

NAMA : RIFAL FEBIYAN (2100018345)

Nama: Rifal Febiyan

NIM: 2100018345

Kelas: G

Slot: P. Alpro Selasa 13.30

1. Buatlah algoritma mengurutkan data array 2 dimensi, berukuran  $3 \times 3$  dengan menggunakan algoritma bubble sort.

Petunjuk: konversikan array 2 dimensi menjadi 1 dimensi, urutkan menggunakan bubble sort lalu kembalikan menjadi array 2 dimensi lagi.

-> Deklarasi

a : array [1...10][1...10] of integer

aray : array [1...10] of integer

cur, cur2, z, temp : integer

tukar : integer

i, j, k, z : integer

-> Deskripsi

/\* input \*/

write('masukkan data')

read(z)

for i ← 0 to z do

for j ← 0 to z do

read(a[i][j])

end for

/\* Array 2 dimensi Sebelum dikonversi \*/

for (i ← 0 to z do

for j ← 0 to z do

write(a[i][j])

end for  
end for

/\* Array 2 dimensi dikonversi menjadi 1 dimensi \*/

$k \leftarrow 0$ ;

for  $i \leftarrow 0$  to  $z$  do

for  $j \leftarrow 0$  to  $z$  do

array[k]  $\leftarrow$  a[i][j]

$k++$

end for

end for

for  $k \leftarrow 0$  to  $z^2 z$  do

write (array[k])

end for

/\* Setelah dikonversi menjadi array 1 dimensi, di sorting dengan bubble sort \*/

for  $k \leftarrow 0$  to  $z^2 z$  do

tukar  $\leftarrow k$

for  $j \leftarrow k+1$  to  $z^2 z$  do

if (array[j] < array[tukar])

tukar  $\leftarrow j$ ;

end if

end for

temp  $\leftarrow$  array[tukar]

array[tukar]  $\leftarrow$  array[k]

array[k]  $\leftarrow$  temp

write (array[k])

end for

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\* / Array 1 dimensi yang telah disorting dikonversikan kembali ke array 2 dimensi \* /

for  $i \leftarrow 0$  to  $z$  do

for  $j \leftarrow 0$  to  $z$  do

cur  $\leftarrow i$ ;

cur2  $\leftarrow j$ ;

for  $k \leftarrow 0$  to  $z$  do

for  $l \leftarrow 0$  to  $z$  do

if ( $a[\text{cur}][\text{cur2}] < a[k][l]$ )

cur  $\leftarrow k$ ;

cur2  $\leftarrow l$ ;

endif

temp  $\leftarrow a[i][j]$

$a[i][j] \leftarrow a[\text{cur}][\text{cur2}]$

$a[\text{cur}][\text{cur2}] \leftarrow \text{temp}$ ;

