In [ ]:
```
Ask user total numbers need to be generated randomly and inserted into the list. Then
number generation function to generate that many numbers and insert them into the list
enter a key number and check the entire list whether it is present or not. Print the s
index, and last index of the list. Print whether the entered key element is present ir
present then print the index. Record time taken with each approach.
```

In [1]:
```
import random
import time
num = int(input("How many number will be inscerted into this list?: "))
list = []
start = time.time()
for i in range(0,num) :
    rand = random.randint(1,num)
    list.append(rand)
print(list)

list.sort()

end = time.time()
key = int(input("What number do you want to see if its in the list or not?: "))
print("This program took",(start-end),"seconds to run")
```

```
How many number will be inscerted into this list?: 5
[2, 4, 4, 3, 4]
What number do you want to see if its in the list or not?: 2
This program took -0.0005676746368408203 seconds to run
```

In [ ]:
```
Approach one:
• Start with index 0 and compare each element with the target
• If the target is found to be equal to the element, return its index
• If the target is not found, return -1
```

In [37]:
```
import random
import time

num = int(input("How many number will be inscerted into this list?: "))
list = []
for i in range(0,num) :
    rand = random.randint(1,num)
    list.append(rand)
print(list)

list.sort()

key = int(input("What number do you want to see if its in the list or not?: "))
print("starting: ",0,"\nmiddle index: ",num//2,"\nlast index: ",num-1)
start = time.time()
t = False
for i in range(num) :
    if(key == list[i]):
        print("Your number is in the list at index", i)
        t = True
        #break

if t == False:
    print("your number is not in the list")
```

```
end = time.time()
print("Linear Search took",(end-start),"seconds to run")
```

```
How many number will be inscerted into this list?: 3
[3, 3, 2]
What number do you want to see if its in the list or not?: 2
starting:  0
middle index:  1
last index:  2
Your number is in the list at index 0
Linear Search took 0.0005428791046142578 seconds to run
```

Approach two: • Compare the target element with the middle element of the array. • If the target element is greater than the middle element, then the search continues in the right half. • Else if the target element is less than the middle value, the search continues in the left half. • This process is repeated until the middle element is equal to the target element, or the target element is not in the array • If the target element is found, its index is returned, else -1 is returned.

In [36]:
```
import random
import time
num = int(input("How many number will be inscerted into this list?: "))
list = []
start = time.time()
for i in range(0,num) :
    rand = random.randint(1,num)
    list.append(rand)
print(list)

list.sort()


key = int(input("What number do you want to see if its in the list or not?: "))
print("starting: ",0,"\nmiddle index: ",num//2,"\nlast index: ",num-1)
flag = False
low = 0
high = num-1


while(low <= high):
    mid = low + high //2
    if list[mid] == key:
        flag = True
        break
    if list[mid] > key:
        high = mid - 1
    if list[mid] < key:
        low = mid + 1
if(flag) :
    print("found at index ",mid)
else:
    print("Your number was not in the list")
end = time.time()
print("Binary Search took",(end-start),"seconds to run")
```

```
How many number will be inscerted into this list?: 3
[2, 1, 1]
What number do you want to see if its in the list or not?: 1
starting:  0
middle index:  1
last index:  2
found at index  1
Binary Search took 0.995429515838623 seconds to run
```

In [ ]: