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Modul 6
Pengurutan Lanjutan

1. **Ubahlah kode mergeSort dan quickSort diatas agar bisa mengurutkan list yang berisi object-object mhsTIF yang sudah kamu buat di modul 2. Uji programmu secukupnya.**

satu.py - C:\Users\ACER\Downloads\URUSAN BERLIN BUKAN

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```
def cek(Daftar):
    for i in Daftar:
        print(i.nama,i.no,i.kota)
#nomer 1
    #mergesort
def mergesort(A) :
    if len (A) > 1 :
        mid = len(A) // 2
        separuhkiri = A[:mid]
        separuhkanan = A[mid:]

        mergesort(separuhkiri)
        mergesort(separuhkanan)

        i=0;j=0;k=0
        while i < len (separuhkiri)and j < len (separuhkanan) :
            if separuhkiri[i].no < separuhkanan[j].no :
                A[k] = separuhkiri[i]
                i = i+1
            else :
                A[k] = separuhkanan[j]
                j = j+1
            k = k+1

        while i < len (separuhkiri) :
            A[k] = separuhkiri[i]
            i = i+1
            k = k+1
        while j < len (separuhkanan) :
            A[k] = separuhkanan[j]
            j = j+1
            k = k+1
    #quicksort
def quicksort(A):
    quicksortbantu(A,0,len(A)-1)

def quicksortbantu(A,awal,akhir):
```

Python 3.7.4 Shell

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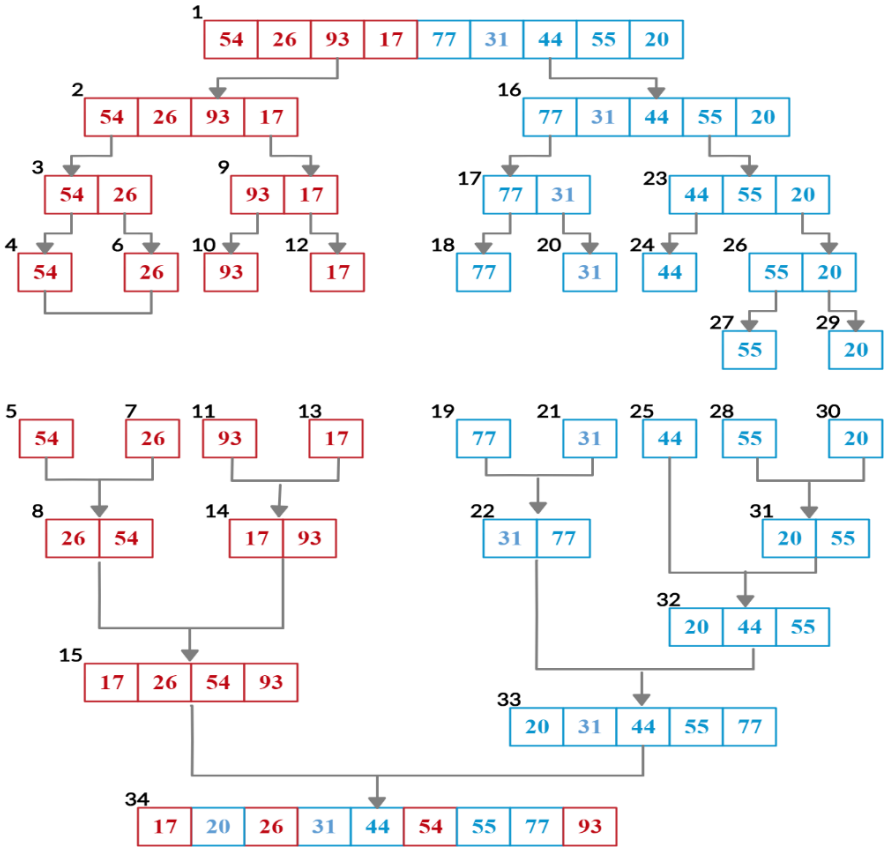
```
Ayudhia 95 Surakarta
Wulan 91 Kartasura
Nayu 99 Pangkalan Bun
Tata 61 Pati
Irul 101 Riau
Caca 97 Banten
Diah 106 Sorong
Anggit 111 NTT
Amron 105 Kudus
==========
mergesortnya
==========
Tata 61 Pati
Wulan 91 Kartasura
Ayudhia 95 Surakarta
Caca 97 Banten
Nayu 99 Pangkalan Bun
Irul 101 Riau
Amron 105 Kudus
Diah 106 Sorong
Berlian 107 Pati
Elsa 108 Mojolaban
Anggit 111 NTT
==========
quicksortnya
==========
Tata 61 Pati
Wulan 91 Kartasura
Ayudhia 95 Surakarta
Caca 97 Banten
Nayu 99 Pangkalan Bun
Irul 101 Riau
Amron 105 Kudus
Diah 106 Sorong
Berlian 107 Pati
Elsa 108 Mojolaban
Anggit 111 NTT
```

2. **Memakai bolpoin merah atau biru, tandai dan beri nomer urut eksekusi proses pada gambar 6.1 dan 6.2 dengan mengacu pada output di halaman 59.**



3. **Uji kecepatan. Ujilah mergeSort dan quickSort diatas (bersama metode sort yang kamu pelajari sebelumnya) dengan kode dibawah ini.**

tiga.py - C:\Users\ACER\Downloads\URUSAN BERLIN BUKAN URUSANMU\berlin\P.ALGOSTR...

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```
from time import time as detak
from random import shuffle as kocok
import time

k = [i for i in range(1, 6001)]
kocok(k)


def bubb(arr):
    n = len(arr)
    for i in range(n):
        for j in range(0, n - i - 1):
            if arr[j] > arr[j + 1]:
                arr[j], arr[j + 1] = arr[j + 1], arr[j]


def sele(A):
    for i in range(len(A)):
        min_idx = i
        for j in range(i + 1, len(A)):
            if A[min_idx] > A[j]:
                min_idx = j
        A[i], A[min_idx] = A[min_idx], A[i]


def inse(arr):
    for i in range(1, len(arr)):
        key = arr[i]
        j = i - 1
        while j >= 0 and key < arr[j]:
            arr[j + 1] = arr[j]
            j -= 1
        arr[j + 1] = key


def mergeSort(arr):
    if len(arr) > 1:
```