endfor

end for

for  $i \leftarrow 0$  to  $z$  do

for  $j \leftarrow 0$  to  $z$  do

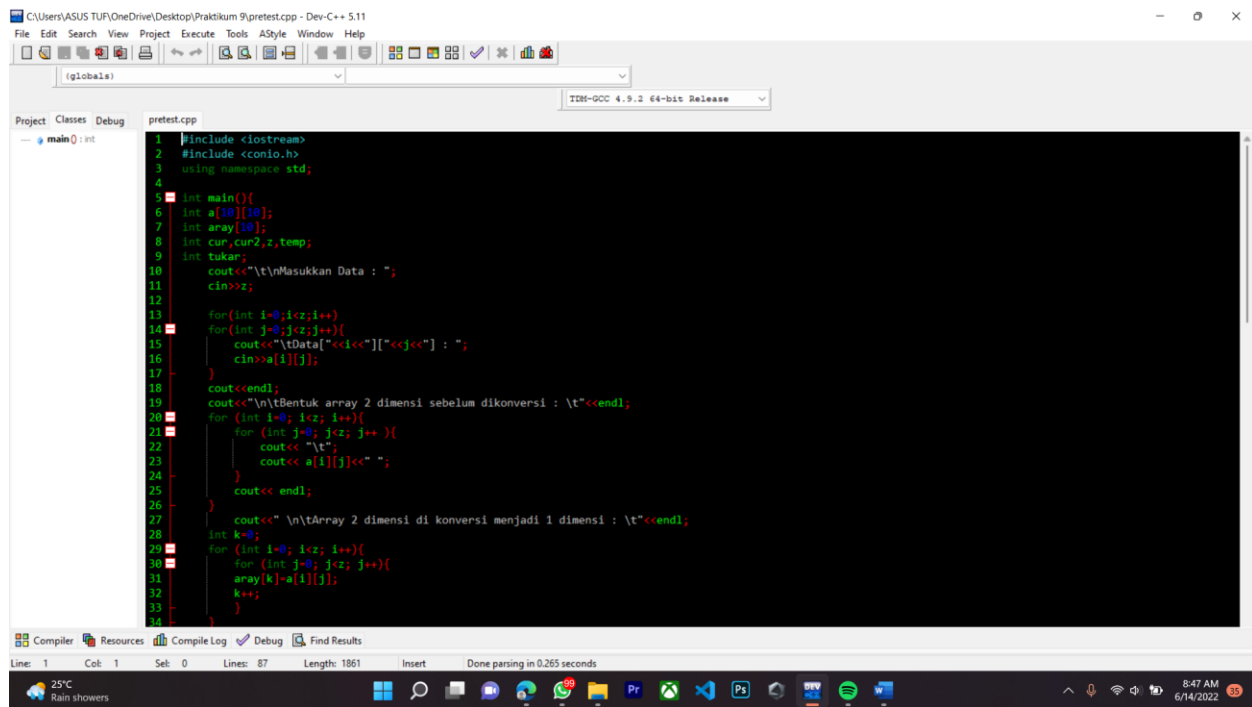
write ( $a[i][j]$ );

