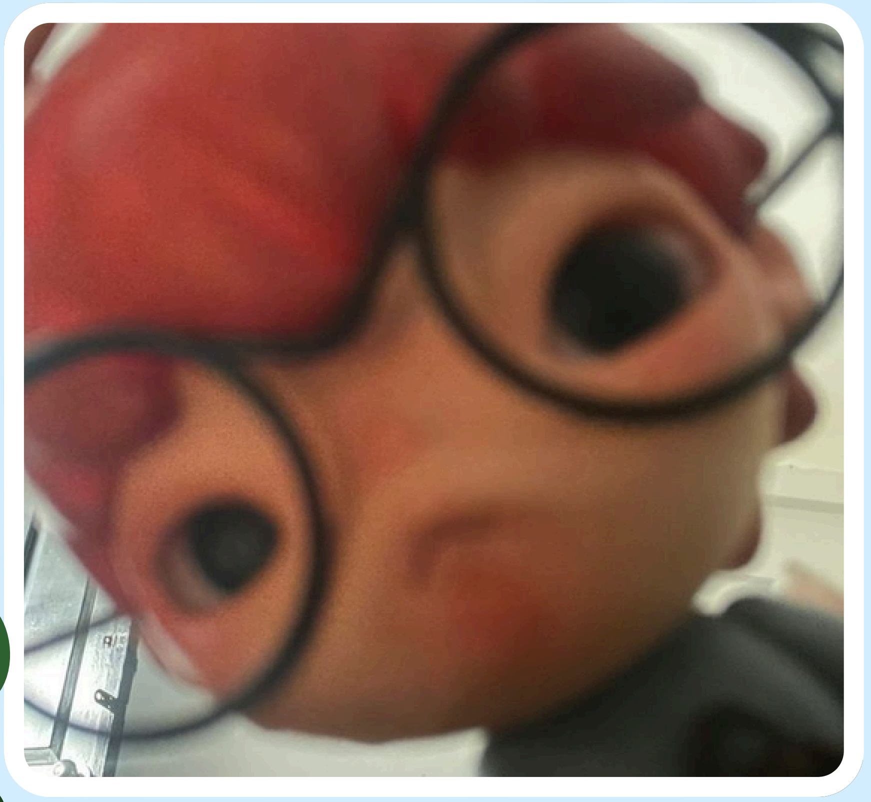
LINEAR SEARCH

KELOMPOK 2

OUR TEAM



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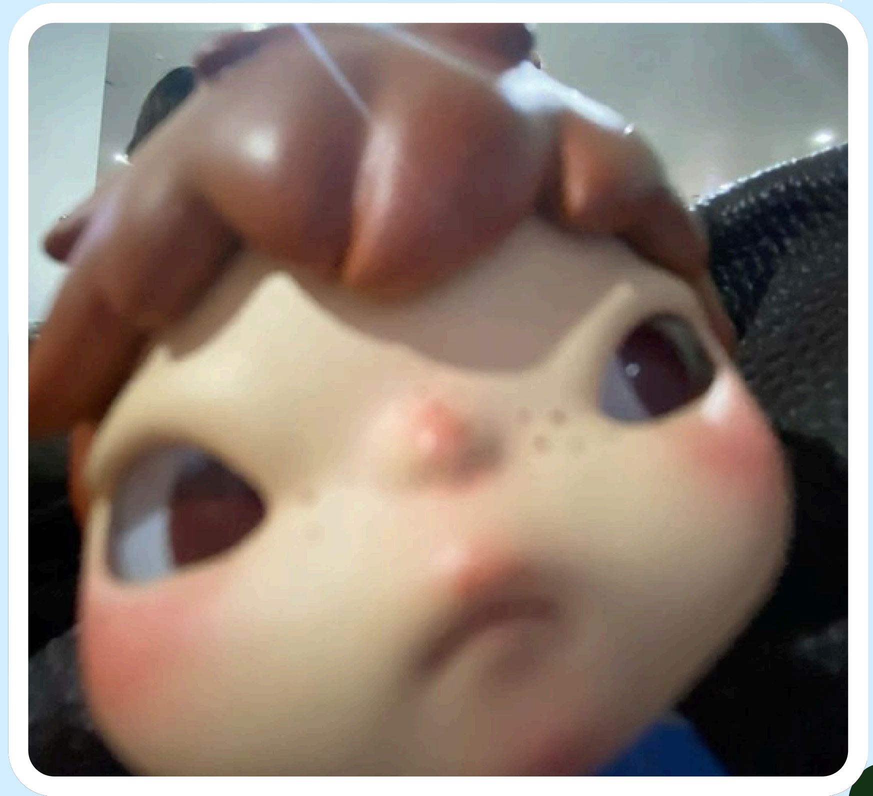


SINTA

SEARCHING ALGORITHM

Searching is one of the most fundamental operations used to find a specific element within a data structure, such as arrays, linked lists, or databases. Searching is essential when dealing with large amounts of data, where manually locating a value would be inefficient and time-consuming.