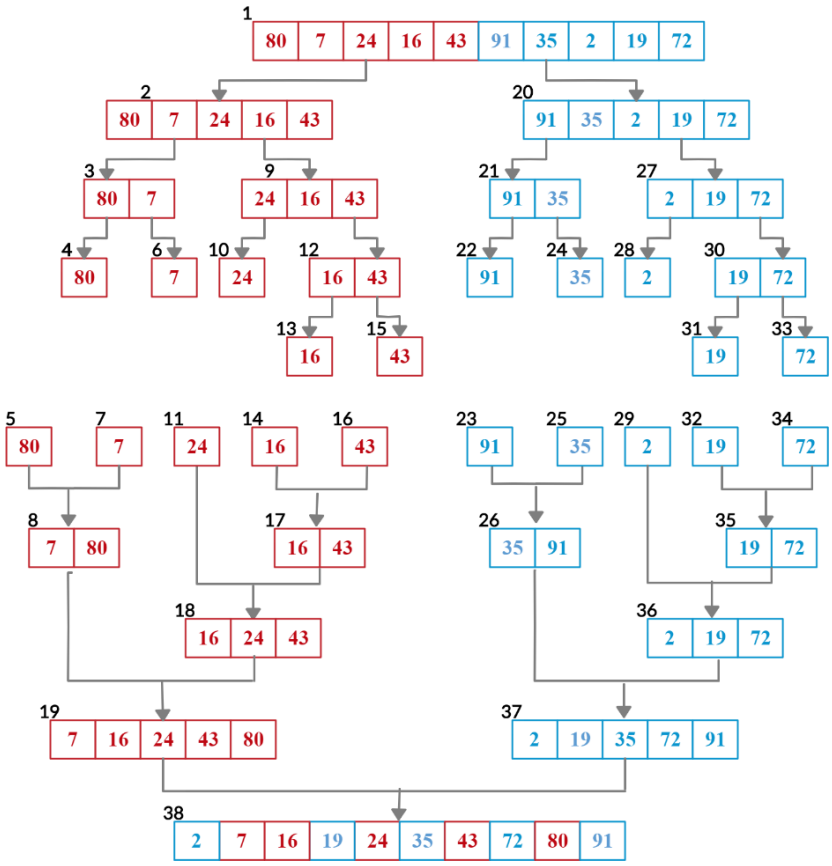
Python 3.7.4 Shell

File Edit Shell Debug Options Window Help

```
Python 3.7.4 (tags/v3.7.4:e09359112e, Jul  8 2019, 20:3
4:20) [MSC v.1916 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more i
nformation.
>>>
 RESTART: C:\Users\ACER\Downloads\URUSAN BE
RLIN BUKAN URUSANMU\berlin\P.ALGOSTRUK\
MODUL_6\tiga.py
bubble : 3.40189 detik
selection : 1.2427 detik
insertion : 1.52491 detik
merge : 0.0289216 detik
quick : 0.0139618 detik
>>>
```

Ln: 10 Col: 4

4. **Diberikan list L = [80, 7, 24, 16, 43, 91, 35, 2, 19, 72], gambarlah trace pengurutan untuk algoritma.**
    a. **mergeSort**
    b. **quickSort**



5. **Tingkatkan efisiensi program mergeSort dengan tidak memakai operator slice (seperti A[:mid] dan A[mid:]), dan lalu mem-pass index awal dan index akhir bersama listnya saat kita memanggil mergeSort secara rekursif. Kamu akan perlu memisah fungsi mergeSort itu menjadi beberapa fungsi, mirip halnya dengan apa yang dilakukan algoritma quickSort.**

lima.py - C:\Users\ACER\Downloads\URUSAN BERLIN BUKAN URUSANMU\berlin\P.ALGOST...

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```
daftar = [54,26,93,17,77,31,44,55,20]
def mergeSort2(A, awal, akhir):
    mid = (awal+akhir)//2
    if awal < akhir:
        mergeSort2(A, awal, mid)
        mergeSort2(A, mid+1, akhir)
    a, f, l = 0, awal, mid+1
    tmp = [None] * (akhir - awal + 1)
    while f <= mid and l <= akhir:
        if A[f] < A[l]:
            tmp[a] = A[f]
            f += 1
        else:
            tmp[a] = A[l]
            l += 1
        a += 1
#proses penggabungan
    if f <= mid:
        tmp[a:] = A[f:mid+1]
    if l <= akhir:
        tmp[a:] = A[l:akhir+1]
#memindah isi tmp ke A
    a = 0
    while awal <= akhir:
        A[awal] = tmp[a]
        awal += 1
        a += 1

def mergeSort(A):
    mergeSort2(A, 0, len(A)-1)

print("sebelum","\n",daftar)
mergeSort(daftar)
print("sesudah","\n",daftar)
```

Python 3.7.4 Shell

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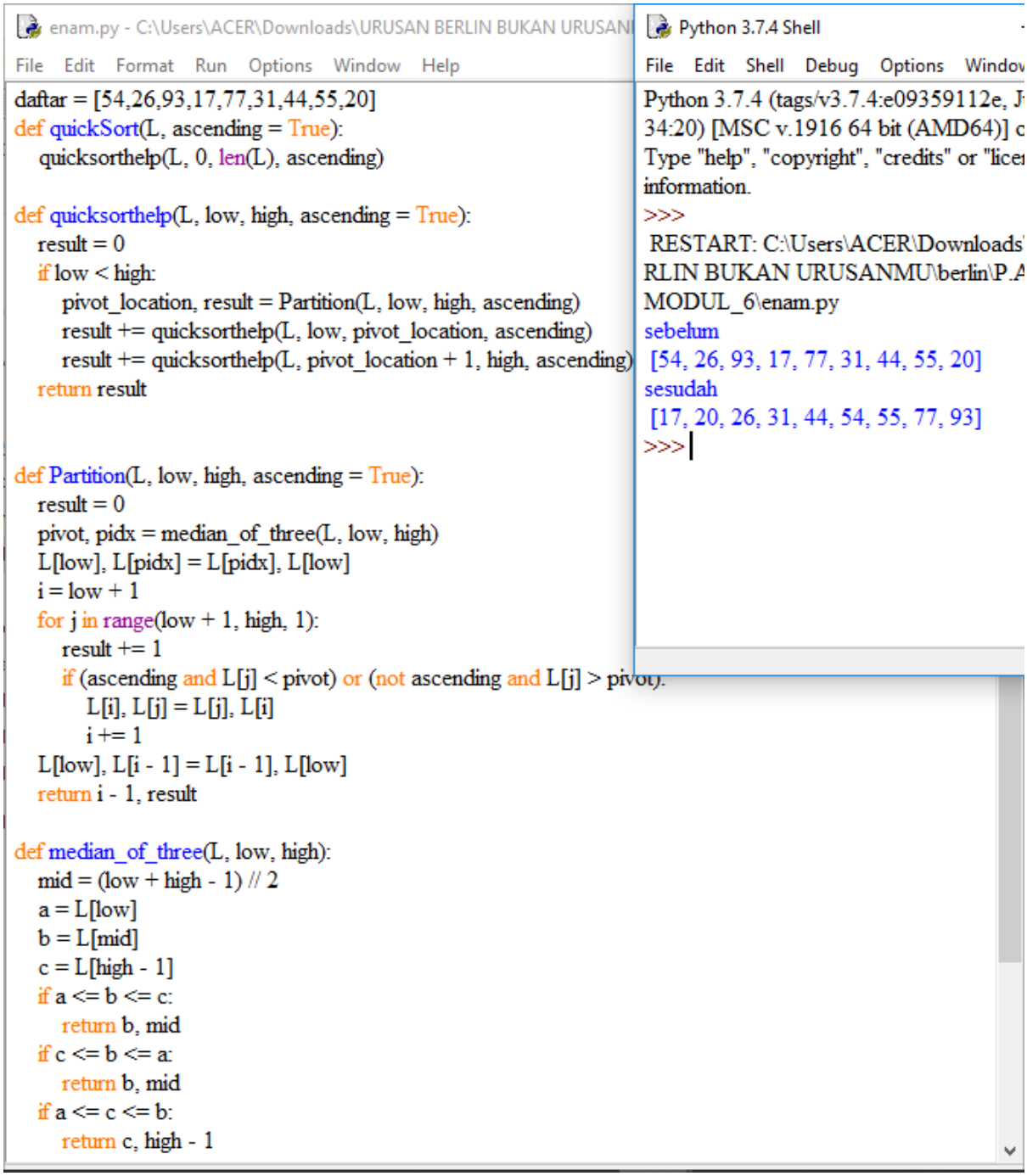
```
Python 3.7.4 (tags/v3.7.4:e09359112e, Jul  8 2019, 20:34:20) [MS
Type "help", "copyright", "credits" or "license()" for more information
>>>
 RESTART: C:\Users\ACER\Downloads\URUSAN BERLIN BUK
TRUK\MODUL_6\lima.py
sebelum
 [54, 26, 93, 17, 77, 31, 44, 55, 20]
sesudah
 [17, 20, 26, 31, 44, 54, 55, 77, 93]
>>>
```

6. **Apakah kita bisa meningkatkan efisiensi program quickSort dengan memakai metode median-dari-tiga untuk memilih pivotnya? Ubahlah kodenya dan ujilah.**



7. **Uji-kecepatan keduanya dan perbandingkan juga dengan kode awalnya.**

tujuh.py - C:\Users\ACER\Downloads\URUSAN BERLIN BUKAN URUSANMU\berlin\P.ALGOS...

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```
        if (ascending and L[j] < pivot) or (not ascending and L[j] > pivot):
            L[i], L[j] = L[j], L[i]
            i += 1
    L[low], L[i - 1] = L[i - 1], L[low]
    return i - 1, result

def median_of_three(L, low, high):
    mid = (low + high - 1) // 2
    a = L[low]
    b = L[mid]
    c = L[high - 1]
    if a <= b <= c:
        return b, mid
    if c <= b <= a:
        return b, mid
    if a <= c <= b:
        return c, high - 1
    if b <= c <= a:
        return c, high - 1
    return a, low

daftar = [10, 51, 2, 18, 4, 31, 13, 5, 23, 64, 29]
from time import time as detak
from random import shuffle as kocok
import time

k =  [[i] for i in range(1, 6001)]
kocok(k)
u_mer = k[:]
u_mer5 = k[:]
u_qui = k[:]
u_qui6 = k[:]

aw=detak();mergesort(u_mer);ak=detak();print("mergesort          : %g detik" %(ak-aw));
aw=detak();mergesort_5(u_mer5);ak=detak();print("mergesort terbaru  : %g detik" %(ak-aw));
aw=detak();quicksort(u_qui);ak=detak();print("quicksort          : %g detik" %(ak-aw));
aw=detak();quicksort_6(u_qui6);ak=detak();print("quicksort terbaru  : %g detik" %(ak-aw));
```

Python 3.7.4 Shell

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```
Python 3.7.4 (tags/v3.7.4:e09359112e, Jul  8 2019, 20:34:20) [MSC v.1916 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
 RESTART: C:\Users\ACER\Downloads\URUSAN BERLIN BUKAN URUSANMU\berlin\P.ALGOSTRUK\MODUL_6\tujuh.py
mergesort          : 0.0299227 detik
mergesort terbaru  : 0.0439134 detik
quicksort          : 0.019944 detik
quicksort terbaru  : 0.0309482 detik
>>>
```

Ln: 9 Col: 4

8. Buatlah versi linked-list untuk program mergeSort diatas.

delapan.py - C:\Users\ACER\Downloads\URUSAN BERLIN BUKAN URUSANMU\berlin\P.ALG...

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```
class Node():
    def __init__(self,data,next= None,prev = None):
        self.data = data
        self.next = next
        self.prev = prev

class Linked():
    def __init__(self,head = None):
        self.head = head

    def cetak(self):
        cur = self.head
        while cur != None:
            print(cur.data)
            cur = cur.next
    def appendList(self, data):
        node = Node(data)
        if self.head == None:
            self.head = node
        else:
            curr = self.head
            while curr.next != None:
                curr = curr.next
        curr.next = node

    def appendSorted(self, data):
        node = Node(data)
        curr = self.head
        prev = None

        while curr is not None and curr.data < data:
            prev = curr
            curr = curr.next

        if prev == None:
            self.head = node
        else:
```

Python 3.7.4 Shell

File Edit Shell Debug Options Window Help

```
n.py
List 1 :
16
17
33
48
92
List 2 :
10
18
23
Mergesort Linked list :
10
16
17
18
23
33
48
92
>>>
```

Ln: 24 Col: 4