

PRAKTIKUM ALGORITMA DAN STRUKTUR DATA

MODUL 3

Collections, Arrays, and Linked Structures



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**PROGRAM STUDI TEKNIK INFORMATIKA
FAKULTAS KOMUNIKASI DAN INFORMATIKA
UNIVERSITAS MUHAMMADIYAH SURAKARTA**

2023

1. Terkait array dua dimensi, kita akan membuat tipe data sebuah matrix yang berisi angka-angka. Untuk itu buatlah fungsi-fungsi

- Untuk memastikan konsisten

```
Modul 3.py X
E: > Kuliah > Semester 4 > Praktikum ASD > Modul 3 > Modul 3.py > ...
1  a = [[1,2],[3,4]]
2  b = [[5,6],[7,8]]
3  c = [[12,3,"x","y"],[12,33,4]]
4
5  def cek_Konsisten(n):
6      column = set(len(i) for i in n)
7      row = len(n)
8
9      if len(column) == 1 and column.pop() == row:
10         print("Matriks Konsisten")
11     else:
12         print("Matriks Tidak Konsisten")
13
14     cek_Konsisten(a)
15     cek_Konsisten(c)
```

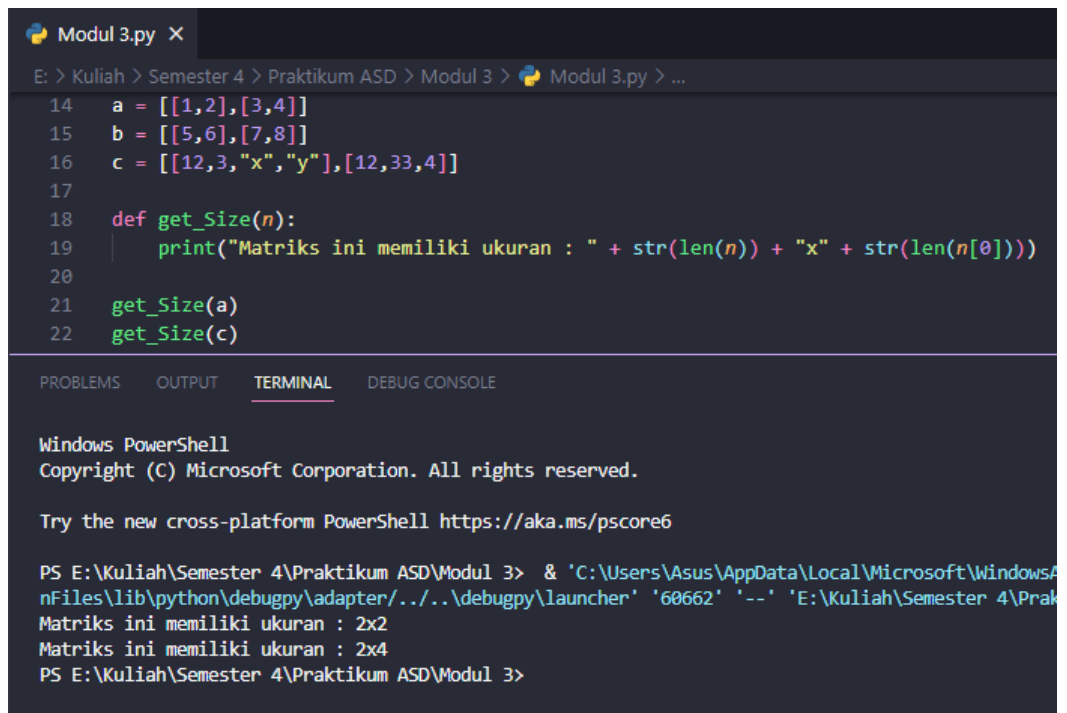
PROBLEMS OUTPUT TERMINAL DEBUG CONSOLE

Windows PowerShell
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```
PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 3> & 'C:\Users\Asus\AppData\Local\Microsoft\Windows\Common-Files\lib\python\debugpy\adapter\..\..\debugpy\launcher' '60594' '--' 'E:\Kuliah\Semester 4\Praktikum ASD\Modul 3\Modul 3.py'
Matriks Konsisten
Matriks Tidak Konsisten
PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 3>
```

- Untuk mengambil ukuran matrixnya



The screenshot shows a VS Code editor window titled 'Modul 3.py'. The code defines three matrices: `a` (2x2), `b` (2x2), and `c` (2x4). A function `get_Size(n)` is defined to print the dimensions of a matrix. The function is called for matrices `a` and `c`. The terminal output shows the execution of the script, displaying the dimensions of the matrices.

