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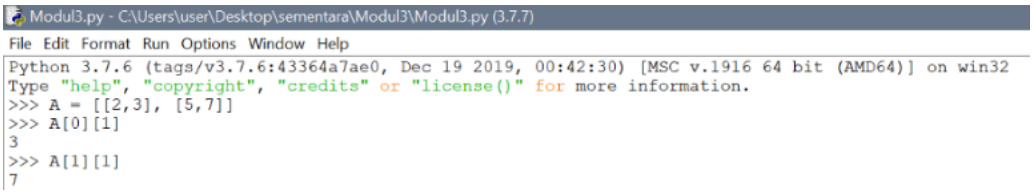
Kelas : C

MODUL 3

Collection, Arrays and Linked Structure

3.2 Array dan Array Dua

Dimensi Latihan3.1



```
Modul3.py - C:\Users\user\Desktop\sementara\Modul3\Modul3.py (3.7.7)
File  Edit  Format  Run  Options  Window  Help
Python 3.7.6 (tags/v3.7.6:43364a7ae0, Dec 19 2019, 00:42:30) [MSC v.1916 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>> A = [[2,3], [5,7]]
>>> A[0][1]
3
>>> A[1][1]
7
```

Latihan3.2

```
>>> B = [[0 for j in range(3)] for i in range(3)]
>>> B
[[0, 0, 0], [0, 0, 0], [0, 0, 0]]
>>> [x**2 for x in range(0,7)]
[0, 1, 4, 9, 16, 25, 36]
>>> [(x,x**2) for x in range(7)]
[(0, 0), (1, 1), (2, 4), (3, 9), (4, 16), (5, 25), (6, 36)]
>>> [x**2 for x in range(15) if x%2==0]
[0, 4, 16, 36, 64, 100, 144, 196]
>>> [3 for i in range(5)]
[3, 3, 3, 3, 3]
>>> [[0 for j in range(3)] for i in range(3)]
[[0, 0, 0], [0, 0, 0], [0, 0, 0]]
>>> [[1 if j==i else 0 for j in range(3)] for i in range(3)]
[[1, 0, 0], [0, 1, 0], [0, 0, 1]]
>>> d = "Yogyakarta dan Surakarta."
>>> [x for x in d if x in "aiueoAIUEO"]
['o', 'a', 'a', 'a', 'a', 'u', 'a', 'a', 'a']
>>> [x for x in range(20,50) if apakahPrima(x)]
Traceback (most recent call last):
  File "<pyshell#13>", line 1, in <module>
    [x for x in range(20,50) if apakahPrima(x)]
  File "<pyshell#13>", line 1, in <listcomp>
    [x for x in range(20,50) if apakahPrima(x)]
NameError: name 'apakahPrima' is not defined
>>>
= RESTART: C:/Users/LABSI-18/AppData/Local/Programs/Python/Python37/latihan3_2.py
>>> [x for x in range(20,50) if apakahGenap(x)]
[20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48]
>>>
```

3.3 Linked

Structures

LinkedList

Berikut adalah screenshot dari program:

class node.py - C:\Users\user\Desktop\sementara\Modul3\class node.py (

File Edit Format Run Options Window Help

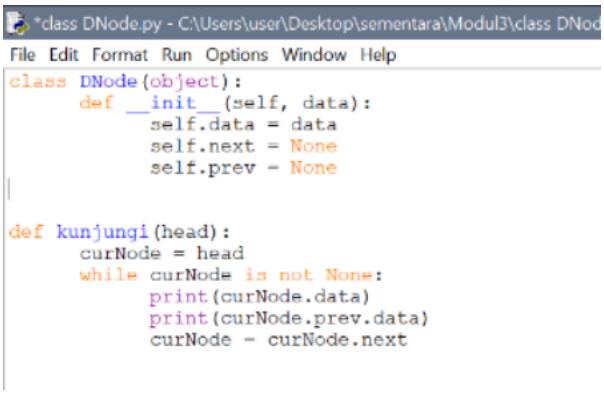
```
class Node(object):
      """Sebuah simpul di linked list"""
      def __init__(self, data, next=None):
            self.data = data
            self.next = next

a = Node(11)
b = Node(52)
c = Node(18)
d = Node(32)
e = Node(16)

a.next = b
b.next = c
c.next = d
d.next = e

def kunjungi(head):
      curNode = head
      while curNode is not None:
            print(curNode.data)
            curNode = curNode.next
```