end for

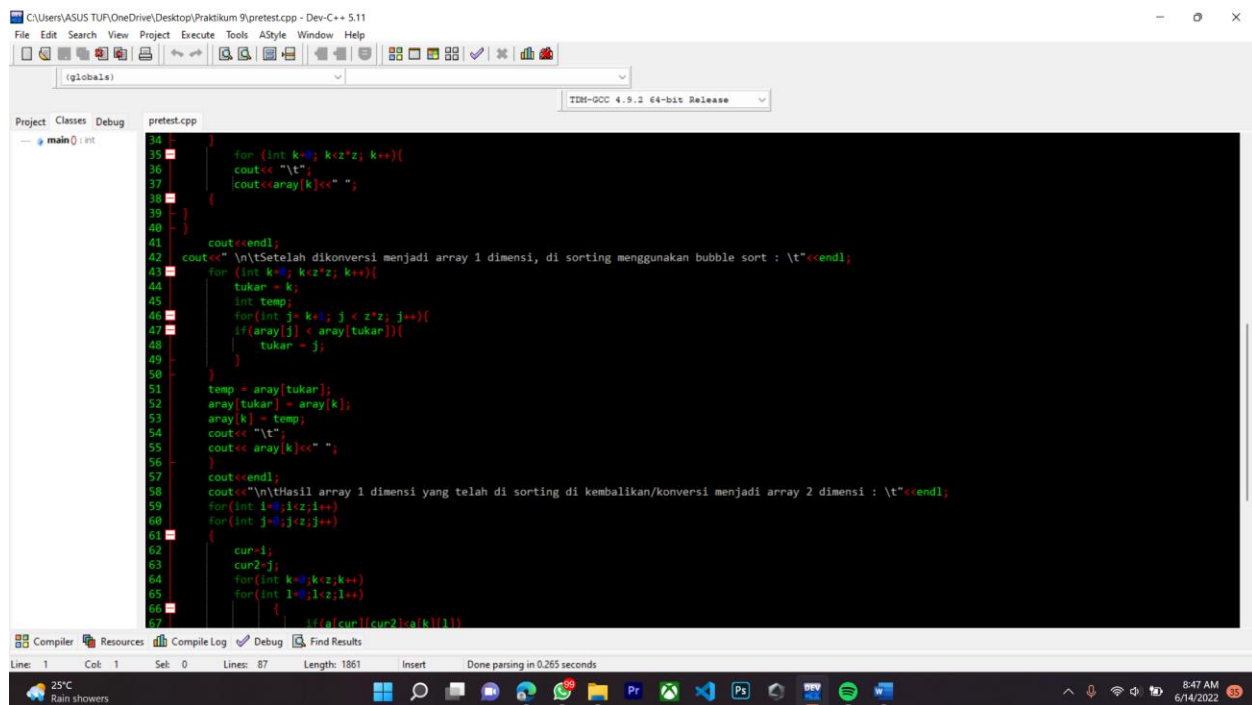
end for



⇒ Source code Pada Dev C++



```
1 #include <iostream>
2 #include <conio.h>
3 using namespace std;
4
5 int main(){
6     int a[10][10];
7     int array[10];
8     int cur,cur2,z,temp;
9     int tukar;
10    cout<<"\nMasukkan Data : ";
11    cin>>z;
12
13    for(int i=0; i<z; i++){
14        for(int j=0; j<z; j++){
15            cout<<"\tData["<<i<<"]["<<j<<"] : ";
16            cin>>a[i][j];
17        }
18        cout<<endl;
19        cout<<"\nBentuk array 2 dimensi sebelum dikonversi : \t"<<endl;
20        for (int i=0; i<z; i++){
21            for (int j=0; j<z; j++){
22                cout<<"\t";
23                cout<<"a["<<i<<"]["<<j<<"]<<" ";
24            }
25            cout<<endl;
26        }
27        cout<<"\nArray 2 dimensi di konversi menjadi 1 dimensi : \t"<<endl;
28        int k=0;
29        for (int i=0; i<z; i++){
30            for (int j=0; j<z; j++){
31                array[k]=a[i][j];
32                k++;
33            }
34        }
```



```
34        for (int k=0; k<z*z; k++){
35            cout<<"\t";
36            cout<<array[k]<<" ";
37        }
38        cout<<endl;
39
40        cout<<endl;
41        cout<<"\nSetelah dikonversi menjadi array 1 dimensi, di sorting menggunakan bubble sort : \t"<<endl;
42        for (int k=0; k<z*z; k++){
43            tukar = k;
44            int temp;
45            for(int j= k+1; j < z*z; j++){
46                if(array[j] < array[tukar]){
47                    tukar = j;
48                }
49            }
50            temp = array[tukar];
51            array[tukar] = array[k];
52            array[k] = temp;
53            cout<<"\t";
54            cout<<array[k]<<" ";
55        }
56        cout<<endl;
57        cout<<"\nHasil array 1 dimensi yang telah di sorting di kembalikan/konversi menjadi array 2 dimensi : \t"<<endl;
58        for (int i=0; i<z; i++){
59            for (int j=0; j<z; j++){
60                {
61                    cur=i;
62                    cur2=j;
63                    for (int k=0; k<z; k++){
64                        for (int l=0; l<z; l++){
65                            if (a[cur][cur2]<a[k][l]){
66                                {
```

```
55     cout<< array[k]<<" ";
56 }
57 cout<<endl;
58 cout<<"\n\tHasil array 1 dimensi yang telah di sorting di kembalikan/konversi menjadi array 2 dimensi : \t"<<endl;
59 for(int i=0;i<z;i++)
60 for(int j=0;j<z;j++)
61 {
62     cur=i;
63     cur2=j;
64     for(int k=0;k<z;k++)
65     for(int l=0;l<z;l++)
66     {
67         if(a[cur][cur2]<a[k][l])
68         {
69             cur=k;
70             cur2=l;
71         }
72         temp=a[i][j];
73         a[i][j]=a[cur][cur2];
74         a[cur][cur2]=temp;
75     }
76 }
77 for(int i=0;i<z;i++)
78 {
79     for(int j=0;j<z;j++)
80     {
81         cout<<"\t";
82         cout<<" "<<a[i][j];
83     }
84     cout<<endl;
85 }
86 }
87 }
```

⇒ Hasil running Percobaan ke-1

```
47     if(array[j] < array[tukar]){
48         tukar = j;
49     }
50     temp = array[tukar];
51     array[tukar] = array[k];
52     array[k] = temp;
53     cout<< "\t";
54     cout<< array[k]<<" ";
55 }
56 cout<<endl;
57 cout<<"\n\tHasil array 1 dimensi yang telah di sorting di kembalikan/konversi menjadi array 2 dimensi : \t"<<endl;
58 for(int i=0;i<z;i++)
59 for(int j=0;j<z;j++)
60 {
61     cur=i;
62     cur2=j;
63     for(int k=0;k<z;k++)
64     for(int l=0;l<z;l++)
65     {
66         if(a[cur][cur2]<a[k][l])
67         {
68             cur=k;
69             cur2=l;
70         }
71         temp=a[i][j];
72         a[i][j]=a[cur][cur2];
73         a[cur][cur2]=temp;
74     }
75 }
76 for(int i=0;i<z;i++)
77 {
78     for(int j=0;j<z;j++)
79     {
80         cout<<"\t";
81         cout<<" "<<a[i][j];
82     }
83     cout<<endl;
84 }
85 }
86 }
```

Masukkan Data : 3  
Data[0][0] : 9  
Data[0][1] : 8  
Data[0][2] : 7  
Data[1][0] : 6  
Data[1][1] : 5  
Data[1][2] : 4  
Data[2][0] : 3  
Data[2][1] : 2  
Data[2][2] : 1

Bentuk array 2 dimensi sebelum dikonversi :

9	8	7
6	5	4
3	2	1

Array 2 dimensi di konversi menjadi 1 dimensi :

9	8	7	6	5	4	3	2	1
---	---	---	---	---	---	---	---	---

Setelah dikonversi menjadi array 1 dimensi, di sorting menggunakan bubble sort :

1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---

Hasil array 1 dimensi yang telah di sorting di kembalikan/konversi menjadi array 2 dimensi :

1	2	3
4	5	6
7	8	9

Process exited after 9.388 seconds with return value 0  
Press any key to continue . . .

⇒ Hasil running percobaan ke-2

The screenshot shows a C++ IDE with the following code and output:

```
#include <iostream>
#include <conio.h>
using namespace std;

int main(){
    int a[10][10];
    int array[10];
    int cur,cur2,z,temp;
    int tukar;

    cout<<"\nMasukkan Data : ";
    cin>>z;

    for(int i=0;i<z;i++){
        for(int j=0;j<z;j++){
            cout<<"\tData["<<i<<"]["<<j<<"] : ";
            cin>>a[i][j];
        }
        cout<<endl;
    }
    cout<<"\nBentuk array 2 dimensi sebelum dikonversi : \t"<<endl;
    for (int i=0; i<z; i++){
        for (int j=0; j<z; j++){
            cout<<"\t";
            temp = a[i][j];
            array[j] = a[i][j];
            a[i][j] = temp;
            cout<<"\t";
        }
        cout<<endl;
    }
    cout<<"\nHasil array 1 dimensi yang telah di s";
    for(int i=0;i<z;i++){
        for(int j=0;j<z;j++){
            cur=i;
            cur2=j;
            for(int k=0;k<z;k++){
                for(int l=0;l<z;l++){
                    if(array[j] < array[tukar]){
                        tukar = j;
                    }
                }
            }
            temp = array[tukar];
            array[tukar] = array[k];
            array[k] = temp;
            cout<<"\t";
        }
        cout<<endl;
    }
    cout<<"\nHasil array 1 dimensi yang telah di s";
    for(int i=0;i<z;i++){
        for(int j=0;j<z;j++){
            cur=i;
            cur2=j;
            for(int k=0;k<z;k++){
                for(int l=0;l<z;l++){
                    if(array[j] < array[tukar]){
                        tukar = j;
                    }
                }
            }
            temp = array[tukar];
            array[tukar] = array[k];
            array[k] = temp;
            cout<<"\t";
        }
        cout<<endl;
    }
}
```

Output:

```
Masukkan Data : 3
Data[0][0] : 80
Data[0][1] : 20
Data[0][2] : 40
Data[1][0] : 70
Data[1][1] : 90
Data[1][2] : 10
Data[2][0] : 30
Data[2][1] : 60
Data[2][2] : 50

Bentuk array 2 dimensi sebelum dikonversi :
80  20  40
70  90  10
30  60  50

Array 2 dimensi di konversi menjadi 1 dimensi :
80  20  40  70  90  10  30  60  50

Setelah dikonversi menjadi array 1 dimensi, di sorting menggunakan bubble sort :
10  20  30  40  50  60  70  80  90

Hasil array 1 dimensi yang telah di sorting di kembalikan/konversi menjadi array 2 dimensi :
10  20  30
40  50  60
70  80  90

Process exited after 34.89 seconds with return value 0
Press any key to continue . . .
```

## Source Code

```
#include <iostream>
#include <conio.h>
using namespace std;

int main(){
    int a[10][10];
    int array[10];
    int cur,cur2,z,temp;
    int tukar;

    cout<<"\nMasukkan Data : ";
    cin>>z;

    for(int i=0;i<z;i++){
        for(int j=0;j<z;j++){
            cout<<"\tData["<<i<<"]["<<j<<"] : ";
            cin>>a[i][j];
        }
        cout<<endl;
    }
    cout<<"\nBentuk array 2 dimensi sebelum dikonversi : \t"<<endl;
    for (int i=0; i<z; i++){
        for (int j=0; j<z; j++){
            cout<<"\t";
            temp = a[i][j];
            array[j] = a[i][j];
            a[i][j] = temp;
            cout<<"\t";
        }
        cout<<endl;
    }
    cout<<"\nHasil array 1 dimensi yang telah di s";
    for(int i=0;i<z;i++){
        for(int j=0;j<z;j++){
            cur=i;
            cur2=j;
            for(int k=0;k<z;k++){
                for(int l=0;l<z;l++){
                    if(array[j] < array[tukar]){
                        tukar = j;
                    }
                }
            }
            temp = array[tukar];
            array[tukar] = array[k];
            array[k] = temp;
            cout<<"\t";
        }
        cout<<endl;
    }
    cout<<"\nHasil array 1 dimensi yang telah di s";
    for(int i=0;i<z;i++){
        for(int j=0;j<z;j++){
            cur=i;
            cur2=j;
            for(int k=0;k<z;k++){
                for(int l=0;l<z;l++){
                    if(array[j] < array[tukar]){
                        tukar = j;
                    }
                }
            }
            temp = array[tukar];
            array[tukar] = array[k];
            array[k] = temp;
            cout<<"\t";
        }
        cout<<endl;
    }
}
```

```

        cout<< a[i][j]<<" ";
    }
    cout<< endl;
}
    cout<<" \n\tArray 2 dimensi di konversi menjadi 1 dimensi : \t"<<endl;
int k=0;
for (int i=0; i<z; i++){
    for (int j=0; j<z; j++){
        aray[k]=a[i][j];
        k++;
    }
}
    for (int k=0; k<z*z; k++){
        cout<< "\t";
        cout<<aray[k]<<" ";
        {
    }
}
    cout<<endl;
cout<<" \n\tSetelah dikonversi menjadi array 1 dimensi, di sorting menggunakan bubble sort : \t"<<endl;
    for (int k=0; k<z*z; k++){
        tukar = k;
        int temp;
        for(int j= k+1; j < z*z; j++){
            if(aray[j] < aray[tukar]){
                tukar = j;
            }
        }
        temp = aray[tukar];
        aray[tukar] = aray[k];
        aray[k] = temp;
        cout<< "\t";
        cout<< aray[k]<<" ";
    }
    cout<<endl;
    cout<<"\n\tHasil array 1 dimensi yang telah di sorting di kembalikan/konversi menjadi array 2 dimensi : \t"<<endl;
    for(int i=0;i<z;i++)
    for(int j=0;j<z;j++)
    {
        cur=i;
        cur2=j;
        for(int k=0;k<z;k++)
        for(int l=0;l<z;l++)
        {

```

```
        if(a[cur][cur2]<a[k][l])
        {
            cur=k;
            cur2=l;
        }
        temp=a[i][j];
        a[i][j]=a[cur][cur2];
        a[cur][cur2]=temp;
    }
}
for(int i=0;i<z;i++)
{
    for(int j=0;j<z;j++)
    {
        cout<<"\t";
        cout<<" "<<a[i][j];
    }
    cout<<endl;
}
};
```