```

14 a = [[1,2],[3,4]]
15 b = [[5,6],[7,8]]
16 c = [[12,3,"x","y"],[12,33,4]]
17
18 def get_Size(n):
19     print("Matriks ini memiliki ukuran : " + str(len(n)) + "x" + str(len(n[0])))
20
21 get_Size(a)
22 get_Size(c)

```

```

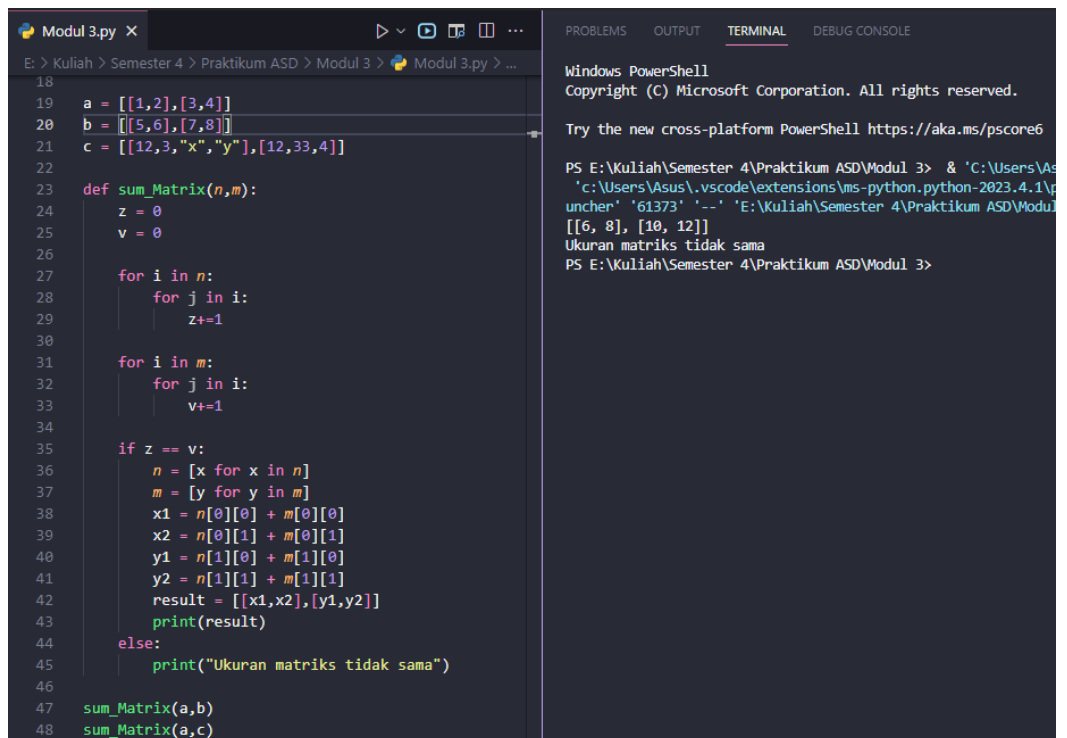
Windows PowerShell
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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 3> & 'C:\Users\Asus\AppData\Local\Microsoft\WindowsA
nFiles\lib\python\debugpy\adapter\..\..\debugpy\launcher' '60662' '--' 'E:\Kuliah\Semester 4\Prak
Matriks ini memiliki ukuran : 2x2
Matriks ini memiliki ukuran : 2x4
PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 3>

```

- Untuk menjumlahkan dua matrix (pastikan ukurannya sesuai)



The screenshot shows a VS Code editor window titled 'Modul 3.py'. The code defines three matrices: `a` (2x2), `b` (2x2), and `c` (2x4). A function `sum_Matrix(n,m)` is defined to add two matrices. The function is called for matrices `a` and `b`, and `a` and `c`. The terminal output shows the execution of the script, displaying the dimensions of the matrices and the result of the addition.

```

18
19 a = [[1,2],[3,4]]
20 b = [[5,6],[7,8]]
21 c = [[12,3,"x","y"],[12,33,4]]
22
23 def sum_Matrix(n,m):
24     z = 0
25     v = 0
26
27     for i in n:
28         for j in i:
29             z+=1
30
31     for i in m:
32         for j in i:
33             v+=1
34
35     if z == v:
36         n = [x for x in n]
37         m = [y for y in m]
38         x1 = n[0][0] + m[0][0]
39         x2 = n[0][1] + m[0][1]
40         y1 = n[1][0] + m[1][0]
41         y2 = n[1][1] + m[1][1]
42         result = [[x1,x2],[y1,y2]]
43         print(result)
44     else:
45         print("Ukuran matriks tidak sama")
46
47 sum_Matrix(a,b)
48 sum_Matrix(a,c)

```

```

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PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 3> & 'C:\Users\Asus\AppData\Local\Microsoft\WindowsA
nFiles\lib\python\debugpy\adapter\..\..\debugpy\launcher' '60662' '--' 'E:\Kuliah\Semester 4\Prak
[[6, 8], [10, 12]]
Ukuran matriks tidak sama
PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 3>

```

- Untuk mengalikan dua matrix (pastikan ukurannya sesuai)

```

Modul 3.py X
E: > Kuliah > Semester 4 > Praktikum ASD > Modul 3 > Modul 3.py > ...

44 a = [[1,2],[3,4]]
45 b = [[5,6],[7,8]]
46 c = [[12,3,"x","y"],[12,33,4]]
47
48 def kali_Matriks(n,m):
49     z = 0
50     v = 0
51
52     for i in n:
53         for j in i:
54             z+=1
55
56     for i in m:
57         for j in i:
58             v+=1
59
60     if z == v:
61         n = [x for x in n]
62         m = [y for y in m]
63         x1 = (n[0][0] * m[0][0]) + (n[0][1] * m[1][0])
64         x2 = (n[0][0] * m[0][1]) + (n[0][1] * m[1][1])
65         y1 = (n[1][0] * m[0][0]) + (n[1][1] * m[1][0])
66         y2 = (n[1][0] * m[0][1]) + (n[1][1] * m[1][1])
67         result = [[x1,x2],[y1,y2]]
68         print(result)
69     else:
70         print("Ukuran matriks tidak sama")
71
72 kali_Matriks(a,b)
73 kali_Matriks(b,c)

```

```

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PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 3> & 'C:\Users\Asus\AppData\Local\Microsoft\WindowsApps\python3.10.exe' 'c:\Users\Asus\.vscode\extensions\ms-python.python\debugpy\adapter\..\..\debugpy\launcher' '61474' '--ASD\Modul 3\Modul 3.py'
[[19, 22], [43, 50]]
Ukuran matriks tidak sama
PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 3>

```

- Untuk menghitung determinan sebuah matrix bujursangkar.

```

Modul 3.py X
E: > Kuliah > Semester 4 > Praktikum ASD > Modul 3 > Modul 3.py > ...

72 a = [[1,2],[3,4]]
73 b = [[7,8],[5,6]]
74
75 def det_Matrix(n):
76     if len(n) == len(n[0]):
77         n = [x for x in n]
78         det = (n[0][0]*n[1][1]) - (n[0][1]*n[1][0])
79         print(det)
80     else:
81         print("Ukuran matriks tidak sama")
82
83 det_Matrix(a)
84 det_Matrix(b)

```

```

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PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 3> & 'C:\Users\Asus\AppData\Local\Microsoft\WindowsApps\python3.10.exe' 'c:\Users\Asus\.vscode\extensions\ms-python.python\debugpy\adapter\..\..\debugpy\launcher' '61561' '--ASD\Modul 3\Modul 3.py'
-2
2
PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 3>

```

2. Terkait matrix dan list comprehension, buatlah (dengan memanfaatkan list comprehension) fungsi-fungsi

- Untuk membangkitkan matrix berisi nol semua, dengan diberikan ukurannya. Pemanggilan: buatnol(m,n) dan buatnol(m). Pemanggilan dengan cara terakhir akan memberikan matrix bujursangkar ukuran m×m.

```

Modul 3.py X
E: > Kuliah > Semester 4 > Praktikum ASD > Modul 3 > Modul 3.py > ...

87 def buat_Nol(m, n=None):
88     if n != None:
89         matriks = [[0 for j in range(m)] for i in range(n)]
90         print(matriks)
91     else:
92         matriks = [[0 for j in range(m)] for i in range(m)]
93         print(matriks)
94
95 buat_Nol(3,2)
96 buat_Nol(3)

```

```

Windows PowerShell
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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 3> & 'C:\Users\Asus\AppData\Local\Microsoft\WindowsApps\python3.10.exe' 'c:\Users\Asus\.vscode\extensions\ms-python.python\debugpy\adapter\..\..\debugpy\launcher' '61631' '--ASD\Modul 3\Modul 3.py'
[[0, 0], [0, 0]]
[[0, 0, 0], [0, 0, 0], [0, 0, 0]]
PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 3>

```

- Untuk membangkitkan matrix identitas, dengan diberikan ukurannya.

Pemanggilan: buatidentitas(m).

The screenshot shows a VS Code editor with a file named 'Modul 3.py'. The code defines a function `buat_Identitas(m)` that creates an identity matrix of size `m`. The terminal output shows the function being called with `2`, resulting in the matrix `[[1, 0], [0, 1]]`.