Berikut adalah screenshot dari hasil:

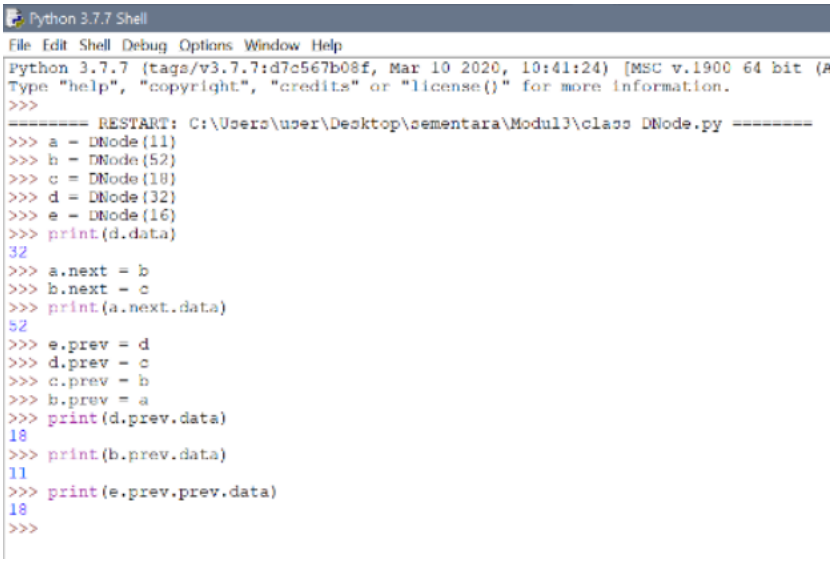
```
========= RESTART: C:\Users\user\Desktop\sementara\Modul3\class node.py ========
>>> a = Node(11)
>>> b = Node(52)
>>> c = Node(18)
>>> d = Node(30)
>>> e = Node(65)
>>> a.next = b
>>> b.next = c
>>> c.next = d
>>> d.next = e
>>> print(a.data)
11
>>> print(a.next.data)
52
>>> print(a.next.next.data)
18
>>> print(a.next.next.next.data)
30
>>> print(a.next.next.next.next.data)
65
>>> a.kunjungi(a)
11
52
18
30
65
>>> c.kunjungi(c)
18
30
65
>>> e.kunjungi(e)
65
>>> b.kunjungi(c)
18
30
65
>>> c.kunjungi(b)
52
18
30
65
>>>
```

Advanced Linked List

Berikut adalah screenshot dari program:



Berikut adalah screenshot dari hasil:



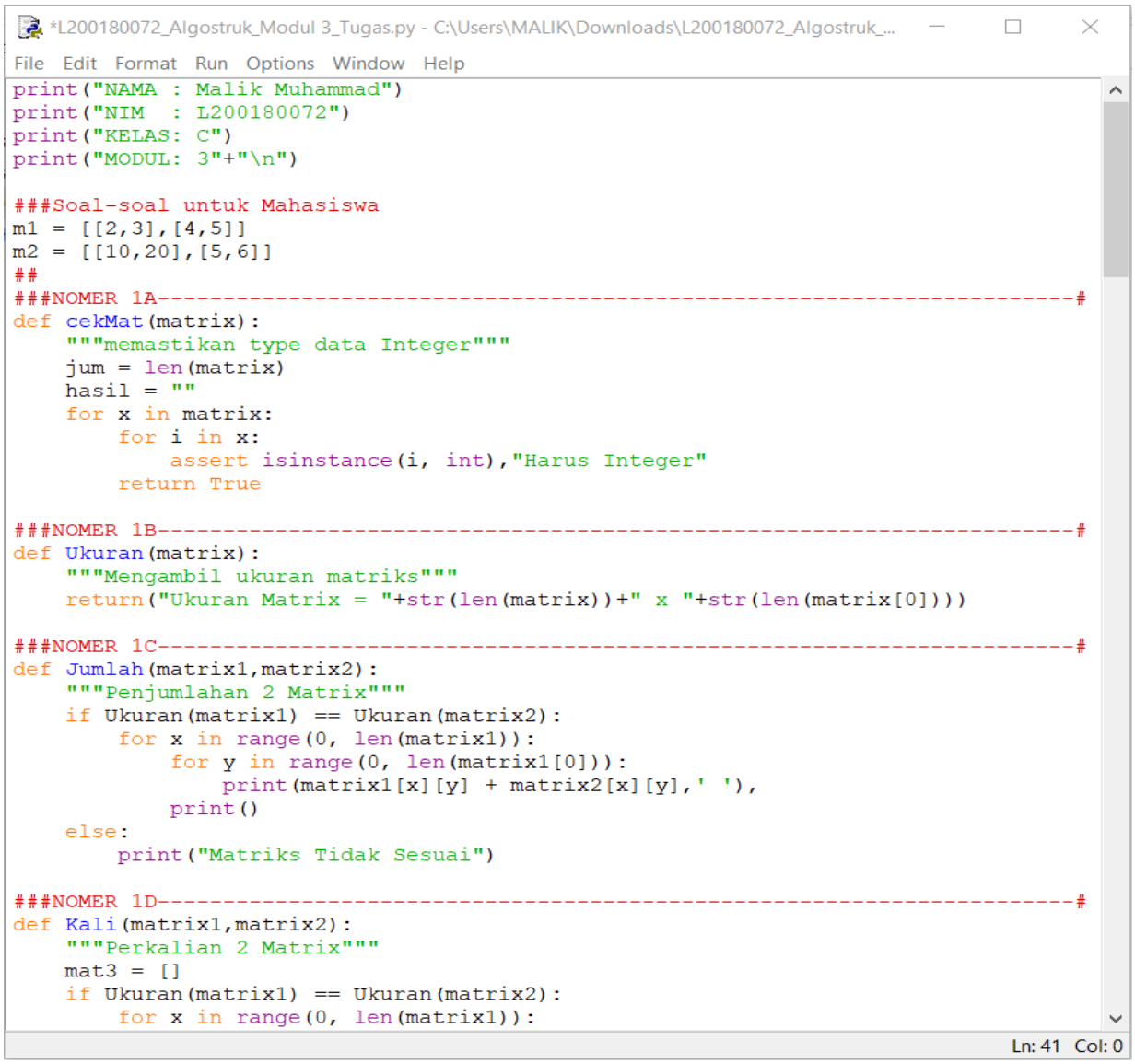
3.4 Soal-soal untukMahasiswa

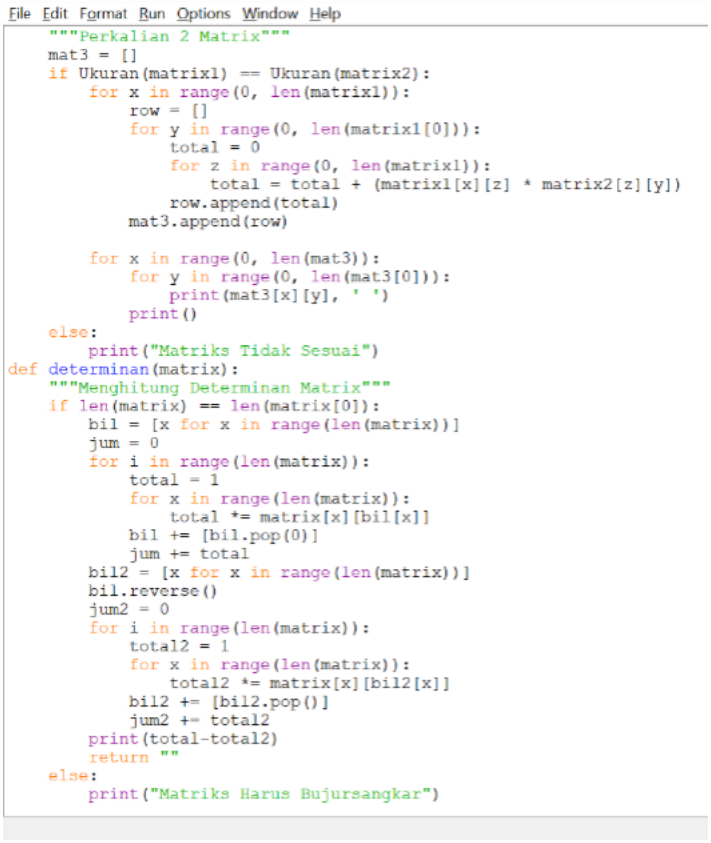
1. Terkait array dua dimensi, kita akan membuat tipe data sebuah matrix yang berisi angkaangka. Untuk itu buatlahfungsi-fungsi:
   - Memastikan bahwa isi dan ukuran matrix-nya konsisten (karena tiap anggota dari list luar nya bisa saja mempunyai ukuran yang berbeda-beda daan bahkan bisa saja berbedatipe)
   - Untuk mengambil ukuranmatrix-nya
   - Untuk menjumlahkan dua matrix (pastikan ukurannyasesuai)

- Untuk mengalikan dua matrix (pastikanukurannyasesuai) Untuk menghitung determinan sebuah matrixbujursangkar

Jawab:

Berikut adalah screenshot dari program yang saya buat:





```
File Edit Format Run Options Window Help
    """Perkalian 2 Matrix"""
    mat3 = []
    if Ukuran(matrix1) == Ukuran(matrix2):
        for x in range(0, len(matrix1)):
            row = []
            for y in range(0, len(matrix1[0])):
                total = 0
                for z in range(0, len(matrix1)):
                    total = total + (matrix1[x][z] * matrix2[z][y])
                row.append(total)
            mat3.append(row)

        for x in range(0, len(mat3)):
            for y in range(0, len(mat3[0])):
                print(mat3[x][y], ' ')
            print()
    else:
        print("Matriks Tidak Sesuai")
def determinan(matrix):
    """Menghitung Determinan Matrix"""
    if len(matrix) == len(matrix[0]):
        bil = [x for x in range(len(matrix))]
        jum = 0
        for i in range(len(matrix)):
            total = 1
            for x in range(len(matrix)):
                total *= matrix[x][bil[x]]
            bil += [bil.pop(0)]
            jum += total
        bil2 = [x for x in range(len(matrix))]
        bil.reverse()
        jum2 = 0
        for i in range(len(matrix)):
            total2 = 1
            for x in range(len(matrix)):
                total2 *= matrix[x][bil2[x]]
            bil2 += [bil2.pop()]
            jum2 += total2
        print(total-total2)
        return ""
    else:
        print("Matriks Harus Bujursangkar")
```

```
#----------------------------------CEK NOMER 1--------------------------------#
print("Nomer 1")
print(cekMat(m1))
print(Ukuran(m1))
Jumlah(m1,m2)
Kali(m1,m2)
print(determinan(m1))
```

Berikut adalah program yang saya buat:

#NOMER 1A - #

def cekMat(matrix):