The goal of a search operation :

- To determine whether a particular target (or key) exists within the dataset.
- If it exists, we often want to know the index or position of that target.

TYPE OF SEARCHING ALGORITHM

Linear Search Algorithm

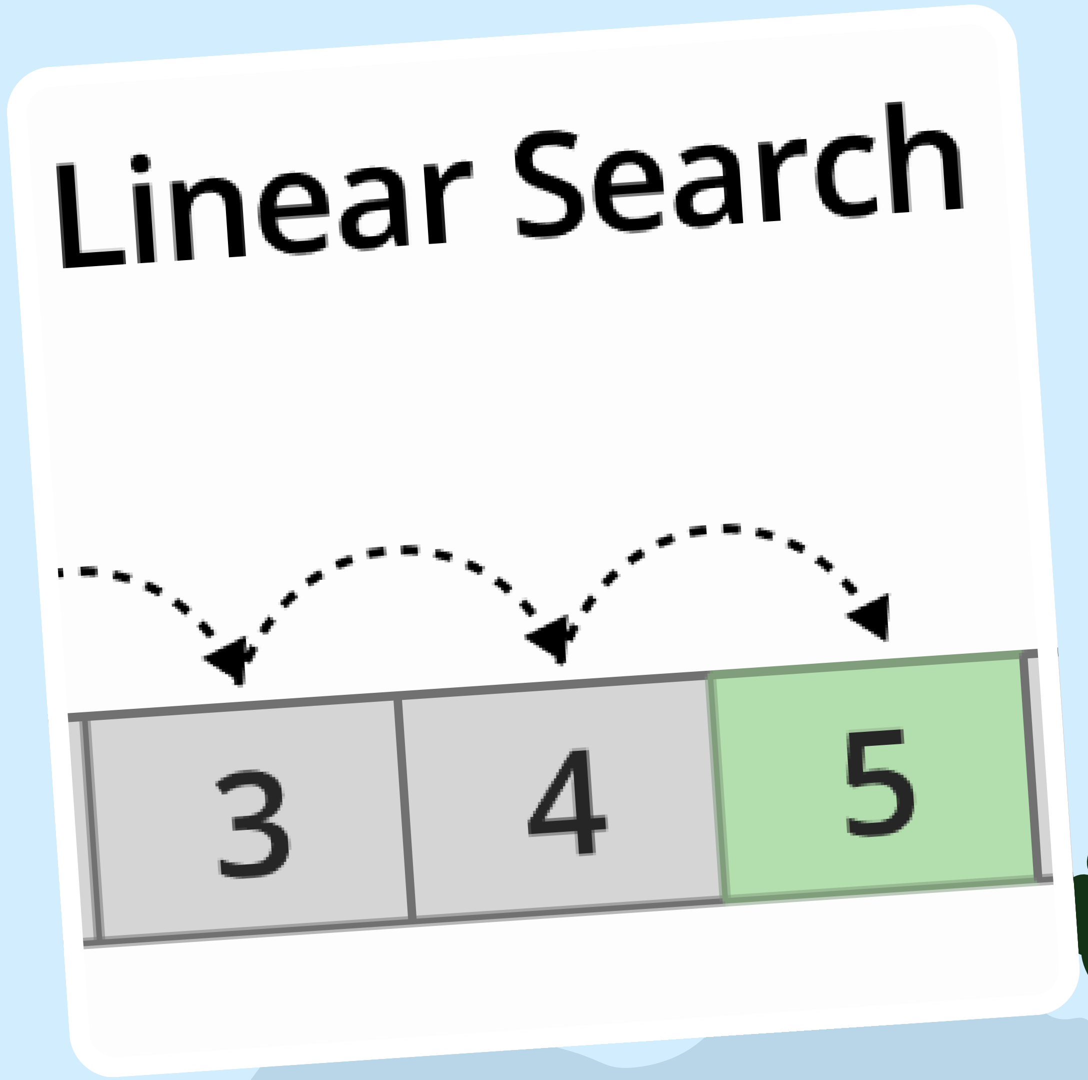
Binary Search Algorithm

LINEAR SEARCH

Linear Search is the simplest searching algorithm. It checks each element of the list one by one until the desired element (target) is found or until the end of the list is reached.

Component :

- ***Array/List***: The collection of elements to be searched.
- ***Target (Key)***: The specific value we want to find.
- ***Loop***: A way to go through each element in the array.
- ***Condition***: A comparison between the current element and the target.



HOW DOES LINEAR SEARCH WORK

Array : [12 , 90 , 45 , 67 , 30]
Key : 67

1. Start from the first element in the list.

$$[\ \boxed{12}\ ,\ 90\ ,\ 45\ ,\ 67\ ,\ 30\ ]$$

HOW DOES LINEAR SEARCH WORK

Array : [12 , 90 , 45 , 67 , 30]
Key : 67

2. Compare each element with the target.

[12 , $\boxed{90}$, 45 , 67 , 30]

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HOW DOES LINEAR SEARCH WORK

Array : [12 , 90 , 45 , 67 , 30]
Key : 67

3. If a match is found, return the index of the matching element

[12 , 90 , 45 , $\boxed{67}$, 30]

[3]

HOW DOES LINEAR SEARCH WORK?

Array : [12 , 90 , 45 , 67 , 30]
Key : 10

4. If the end of the list is reached and no match is found, return -1 to indicate the target is not present.

$$[\boxed{12},\boxed{90},\boxed{45},\boxed{67},\boxed{30}]$$

WHEN TO USE LINEAR SEARCH

The data is unsorted
Linear search doesn't require the data to be in any specific order. This makes it highly flexible and useful when dealing with raw or dynamically changing datasets.

The dataset is small or moderate in size
For a small number of elements, the difference in speed between linear search and more complex algorithms is negligible. Therefore, it's often not worth the extra effort to implement a more optimized method.

You only need to search occasionally
In systems where search operations are rare, using a simple algorithm like linear search avoids unnecessary complexity in your code.

You need to find all occurrences of a value
Linear search can be easily modified to find multiple matches in the data — something not directly supported by more advanced search methods.

You're working with unfamiliar or inconsistent data structures
Linear search can be applied to arrays, lists, strings, or any iterable, even when the structure or length of each element is irregular.

You want something easy to implement and debug
Since it uses only basic programming constructs like loops and conditions, linear search is ideal for beginners and for fast prototyping.

ADVANTAGES AND DISANDVANTAGES

- Simple to implement
- No need for pre-processing
- Works on any data
- Can return multiple results
- Low memory usage

- Inefficient for large datasets
- Worst-case time complexity is O(n)
- Cannot take advantage of sorted data
- Slower than other algorithms
- Not ideal for real-time systems

SOME QUESTION ABOUT LINEAR SEARCH

1. Hal apa yang membuat linear search tidak cocok digunakan pada dataset besar?

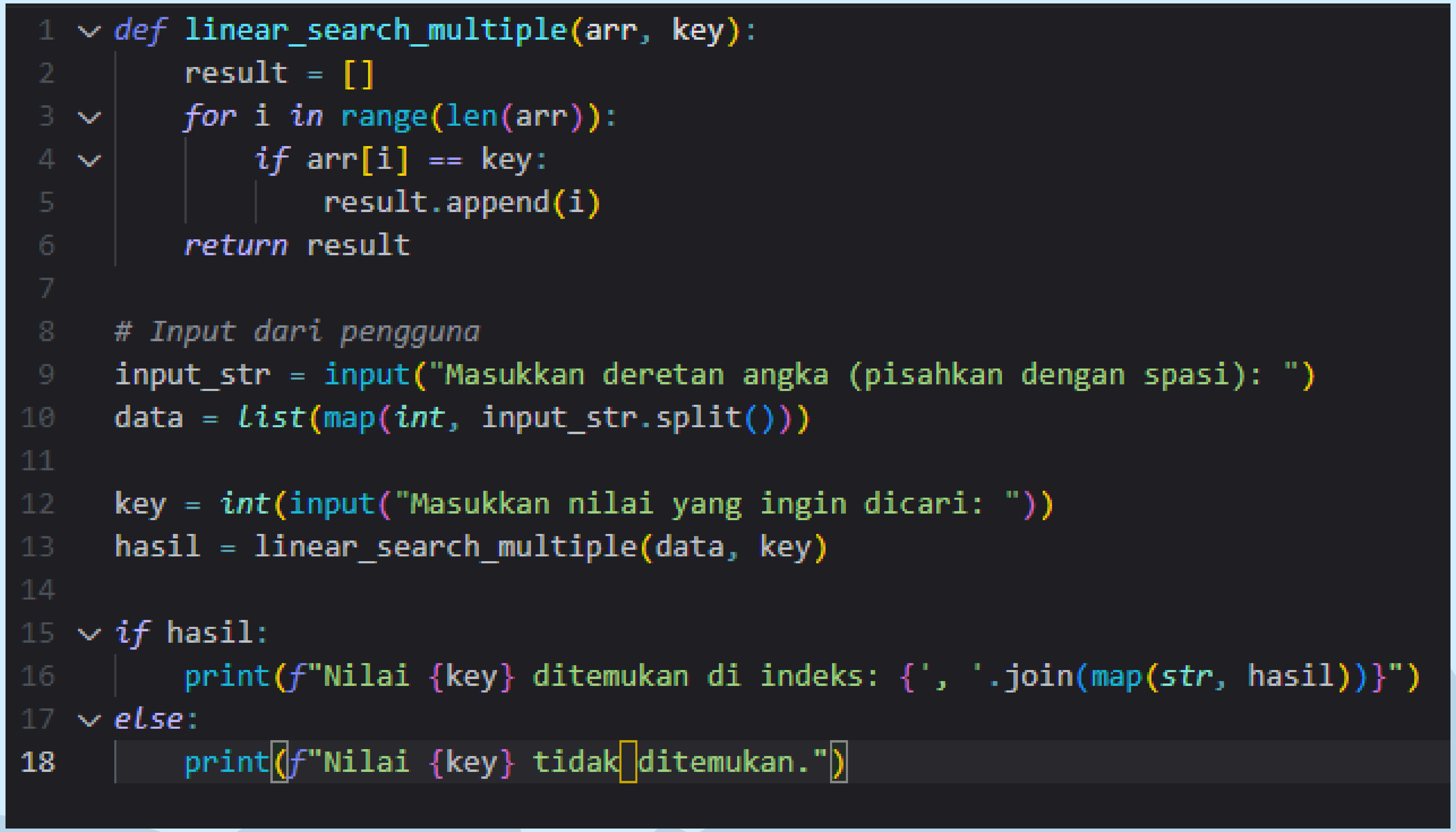
2. Buatlah sebuah program Python dengan menerapkan linear search dan mengimplementasikan fungsi multiple result

1. **Hal apa yang membuat linear search tidak cocok digunakan pada dataset besar?**

Salah satu alasan utama kenapa linear search tidak cocok digunakan pada dataset besar adalah karena metode ini bekerja dengan cara **memeriksa elemen satu per satu dari awal hingga akhir.** Proses ini dilakukan tanpa memperhatikan apakah data sudah terurut atau tidak, dan tanpa kemampuan untuk melompati bagian data tertentu. Jadi, **semakin banyak jumlah data yang kita miliki, semakin banyak juga jumlah elemen yang harus diperiksa** oleh algoritma ini. Ini menyebabkan waktu pencarian menjadi lebih lama, terutama saat data yang dicari adalah **data yang berada paling akhir atau tidak ada dalam list.**

2. Buatlah sebuah program Python dengan menerapkan linear search dan mengimplementasikan fungsi multiple result

Contoh Jawaban :



```python
def linear_search_multiple(arr, key):
    result = []
    for i in range(len(arr)):
        if arr[i] == key:
            result.append(i)
    return result

# Input dari pengguna
input_str = input("Masukkan deretan angka (pisahkan dengan spasi): ")
data = list(map(int, input_str.split()))

key = int(input("Masukkan nilai yang ingin dicari: "))
hasil = linear_search_multiple(data, key)

if hasil:
    print(f"Nilai {key} ditemukan di indeks: {', '.join(map(str, hasil))}")
else:
    print(f"Nilai {key} tidak ditemukan.")
```

CONCLUSION

Linear Search is a basic yet powerful searching technique used when simplicity is more important than performance. Although it may not be the most efficient method for large datasets, it remains a crucial foundational algorithm in computer science, especially useful when dealing with small or unsorted collections of data.

THANK YOU!