

20网工 阮炜霖 2020101603

9.2 查找e:  $a b c d e f g \Rightarrow a b c d e f g$

$\begin{matrix} \uparrow & & \uparrow & & \uparrow \\ l & & m & & h \\ 1 & & 4 & 5 & 7 \end{matrix} \Rightarrow \begin{matrix} \uparrow & \uparrow & \uparrow & \uparrow \\ l & m & h & \\ 5 & 6 & 7 \end{matrix}$

$\Rightarrow a b c d e f g$   $\begin{matrix} \uparrow & \uparrow \\ l & h \end{matrix}$   $h-l \leq 1$ , 查找完毕

同理查找f:  $a b c d e f g \Rightarrow a b c d e f g \Rightarrow a b c d e f g$

$\begin{matrix} \uparrow & & \uparrow & & \uparrow \\ l & & m & & h \\ 1 & & 4 & 5 & 7 \end{matrix} \Rightarrow \begin{matrix} \uparrow & \uparrow & \uparrow \\ l & m & h \end{matrix} \Rightarrow \begin{matrix} \uparrow & \uparrow & \uparrow \\ l & m & h \end{matrix}$

查找g:  $a b c d e f g \Rightarrow a b c d e f g \Rightarrow a b c d e f g$

$\begin{matrix} \uparrow & & \uparrow & & \uparrow \\ l & & m & & h \\ 1 & & 4 & 5 & 7 \end{matrix} \Rightarrow \begin{matrix} \uparrow & \uparrow & \uparrow \\ l & m & h \end{matrix} \Rightarrow \begin{matrix} \uparrow & \uparrow & \uparrow \\ l & m & h \end{matrix}$

9.3  $ASL = \frac{1}{10} [1 \times 1 + 2 \times 2 + 4 \times 3 + 3 \times 4] = 2.9$

9.9

(1)  $ASL = \frac{1}{12} (1 \times 1 + 2 \times 2 + 3 \times 3 + 3 \times 4 + 2 \times 5 + 1 \times 6) = 3.5$

(2)

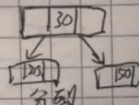
$ASL = \frac{1}{12} (1 \times 1 + 2 \times 2 + 4 \times 3 + 5 \times 4) \approx 3.0$

9.14 空树 X

⇒ [20]  
加入 20

⇒ [20 | 30]  
加入 30

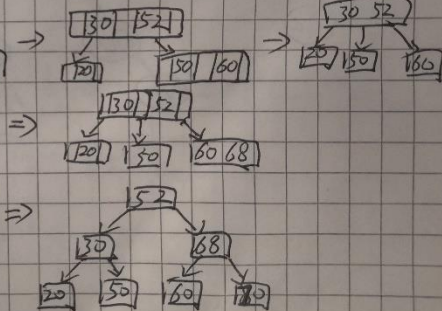
⇒ [20 | 30 | 50] → [30]  
加入 50



分裂  
⇒ [20] [50 | 52]  
加入 52

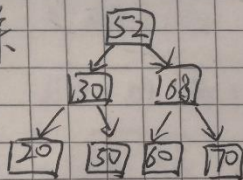
⇒ [20] [50 | 52 | 60]  
加入 60

创建



~~删除~~

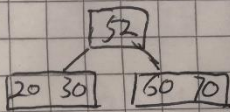
删除



删除 50  
⇒ [52]  
[30] [68]  
[20] [60] [70]

⇒ [52 | 68]  
[20 | 30] [60 | 70]

删除 68



递归版折半查找.cpp

```

1  #pragma GCC optimize("Ofast", "inline", "-ffast-math")
2  #pragma GCC target("avx,sse2,sse3,sse4,mmx")
3  #include<bits/stdc++.h>
4  #define inf 0x3f3f3f3f
5  // #define int long long
6  using namespace std;
7  const int N=2e5+7;
8  int n,num,idx,a[N];
9
10 int binsearch(int a[],int key,int ql,int qr){
11     int i=ql,j=qr;
12     int mid=(ql+qr)>>1;
13     if(i>j) return -1;
14     if(key==a[mid]) return mid;
15     else if(key>a[mid]) return binsearch(a,key,mid+1,j);
16     else return binsearch(a,key,i,mid-1);
17     return -1;
18 }
19 signed main(){
20     // ios::sync_with_stdio(0);
21     // cin.tie(0);cout.tie(0);
22     // freopen("in.cpp","r",stdin);
23     // freopen("out.cpp","w",stdout);
24     cout<<"递归版折半查找 By 2020101603 rw1\n";
25     cout<<"输入元素个数n(范围1e5)，然后依次输入n个整数\n";
26     cin>>n;
27     for(int i=1;i<=n;i++) cin>>a[i];
28     cout<<"请输入你要查找的数字（找到返回下标，否则返回-1）：\n";
29     while(cin>>num){
30         idx=binsearch(a,num,1,n);
31         printf("num的下标是： %d\n",idx);
32     }
33     cout<<"程序结束\n";
34     return 0;
35 }
36

```