Intermediate C Programming

Lesson7

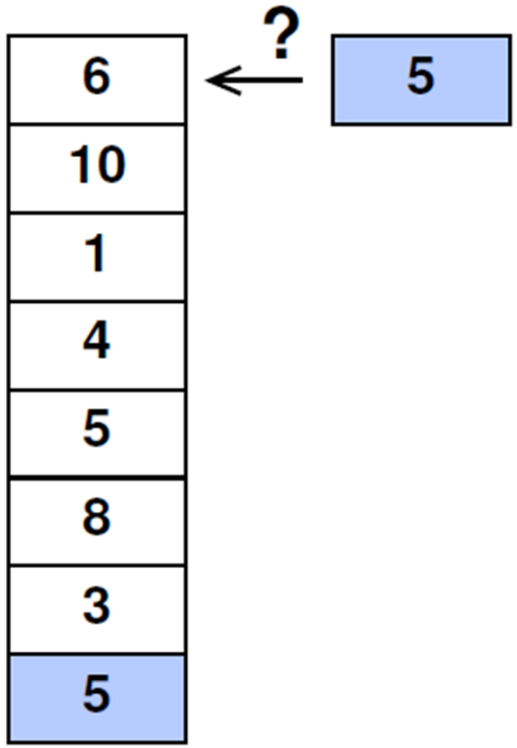
Search (2)

Today's outline

- Serial search (sentinel)
- Binary search
- Exercise

Serial Search (sentinel)

- Put a search key at the end of the list
- The search key put at the end of the list is called the sentinel.



Serial Search (sentinel)

```
while( 1 ){
    if( data[i] == key ){
        break;
    }
    i++;
}
if( i == n ){

} else {

}
```

Exercise

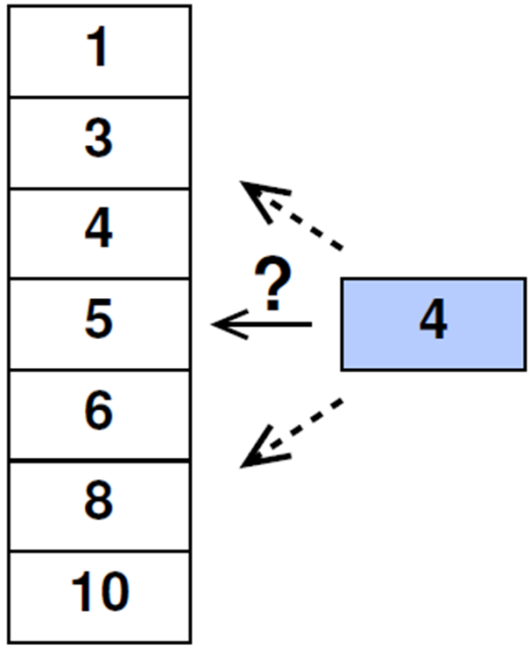
Finish the program of Serial Search (sentinel)

Binary Search

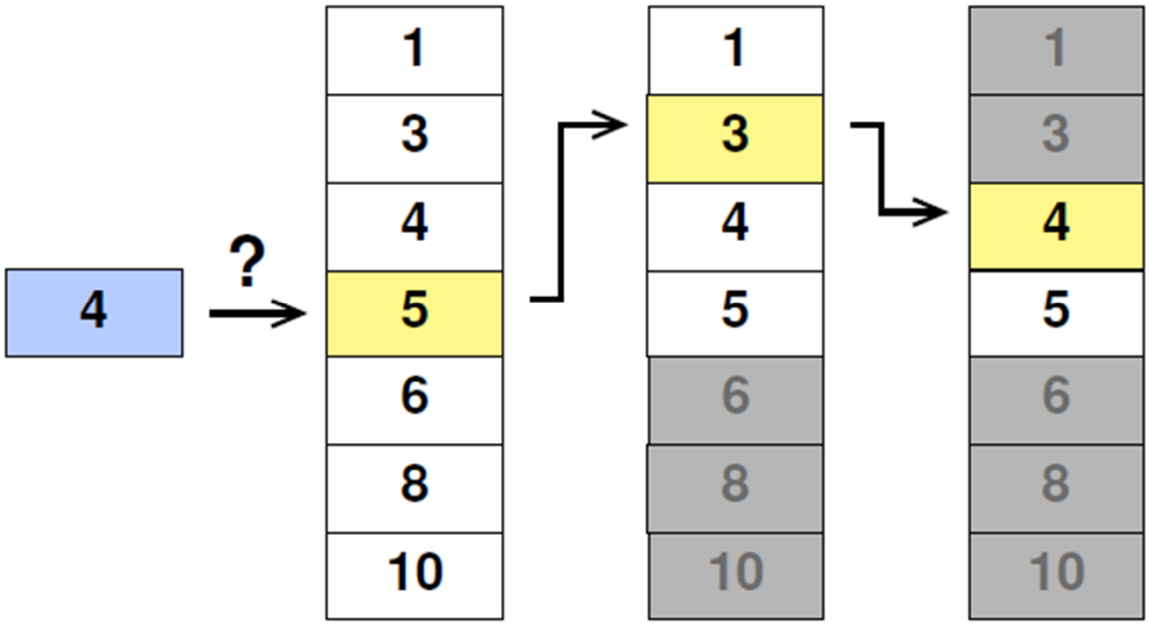
- All items have been sorted
- Compare the item in the middle of the list as the first step

If the key is less than the central item, check the part before the central item.

If the key is greater than the central item, check the part after the central item.



Binary Search



Binary Search

```
#define N 7
int data[] = { 1, 3, 4, 5, 6, 8, 10 };
```

Variables to declare:

- head
- tail
- Middle

```
mid = (head + tail)/2
head <= mid < tail
```

Initializing value

```
head=0, tail=N-1
```

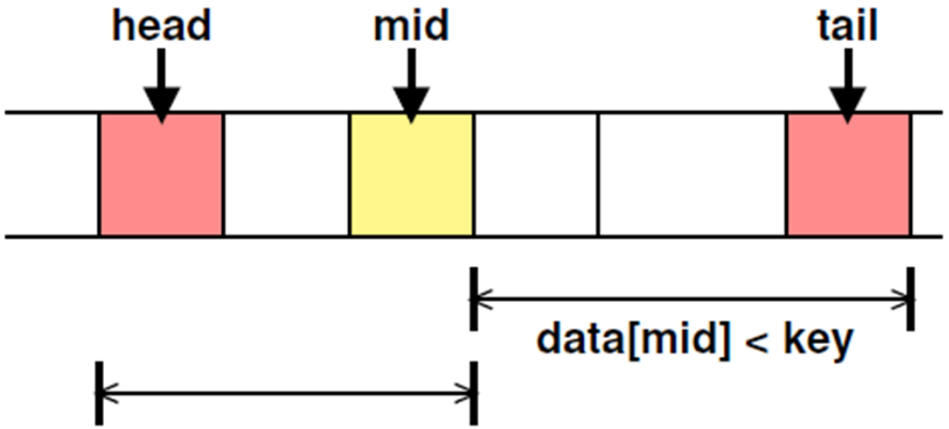
Binary Search

1)if head < tail, there are more than 2 items in the list, mid can be calculated

data[mid]<key: search the part after the key
head=mid+1

data[mid]>key: search the part before the key
tail=mid

2) if tail<=head, finish



Exercise

```
#include <stdio.h>
#define N 10000
int main(){
   FILE *datafile;
   int i, size, key, data[N];
   int head, mid, tail;
   char filename[20];
   printf( "sorted data file: " );
   scanf( "%s", filename );
   datafile = fopen( filename, "r" );
   for( i=0; i<N; i++ ){
      if( fscanf(datafile, "%d", &data[i]) == EOF ){
         break; }
}
   size = i;
   printf( "search key: " );   scanf( "%d", &key );
```

```
return 0;
}
```