```

96
97 def buat_Identitas(m):
98     matriks = [[1 if j==i else 0 for j in range(m)] for i in range(m)]
99     print(matriks)
100
101 buat_Identitas(2)
102
103
104

```

```

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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 3> & 'C:\Users\Asus\AppData\Local\Microsoft\WindowsApps\python3.10.exe' 'c:\Users\Asus\.vscode\extensions\ms-python.python\python\debugpy\adapter\..\..\debugpy\launcher' '61784' '--
ASD\Modul 3\Modul 3.py'
[[1, 0], [0, 1]]
PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 3>

```

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 di mana saja: tambah(head,posisi)
- Menghapus suatu simpul di awal, di akhir, atau di mana

The screenshot shows three VS Code editor windows, each containing a different function for linked list operations. The first window shows the `Node` class and `cetak` function. The second window shows `cari`, `tambahDepan`, `tambahAkhir`, `tambah`, and `hapus` functions. The third window shows the initialization of nodes `a`, `b`, `c`, and `d`, and the execution of `tambah` and `cetak` functions.

```

194 class Node:
195     def __init__(self, data, nextNode=None):
196         self.data = data
197         self.nextNode = nextNode
198
199     def cetak(head):
200         curr = head
201         while curr != None:
202             print(curr.data)
203             curr = curr.nextNode
204
205     def cari(head, cari):
206         curr = head
207         while curr != None:
208             if curr.data == cari:
209                 print("Data ditemukan!")
210             else:
211                 print("Check data!")
212             curr = curr.nextNode
213
214     def tambahDepan(head):
215         newNode = Node(1)
216         newNode.nextNode = head
217         head = newNode
218         return head
219
220     def tambahAkhir(head):
221         curr = head
222         while curr is not None:
223             if curr.nextNode == None:
224                 newNode = Node(25)
225                 curr.nextNode = newNode
226
227         return curr
228
229         else:
230             pass
231             curr = curr.nextNode
232         return curr
233
234 a = Node(14)
235 b = Node(76)
236 c = Node(54)
237 d = Node(9796)
238
239 a.nextNode = b
240 b.nextNode = c
241 c.nextNode = d
242
243 # print(a.nextNode.nextNode.data)
244 a.tambah(b)
245 a.cari(14)
246 a.tambahAkhir()
247 a.tambahDepan()
248 a.cetak()
249
250
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300

```

The screenshot shows the terminal output of the linked list operations. It displays the results of the `cetak` function, the `cari` function, and the `tambah` function. The output shows the data values of the nodes in the linked list.

```

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PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 3> & 'C:\Users\Asus\AppData\Local\Microsoft\WindowsApps\python3.10.exe' 'c:\Users\Asus\.vscode\extensions\ms-python.python\python\debugpy\adapter\..\..\debugpy\launcher' '61784' '--
ester 4\Praktikum ASD\Modul 3\Modul 3.py'
Data ditemukan!
Check data!
Check data!
Check data!
Check data!
14
76
8
54
9796
25
PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 3>

```

4. Terkait doubly linked list, buatlah fungsi untuk

- Mengunjungi dan mencetak data tiap simpul dari depan dan dari belakang.
- Menambah suatu simpul di awal
- Menambah suatu simpul di akhir

```
Modul 3.py X
E > Kuliah > Semester 4 > Praktikum ASD > Modul 3 > Modul 3.py > doubly_linked
179
180 class doubly_linked():
181     def __init__(self, Data, Next=None, Prev=None):
182         self.Data = Data
183         self.Next = Next
184         self.Prev = Prev
185
186     def mencetak(head):
187         curr = head
188         while curr != None:
189             print(curr.Data)
190             if curr.Next == None:
191                 curr = curr
192                 break
193             else:
194                 curr = curr.Next
195             print("\n")
196             while curr != None:
197                 print(curr.Data)
198                 curr = curr.Prev
199
200     def simpulAwal(head):
201         newNode = doubly_linked(25)
202         newNode.Next = head
203         head.Prev = newNode
204         head = newNode
205         return head
206
207
208
209
210
211     def simpulAkhir(head):
212         curr = head
213         while curr != None:
214             if curr.Next == None:
215                 newNode = doubly_linked(365)
216                 curr.Next = newNode
217                 newNode.Prev = curr
218                 return curr
219             else:
220                 pass
221             curr = curr.Next
222         return curr
223
224
225     hell = doubly_linked(14)
226     heaven = doubly_linked(15124)
227     between = doubly_linked(9999)
228     hell.Next = heaven
229     heaven.Next = between
230     hell.simpulAwal()
231     hell.simpulAkhir()
232     hell.mencetak()
```

```
PROBLEMS OUTPUT TERMINAL DEBUG CONSOLE Python Debug Console
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PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 3> & 'C:\Users\Asus\AppData\Local\Microsoft\WindowsApps\python3.10.exe' 'c:\Users\Asus\.vscode\extensions\ms-python.pythonFiles\lib\python\debugpy\adapter\..\..\debugpy\launcher' '62229
14
15124
9999
365

365
9999
PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 3>
```