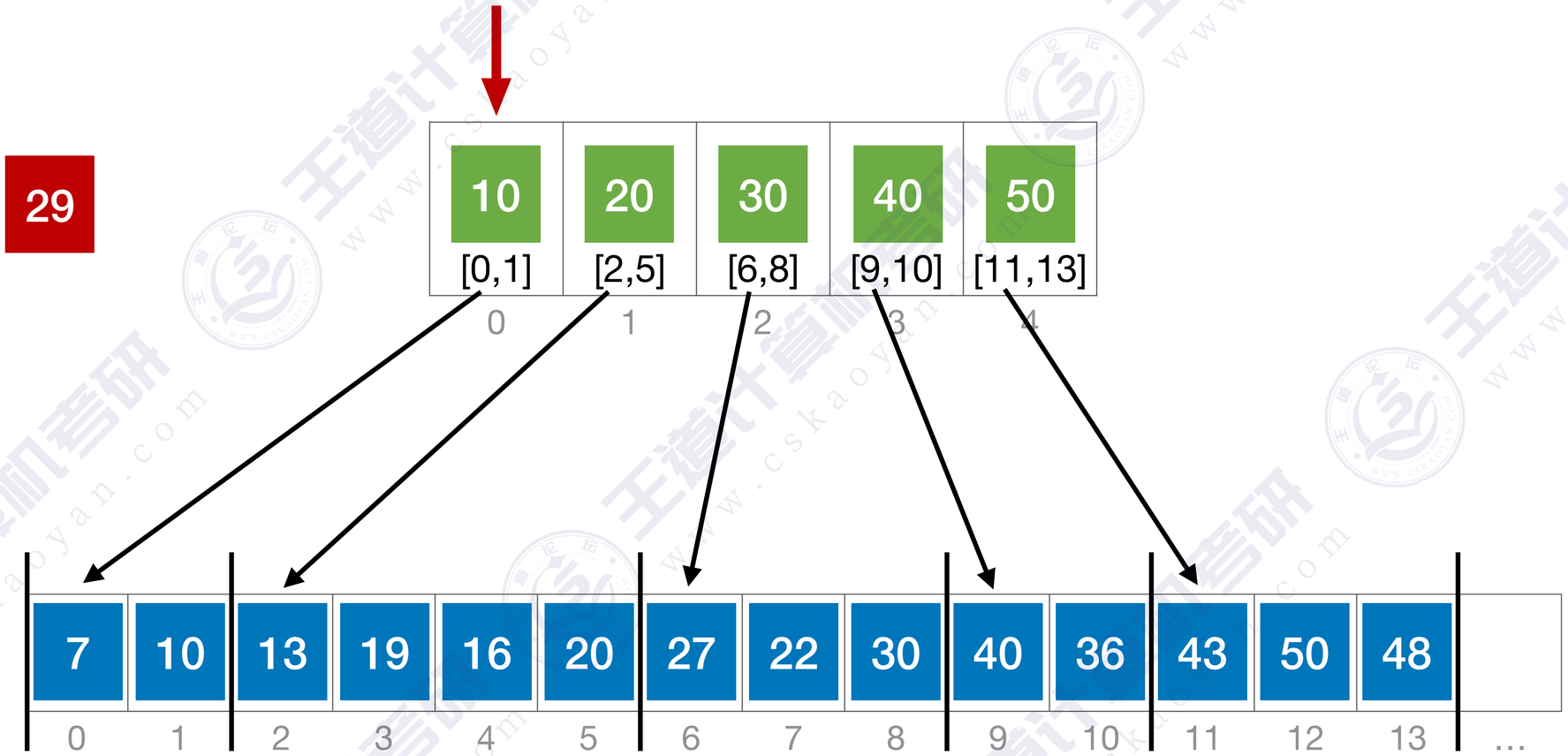
分块查找的算法思想

查找目标：22



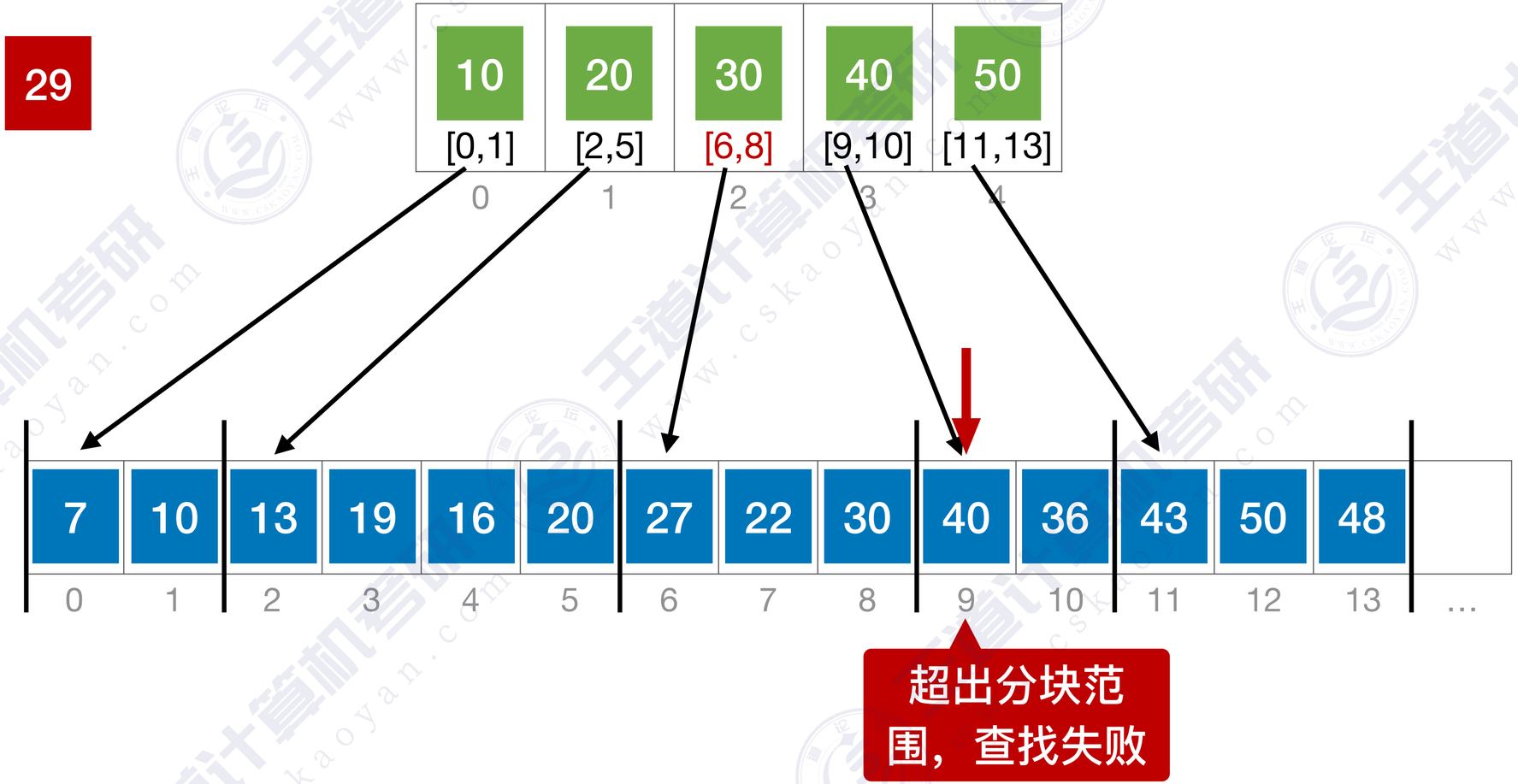
分块查找的算法思想

查找目标：29



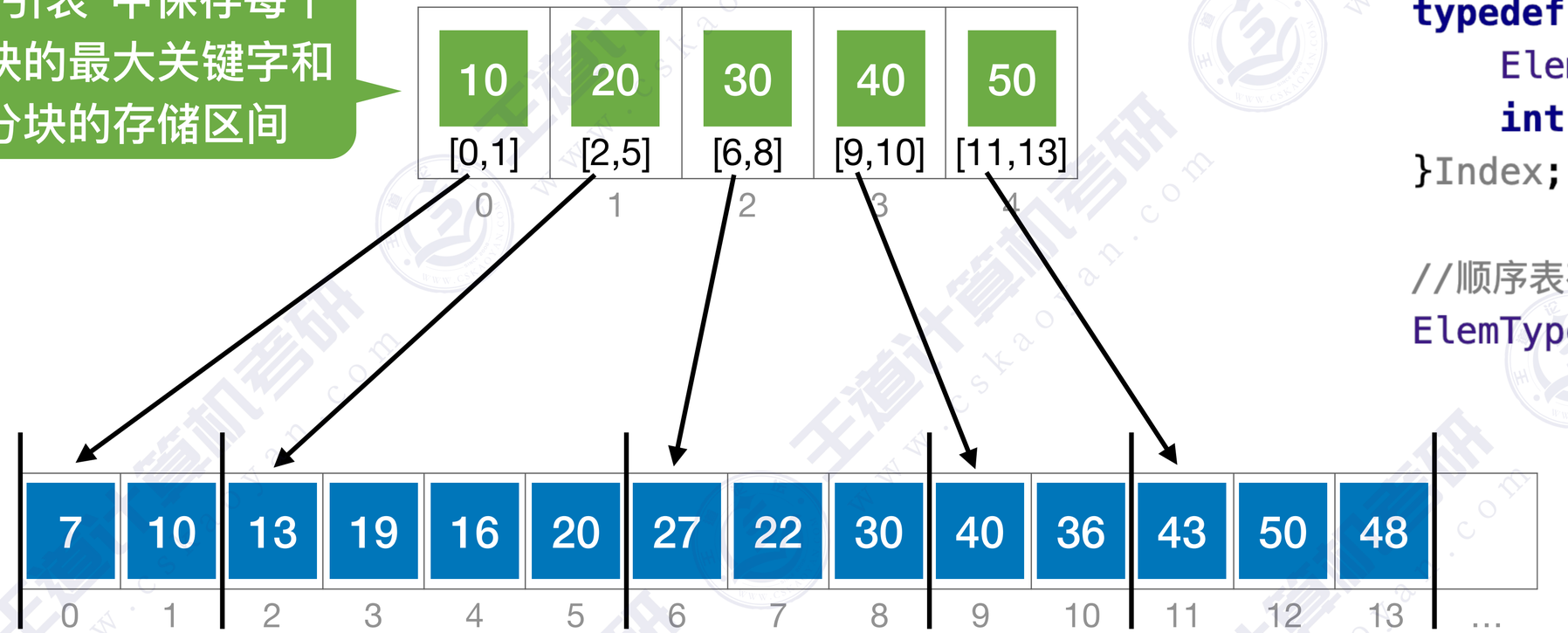
分块查找的算法思想

查找目标：29



分块查找的算法思想

“索引表”中保存每个分块的最大关键字和分块的存储区间




```c
//索引表
typedef struct {
    ElemType maxValue;
    int low,high;
}Index;

//顺序表存储实际元素
ElemType List[100];
```

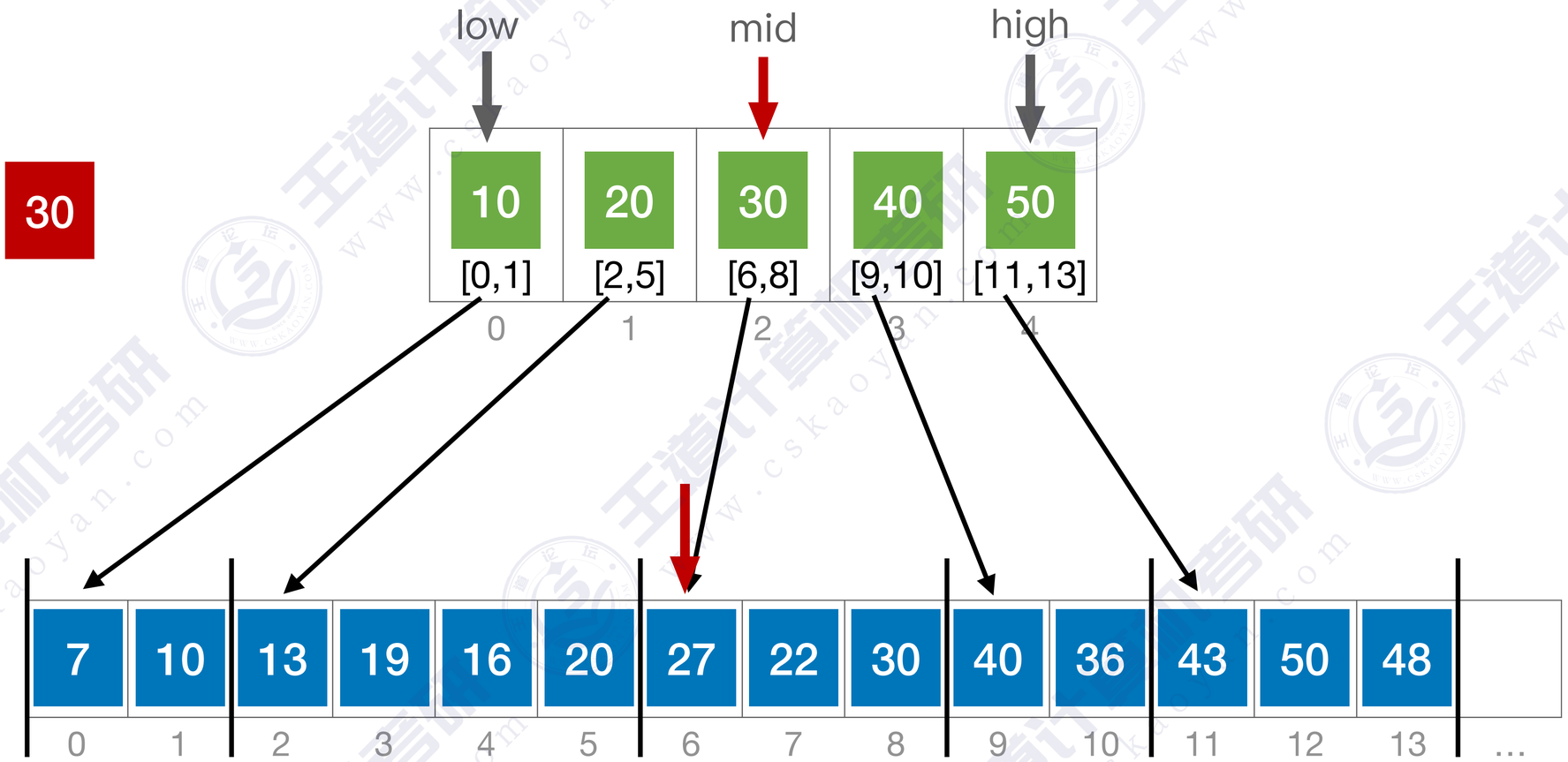
分块查找，又称索引顺序查找，算法过程如下：

①在索引表中确定待查记录所属的分块（可顺序、可折半）

②在块内顺序查找

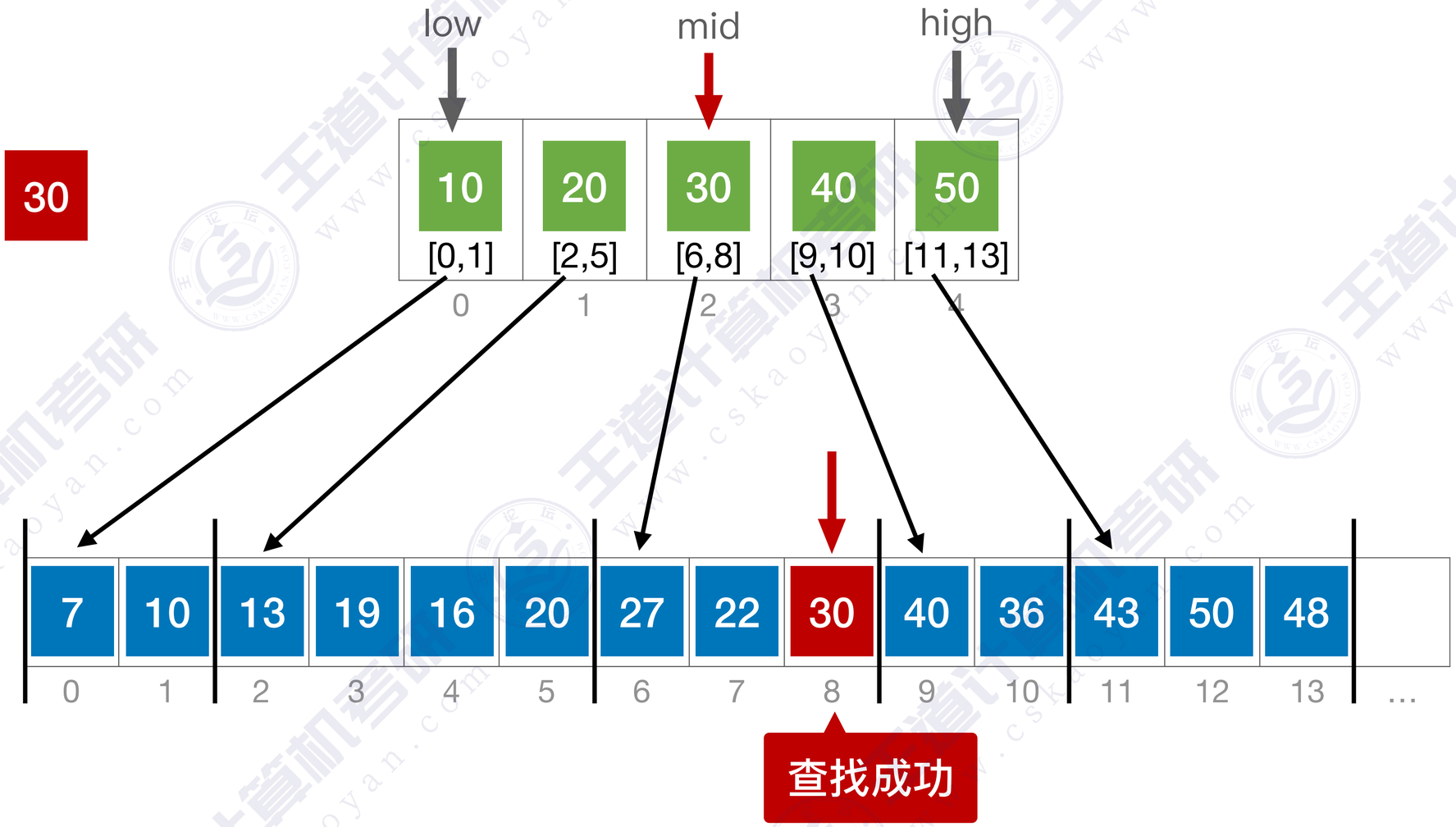
用折半查找查索引

查找目标：30



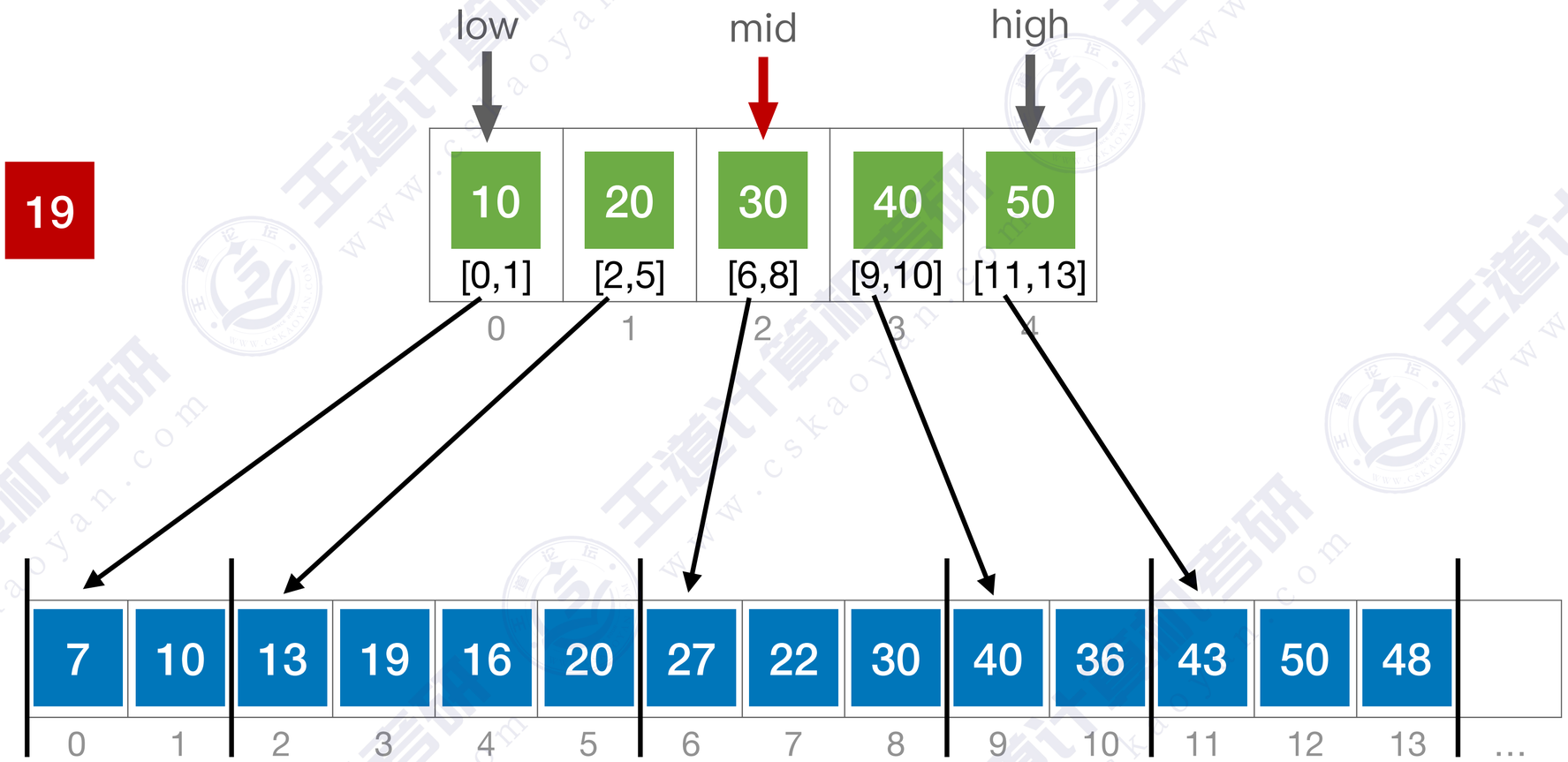
用折半查找查索引

查找目标：30



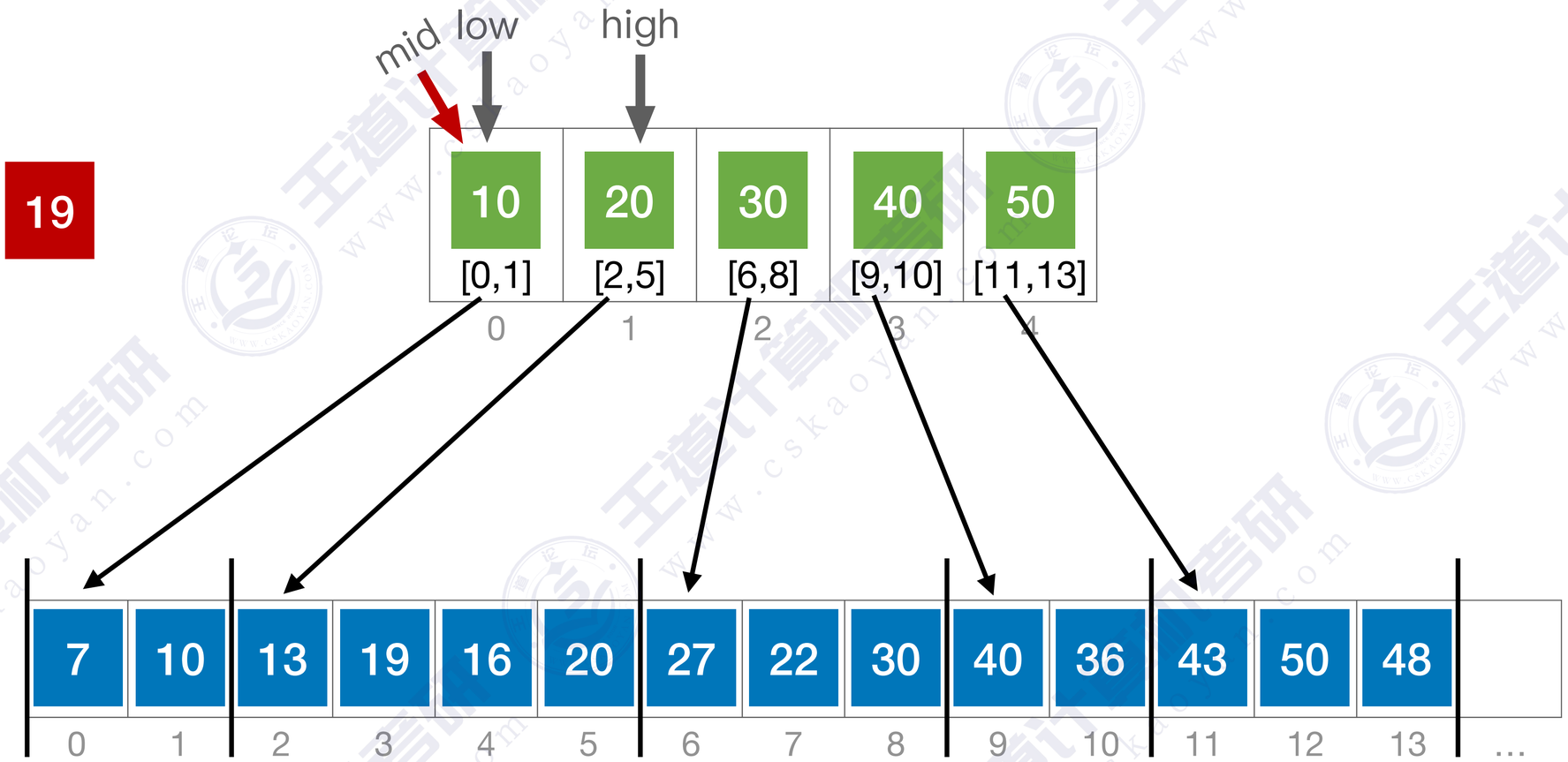
用折半查找查索引

查找目标：19



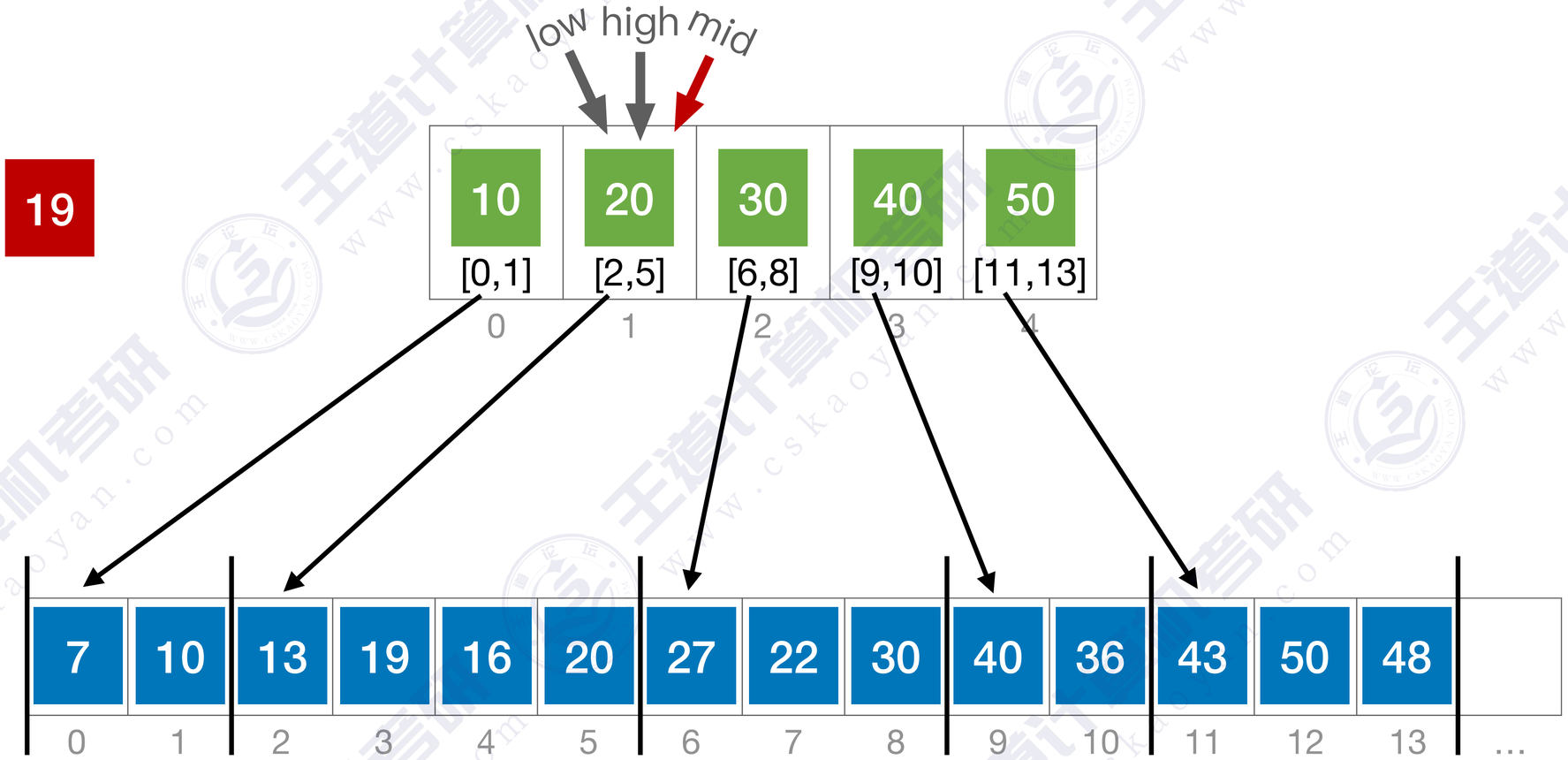
用折半查找查索引

查找目标：19



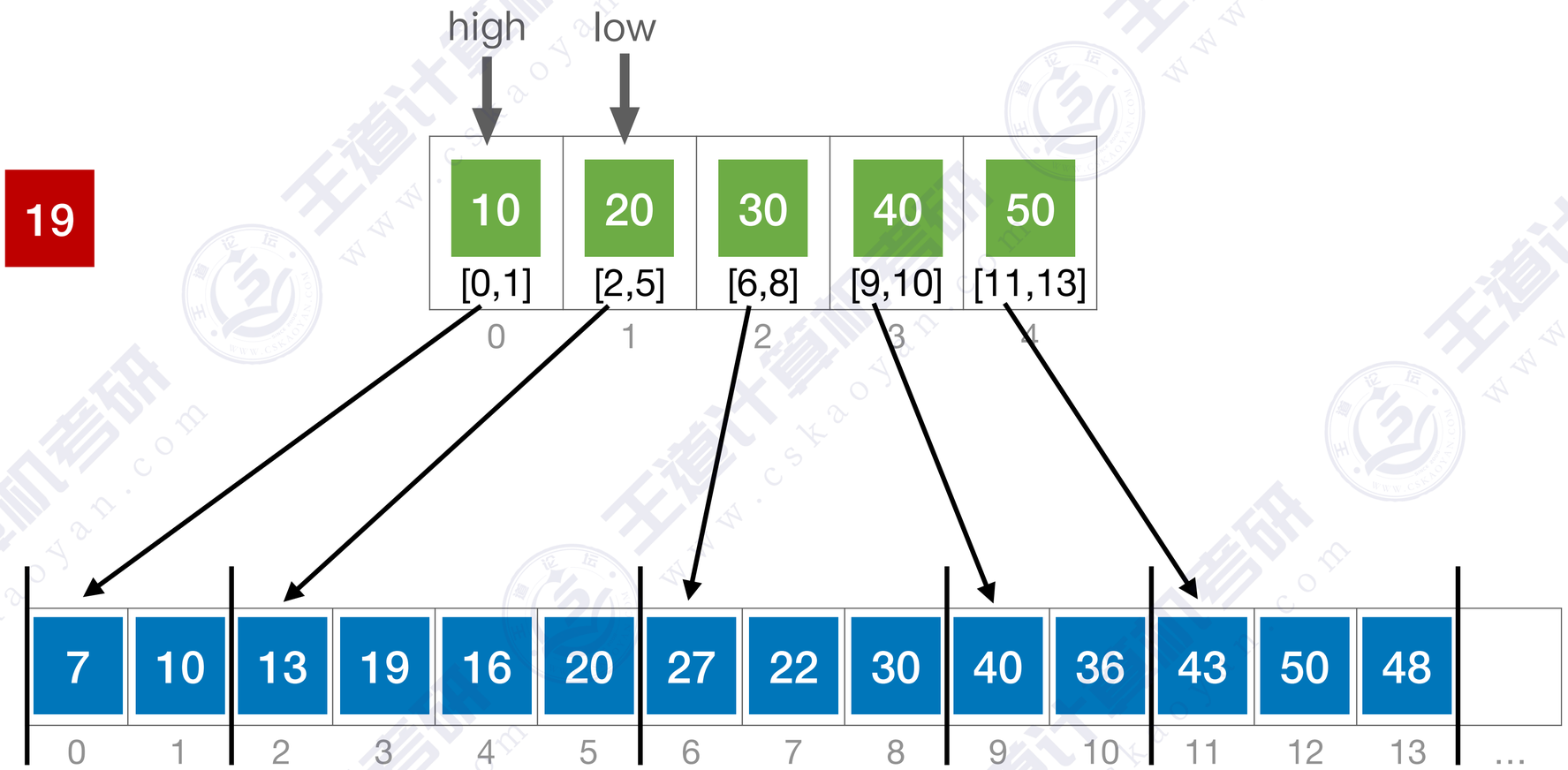
用折半查找查索引

查找目标：19



用折半查找查索引

查找目标：19



用折半查找查索引

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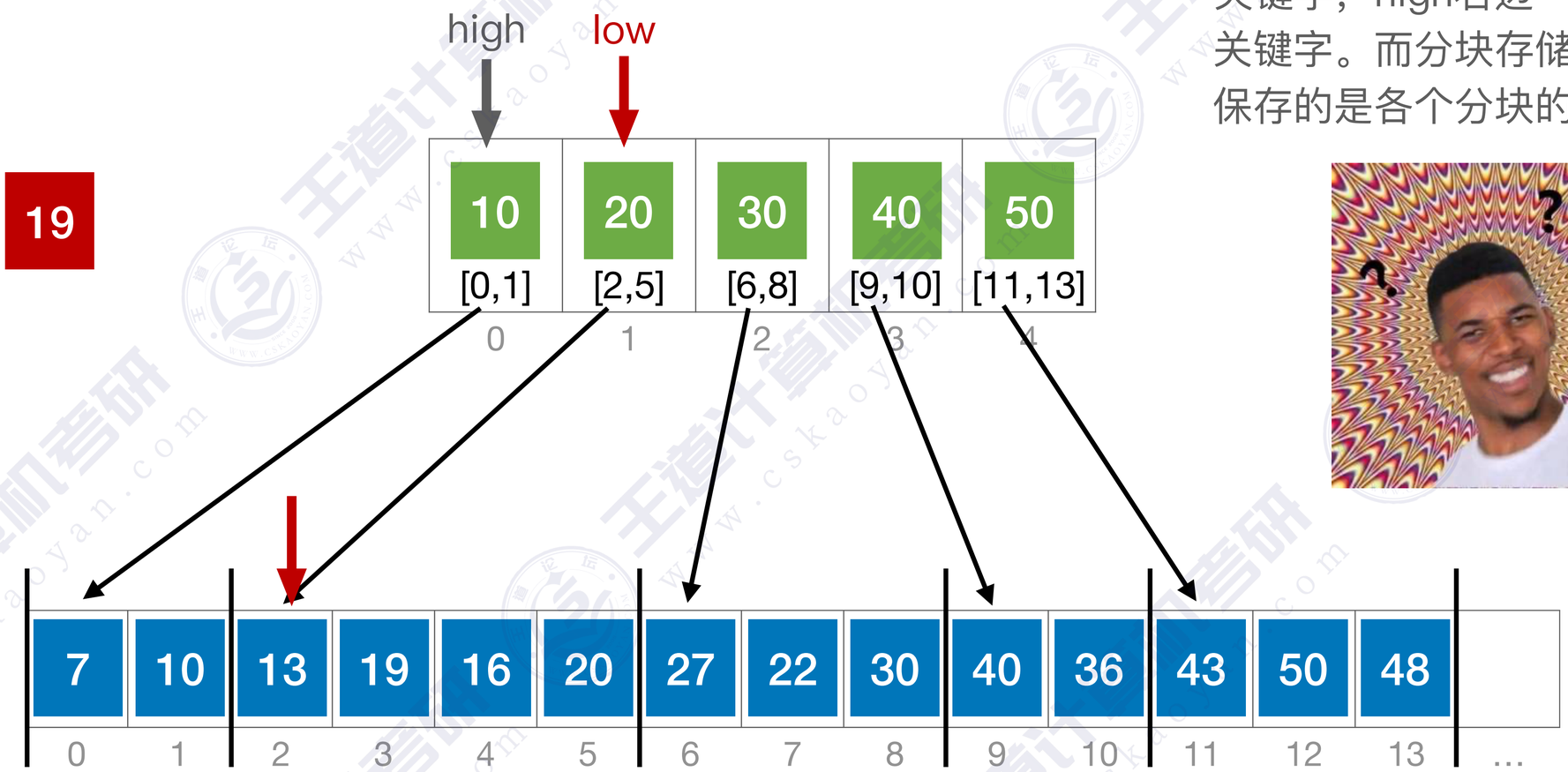
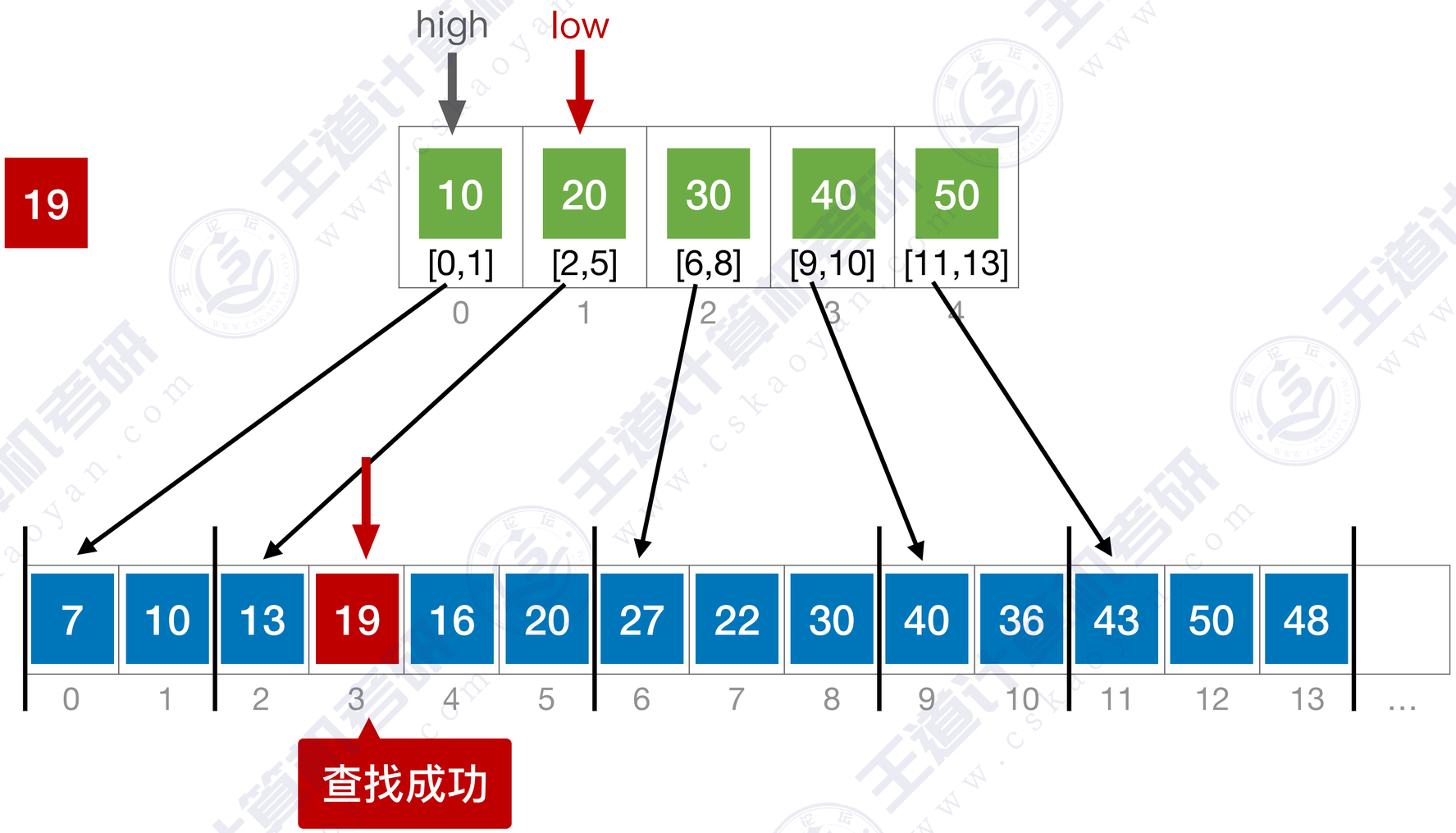


原因：最终low左边一定小于目标关键字，high右边一定大于目标关键字。而分块存储的索引表中保存的是各个分块的最大关键字

若索引表中不包含目标关键字，则折半查找索引表最终停在 low>high，要在low所指分块中查找

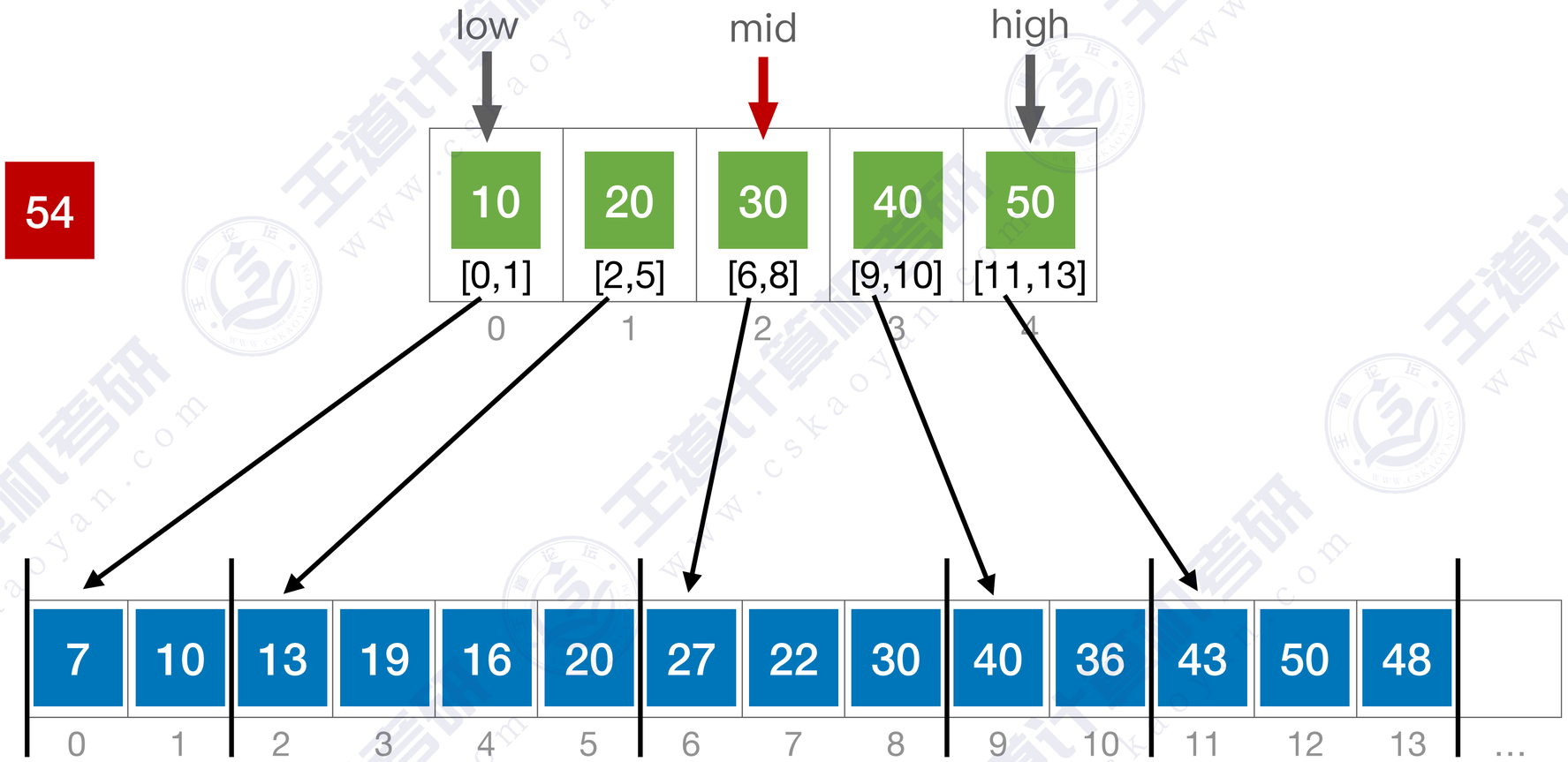
用折半查找查索引

查找目标：19

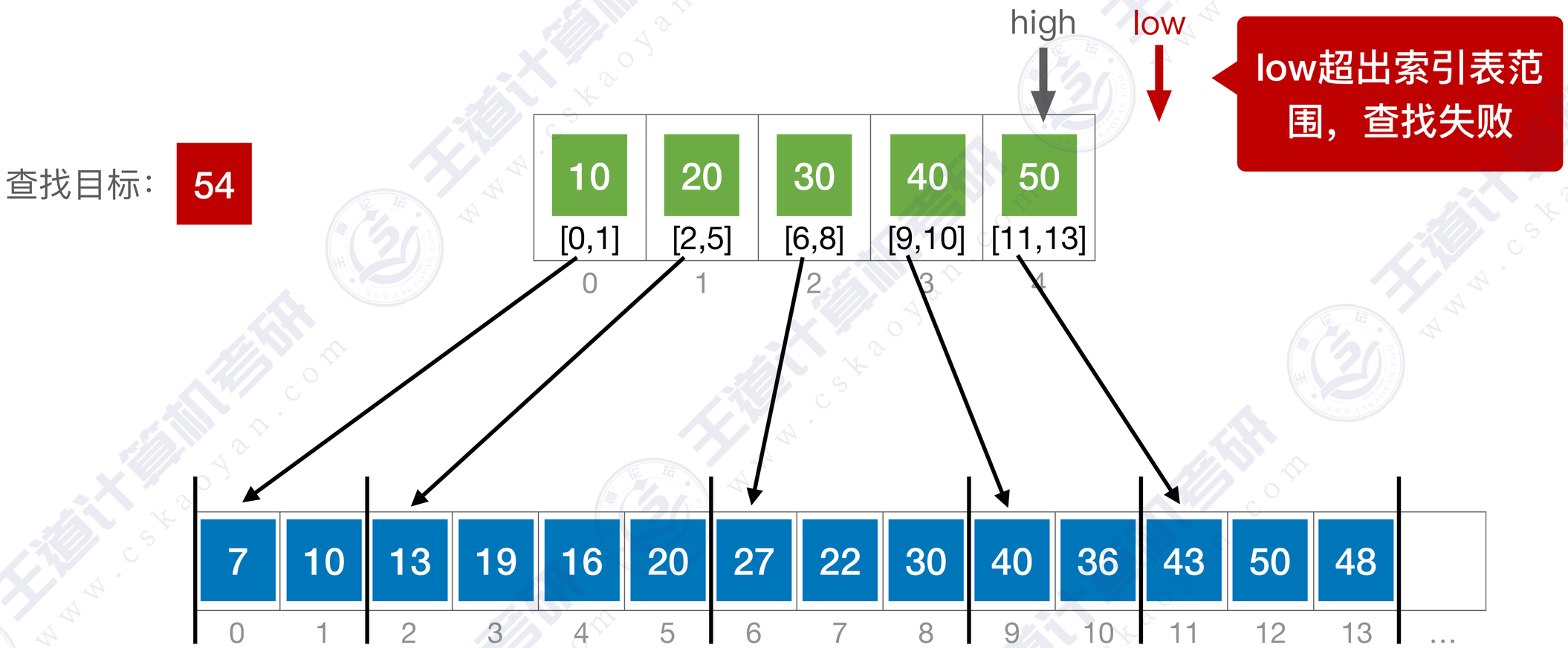


用折半查找查索引

查找目标：54



用折半查找查索引



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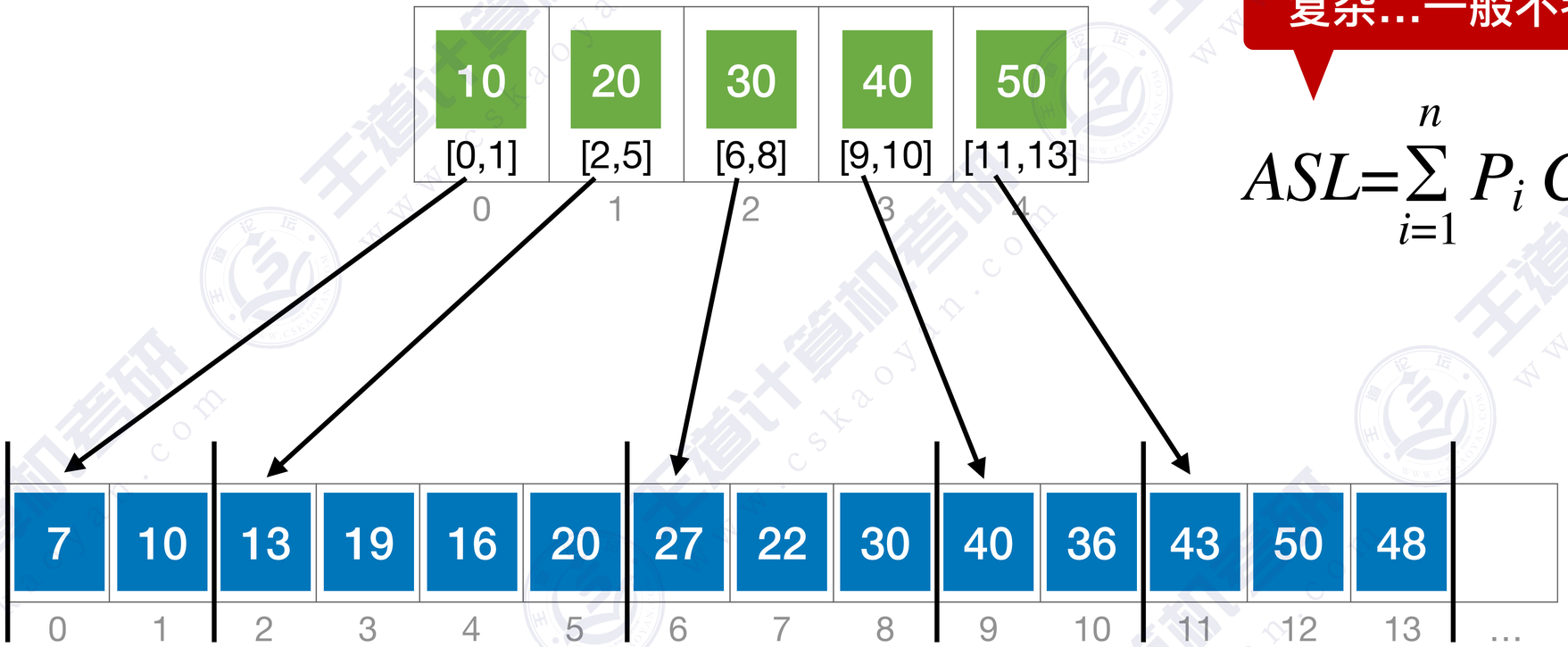
查找效率分析（ASL）

查找失败的情况更复杂...一般不考

$$ASL=\sum_{i=1}^{n} P_i C_i$$

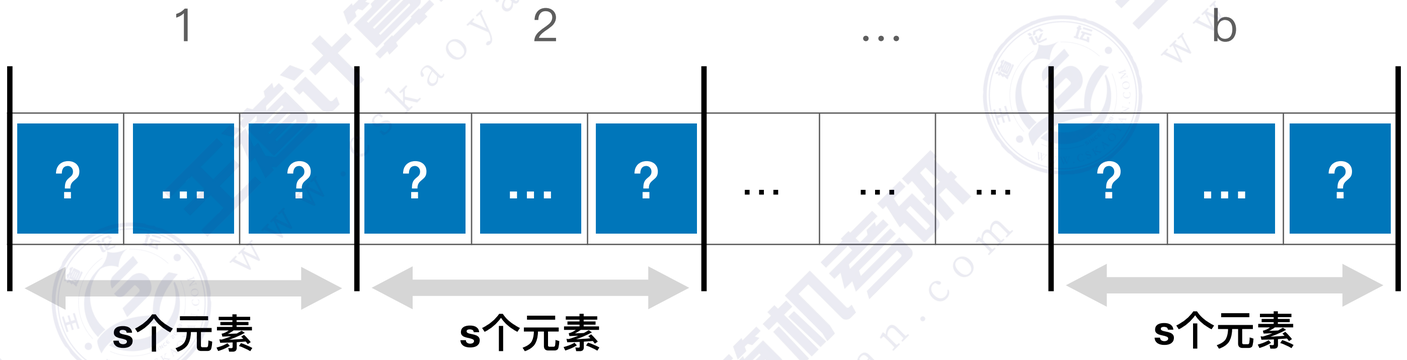


共有14个元素，各自被查概率为1/14

若索引表采用顺序查找，则 7：2次、10：3次、13：3次...

若索引表采用折半查找，则30：4次、27：2次?

查找效率分析（ASL）



假设，长度为n的查找表被均匀地分为b块，每块s个元素

设索引查找和块内查找的平均查找长度分别为L_I、L_S，则分块查找的平均查找长度为

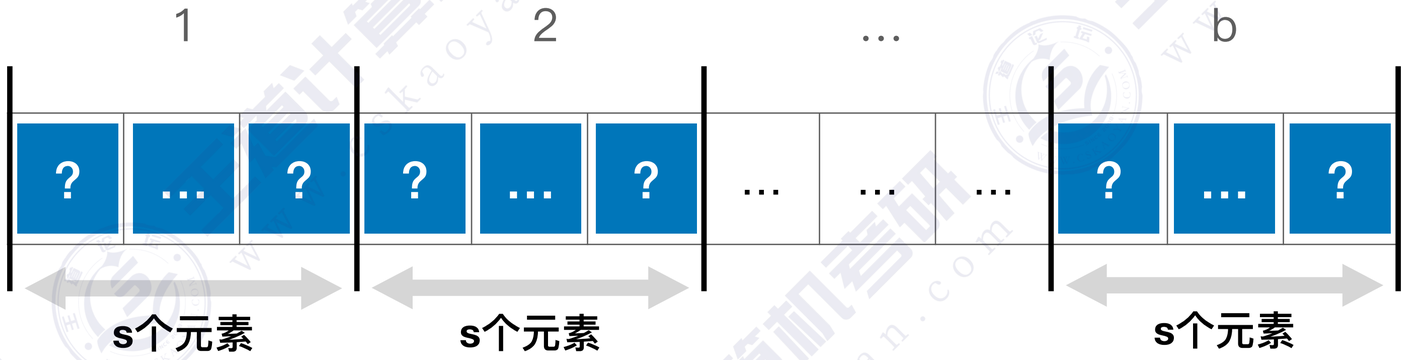
$$ASL=L_I+L_S$$

用顺序查找查索引表，则 $L_I=\frac{(1+2+\ldots+b)}{b}=\frac{b+1}{2}$，$L_S=\frac{(1+2+\ldots+s)}{s}=\frac{s+1}{2}$

则 $ASL=\frac{b+1}{2}+\frac{s+1}{2}=\frac{s^2+2s+n}{2s}$，当 $s=\sqrt{n}$ 时，$ASL_{最小}=\sqrt{n}+1$

若n=10000，则 $ASL_{min}=101$

查找效率分析（ASL）



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$$ASL=L_I+L_S$$

用折半查找查索引表，则 $L_I=\lceil log_2(b+1)\rceil$，$L_S=\dfrac{(1+2+\ldots+s)}{s}=\dfrac{s+1}{2}$

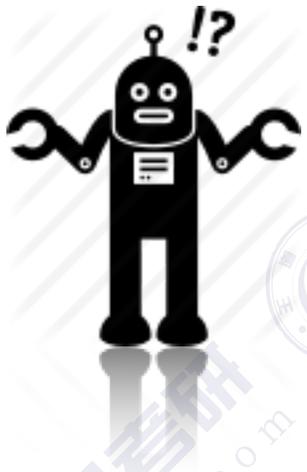
$$则ASL=\lceil log_2(b+1)\rceil+\frac{s+1}{2}$$

知识回顾与重要考点

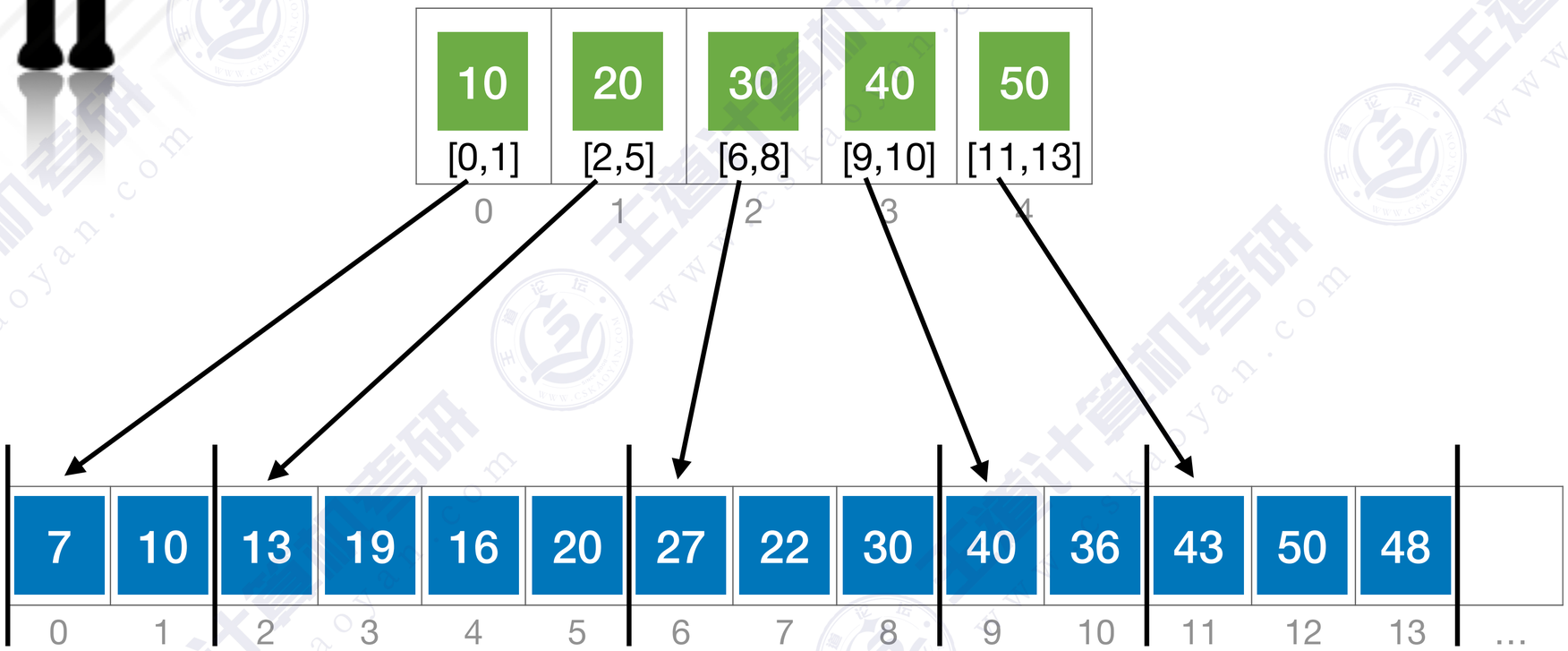
分块查找

- 又称“索引顺序查找”，数据分块存储，块内无序、块间有序
- 算法思想
  - 索引表中记录每个分块的最大关键字、分块的区间
  - 先查索引表（顺序或折半）、再对分块内进行顺序查找
- ASL
  - ASL=查索引表的平均查找长度+查分块的平均查找长度
  - 设n个记录，均匀分为b块，每块s个记录
    - 顺序查找索引表
      - $ASL=\frac{b+1}{2}+\frac{s+1}{2}$
      - 当 $s=\sqrt{n}$ 时，$ASL_{最小}=\sqrt{n}+1$
    - 折半查找索引表
      - $ASL=\lceil \log_2(b+1) \rceil+\frac{s+1}{2}$
- 易错点
  - 对索引表进行折半查找时，若索引表中不包含目标关键字，则折半查找最终停在 low>high，要在low所指分块中查找

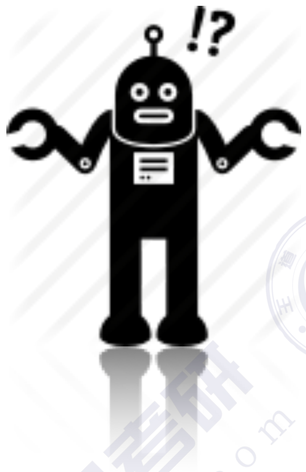
拓展思考



若查找表是“动态查找表”，有木有更好的实现方式?



拓展思考



若查找表是“动态查找表”，有木有更好的实现方式？——链式存储