"""memastikan type data

Integer""" jum = len(matrix)

hasil = ""

for x in

matrix: for i

in x:

assert isinstance(i, int),"Harus Integer"

return True

```
#NOMER1B                    -                    #
def Ukuran(matrix):
   """Mengambil ukuran matriks"""
   return("Ukuran Matrix = "+str(len(matrix))+"
x"+str(len(matrix[0]))) #NOMER 1C                    #
def Jumlah(matrix1,matrix2):
   """Penjumlahan 2 Matrix"""
   if Ukuran(matrix1) ==
      Ukuran(matrix2): for x in range(0,
      len(matrix1)):
         for y in range(0, len(matrix1[0])):
            print(matrix1[x][y] + matrix2[x][y],' '),
         print()
   else:
      print("Matriks Tidak Sesuai")
#NOMER 1D                    -                    #
def Kali(matrix1,matrix2):
   """Perkalian 2 Matrix"""
   mat3 = []
   if Ukuran(matrix1) == Ukuran(matrix2):
      for x in range(0, len(matrix1)):
         row = []
         for y in range(0, len(matrix1[0])):
            total = 0
            for z in range(0, len(matrix1)):
               total = total + (matrix1[x][z] * matrix2[z][y])
            row.append(total)
```

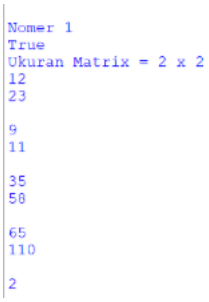
```
            mat3.append(row)

        for x in range(0, len(mat3)):
            for y in range(0,
                len(mat3[0])):
                print(mat3[x][y], ' ')
            print()
    else:
        print("Matriks Tidak
Sesuai") def
determinan(matrix):
    """Menghitung Determinan
    Matrix""" if len(matrix) ==
    len(matrix[0]):
        bil = [x for x in
        range(len(matrix))] jum = 0
        for i in
            range(len(matrix)):
            total = 1
            for x in range(len(matrix)):
                total *= matrix[x][bil[x]]
            bil +=
            [bil.pop(0)] jum
            += total
        bil2 = [x for x in range(len(matrix))]
        bil.reverse()
        jum2 = 0
        for i in
            range(len(matrix)):
            total2 = 1
```

```
for x in range(len(matrix)):
    total2 *= matrix[x][bil2[x]]
bil2 += [bil2.pop()]
```

```
            jum2 +=
        total2 print(total
        -total2) return ""
    else:
        print("Matriks Harus Bujursangkar")
#.....CEKNOMER1.....#
print("Nomer 1")
print(cekMat(m1))
print(Ukuran(m1))
Jumlah(m1,m2)
Kali(m1,m2)
print(determinan(m1)
)
```

Berikut adalah screenshot dari hasil ketika program tersebut dijalankan:

2. Terkait matrix dan list comprehension, buatlah (dengan memanfaatkanlist comprehension)fungsi-fungsi:
   - Untuk membangkitkan matrix berisi nol semua dengan diberikan



     ukurannya. Pemanggilan: buatNol(m,n) dan buatNol(m). Pemanggilan dengan caraterakhir akan memberikan matrix bujursangkar ukuran m xn

- Untuk membangkitkan matrix identitas dengan diberikanukurannya. Pemanggilan:buatIdentitas(m)

Jawab :

Berikut adalah screenshot dari program:

```
#NOMER 2A-------------------------------------------------------------------------#
def buatNol(m, n):
    """Menggunakan dua input"""
    matrix = [[0 for x in range(m)] for i in range(n)]
    print(matrix)

def buatNol2(m):
    """Menggunakan satu input"""
    n = m
    matrix = [[0 for x in range(m)] for i in range(n)]
    print(matrix)

#NOMER 2B-------------------------------------------------------------------------#
def buatIdentitas(m):
    n = m
    matrix = [[1 if j == i else 0 for j in range(m)]for i in range(n)]
    print(matrix)

#----------------------------------CEK NOMER 2-------------------------------#

print("Nomer 2")
buatNol(3,3)
buatNol2(3)
buatIdentitas(4)
print("\n")
```

Berikut adalah program yang saya buat:

```
#NOMER 2A-------------------------------------------------------------------------#
def buatNol(m, n):
  """Menggunakan dua input"""
  matrix = [[0 for x in range(m)] for i in range(n)]
  print(matrix)

def buatNol2(m):
  """Menggunakan satu
  input""" n = m
  matrix = [[0 for x in range(m)] for i in range(n)]
  print(matrix)

#NOMER 2B-------------------------------------------------------------------------#
def
  buatIdentitas(m):
  n = m
  matrix = [[1 if j == i else 0 for j in range(m)]for i in range(n)]
  print(matrix)

#                    CEKNOMER2                    #

print("Nomer 2")
buatNol(3,3)
```

buatNol2(3)
buatIdentitas(
4) print("\n")

Berikut adalah screenshot dari hasil ketika program dijalankan:

```
==================================== RESTART: C:\Users\user\I
Nomer 2
[[0, 0, 0], [0, 0, 0], [0, 0, 0]]
[[0, 0, 0], [0, 0, 0], [0, 0, 0]]
[[1, 0, 0, 0], [0, 1, 0, 0], [0, 0, 1, 0], [0, 0, 0, 1]]
```

3. Terkait linked list, buatlah fungsi untuk:
   - Mencari data yang isinya tertentu:cari(head,yang_dicari)
   - Menambah suatu simpul di awal:tambahDepan(head)
   - Menambah suatu simpul di akhir:tambahAkhir(head)
   - Menyisipkan suatu simpul dimana saja:tambah(head,posisi)
   - Menghapus suatu simpul di awal, di akhir, atau dimana

   saja:hapus(posisi) Jawab:

Berikut adalah screenshot dari program:

File Edit Format Run Options Window Help

```
#NOMER 3-------------------------------------------------------------------------#
print("Nomor 3")
class Node(object):
    def __init__(self, data, next=None):
        self.data = data
        self.next = next

def MakeNode(list):
    a = Node(list[0])
    if len(list) > 1:
        b = a
        for i in range(1,len(list)):
            b.next = Node(list[i])
            b = b.next
    return a

def kunjungi(head):
    curNode = head
    while curNode != None:
        print(curNode.data)
        curNode = curNode.next

def cari(head, yang_dicari):
    temp = head
    while temp != None :
        if temp.data == yang_dicari:
            return temp
        temp = temp.next
    return Node(None)

def tambahDepan(head):
    temp = Node("tambah depan", head)
    return temp

def tambahAkhir(head):
    temp = head
    while temp.next != None:
        temp = temp.next
    temp.next = Node("tambah akhir")
    return head

def tambah(head, posisi):
```

File Edit Format Run Options Window Help

```
def tambah(head, posisi):
    """ Menambahkan simpul sebelum posisi """
    temp = head
    while temp != None:
        if temp.next.data == posisi:
            temp_belakang = temp.next
            temp.next = Node("tambah tengah", temp_belakang)
            return head
        temp = temp.next
    return None

def hapus(head, posisi):
    temp = head
    while temp != None:
        if temp.next.data == posisi:
            temp_belakang = temp.next.next
            temp.next = temp_belakang
            return head
        temp = temp.next
    return None

a = MakeNode(["anang", "prasetyo", "Anang", "Prasetyo"])

print(a.data)
c = cari(a, "prasetyo")
print(c.next.data)
print()
kunjungi(a)
print()
a = tambahDepan(a)
kunjungi(a)
print()
a = tambahAkhir(a)
kunjungi(a)
print()
a = tambah(a, "prasetyo")
kunjungi(a)
print()
a = hapus(a, "prasetyo")
kunjungi(a)
print("\n")
```

Berikut adalah program yang saya buat:

```
#NOMER 3 - #
print("Nomor 3")
class
Node(object):
  definit(self, data, next=None):
    self.data =data
    self.next =next

def
  MakeNode(list):
  a = Node(list[0])
  if len(list) >1:
    b = a
    for i
      inrange(1,len(list)):
      b.next = Node(list[i])
      b =b.next
  return a

def
  kunjungi(head):
  curNode = head
```

```
    while curNode != None:
        print(curNode.data)
        curNode =
        curNode.next

def cari(head,
    yang_dicari): temp =
    head
    while temp != None :
        if temp.data ==
            yang_dicari: return temp
        temp =
    temp.next return
    Node(None)

def tambahDepan(head):
    temp = Node("tambah depan",
    head) return temp

def
    tambahAkhir(head):
    temp = head
    while temp.next !=
        None: temp =
        temp.next
    temp.next = Node("tambah
    akhir") return head

def tambah(head, posisi):
    """ Menambahkan simpul sebelum posisi
    """ temp = head
    while temp != None:
        if temp.next.data == posisi:
            temp_belakang =
            temp.next
            temp.next = Node("tambah tengah", temp_belakang)
            return head
        temp = temp.next
    returnNone

def hapus(head,
    posisi): temp =head
    while temp != None:
        if temp.next.data == posisi:
            temp_belakang =
            temp.next.next temp.next =
```

temp_belakang return head

```
    temp =
  temp.next return
  None

a = MakeNode(["Malik", "Muhammad", "Malik", "Muhammad"])

print(a.data)
c = cari(a, "Malik")
print(c.next.dat
a) print()
kunjungi(a)
print()
a =
tambahDepan(a)
kunjungi(a)
print()
a =
tambahAkhir(a)
kunjungi(a)
print()
a = tambah(a,
"Muhammad")
kunjungi(a)
print()
a = hapus(a,
"Muhammad")
kunjungi(a)
print("\n")
```

Berikut adalah screenshot dari hasil ketika program tersebut dijalankan:

4. Terkait doubly linked list, buatlah fungsi untuk:
   - Mengunjungi dan mencetak data tiap simpul dari depan dan daribelakang
   - Menambah suatu simpul diawal
   - Menambah suatu simpul

   diakhir Jawab:

   Berikut adalah screenshot dari program:

```
#NOMER 4-------------------------------------------------------------------------#
print("Nomor 4")
class DNode(object):
    def __init__(self, data):
        self.data = data
        self.next = None
        self.prev = None

def massDNodeCreator(list):
    a = DNode(list[0])
    p = a
    for i in list[1:]:
        p.next = DNode(i)
        p.next.prev = p
        p = p.next
    return a

def tambahSimpulAwal(head, data):
    data = DNode(data)
    data.next = head
    data.next.prev = data
    return data

def tambahSimpulAkhir(head, data):
    data = DNode(data)
    temp = head
    while temp.next != None:
        temp = temp.next
    temp.next = data
    return head

list = ["e", "f", "g", "h"]
a = massDNodeCreator(list)
print(a.next.next.next.prev.prev.data)

a = tambahSimpulAwal(a, "awal")
print(a.next.prev.data)

a = tambahSimpulAkhir(a, "akhir")
print(a.next.next.next.next.next.data)
```

   Berikut adalah program yang saya buat:

   #NOMER4 - #

   print("Nomor 4")

   classDNode(object)

   :

   definit(self, data):

   self.data = data

   self.next =None

```
        self.prev = None

def
    massDNodeCreator(list)
    : a = DNode(list[0])
    p = a
    for i in list[1:]:
        p.next =
        DNode(i)
        p.next.prev = p
        p =
    p.next
    return a

def tambahSimpulAwal(head,
    data): data = DNode(data)
    data.next = head
    data.next.prev =
    data return data

def tambahSimpulAkhir(head,
    data): data = DNode(data)
    temp = head
    while temp.next !=
        None: temp =
        temp.next
    temp.next = data
    return head

list = ["e", "f", "g", "h"]
a = massDNodeCreator(list)
```

```
print(a.next.next.next.prev.prev.data)

a = tambahSimpulAwal(a,
"awal") print(a.next.prev.data)

a = tambahSimpulAkhir(a, "akhir")
print(a.next.next.next.next.next.da
ta)
```

Berikut adalah screenshot hasil ketika program dijalankan: