Two dimensional arrays:

Array with several rows and columns.

Array with two subscripting operators [ ] [ ].

It is array of arrays. i.e. collection of one-dimensional arrays.

It is implicit double pointer.

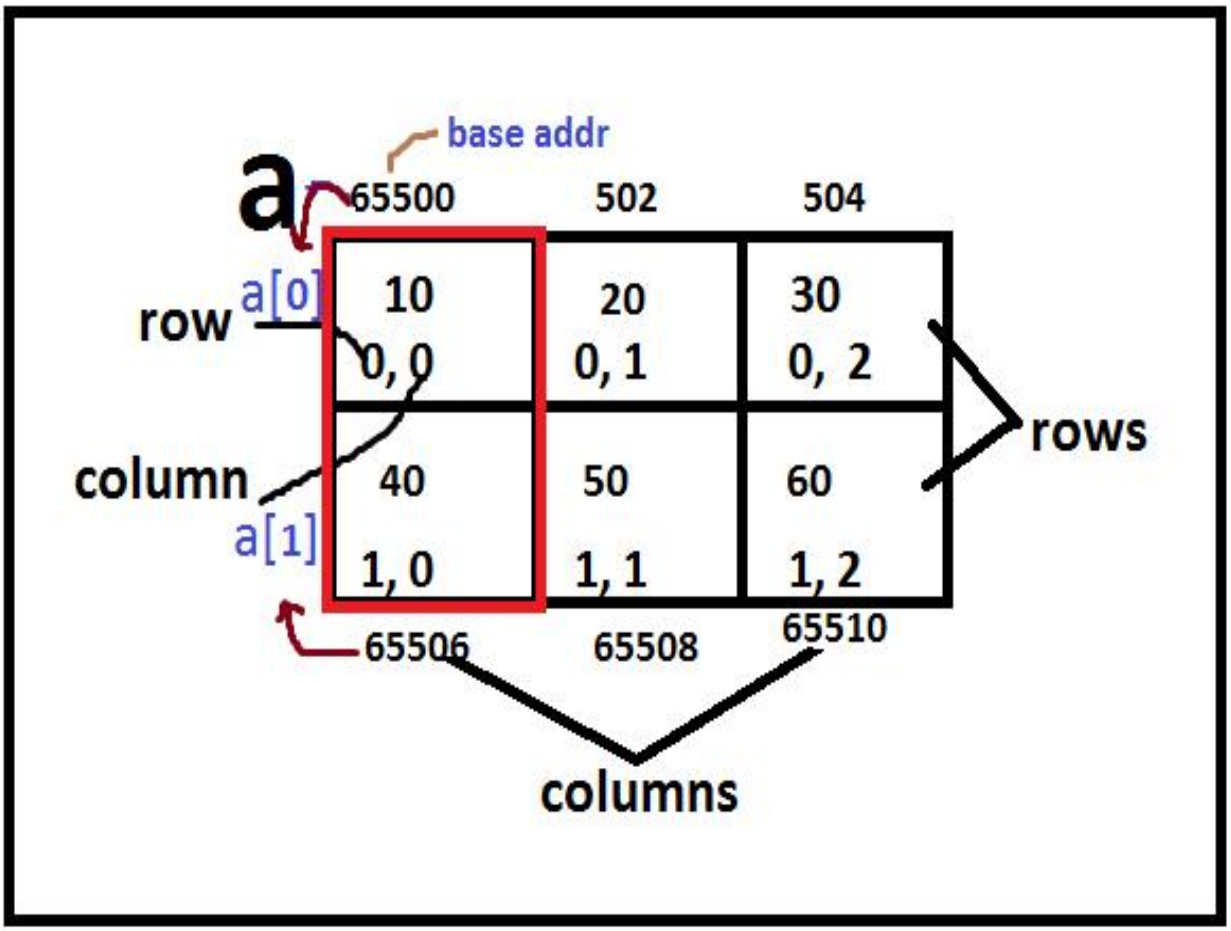
It is a n*n matrix.

Syntax:

datatype variable [rows] [columns] = {elements} ;

Eg:

```
int  a[ 2 ][ 3 ] = { { 10, 20 , 30 } , { 40 ,50, 60 } };
```



In two dimensional array the rows/first subscript is working as array of pointers and they stores first column address of each row. Hence it is an implicit/internal double pointer.

In the above example, To print the first row, first column value, we have to use

printf("%d", a[0] [0]); ➔ 10

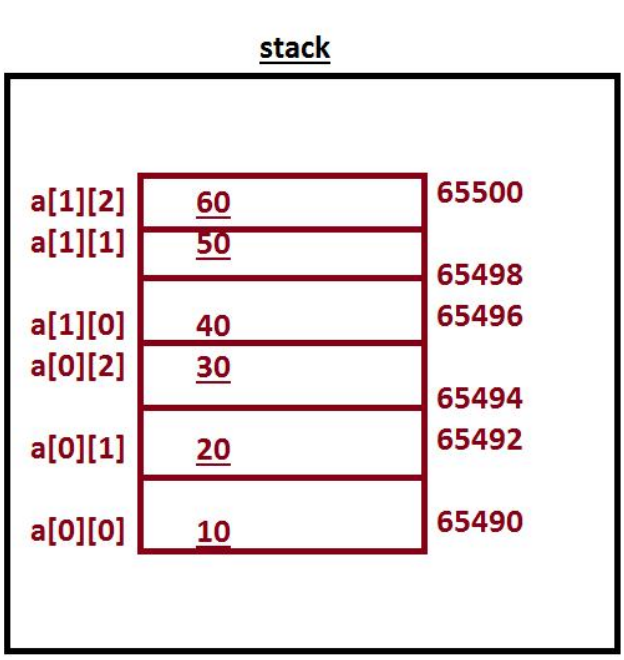
Internally how this statement is working ?

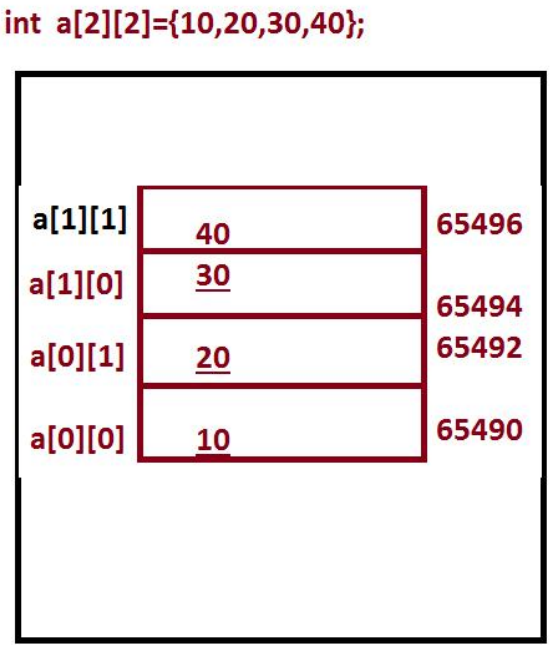
a[0] means value at a[0] i.e. 65500.

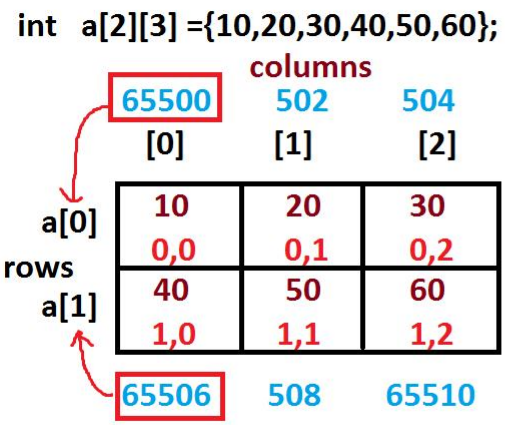
65500 + [0] col ➔ 65500 + 0 * 2 ➔ 65500 ➔ value at 65500 is 10.

Index no

Int size







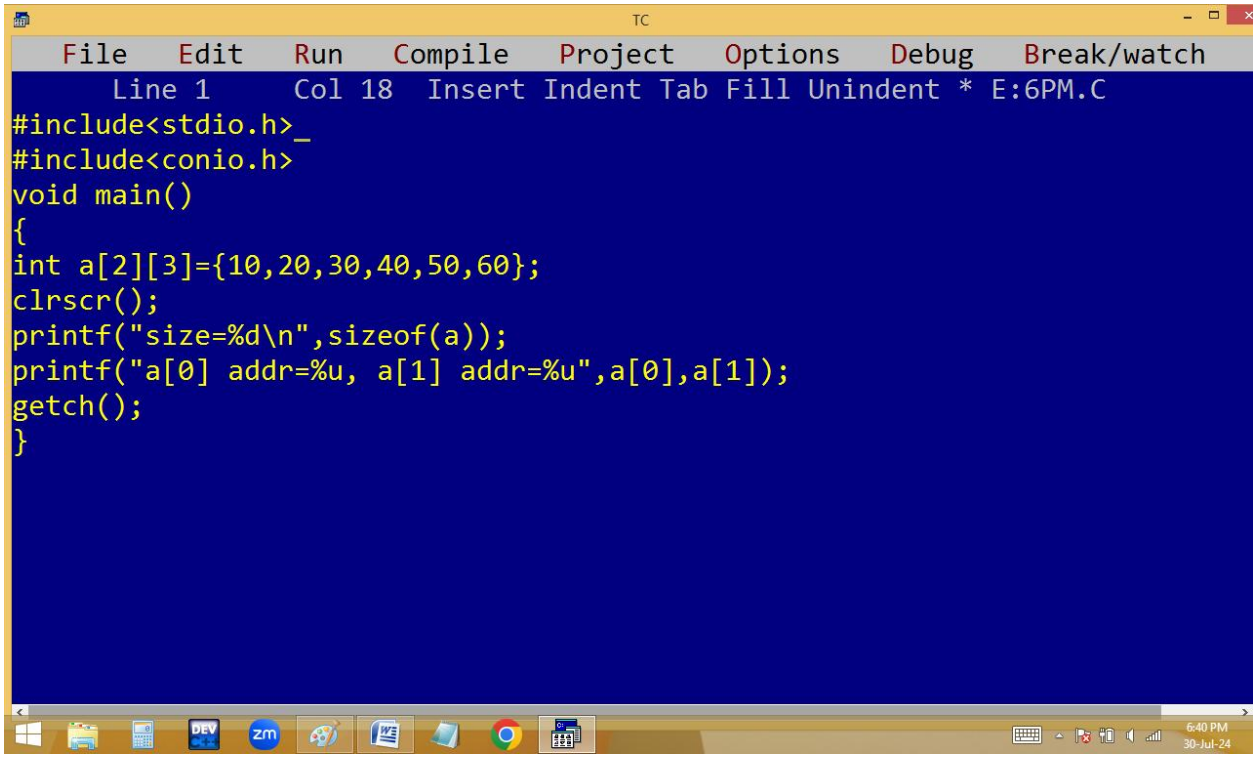
p("%d",a[0][0]);==>10

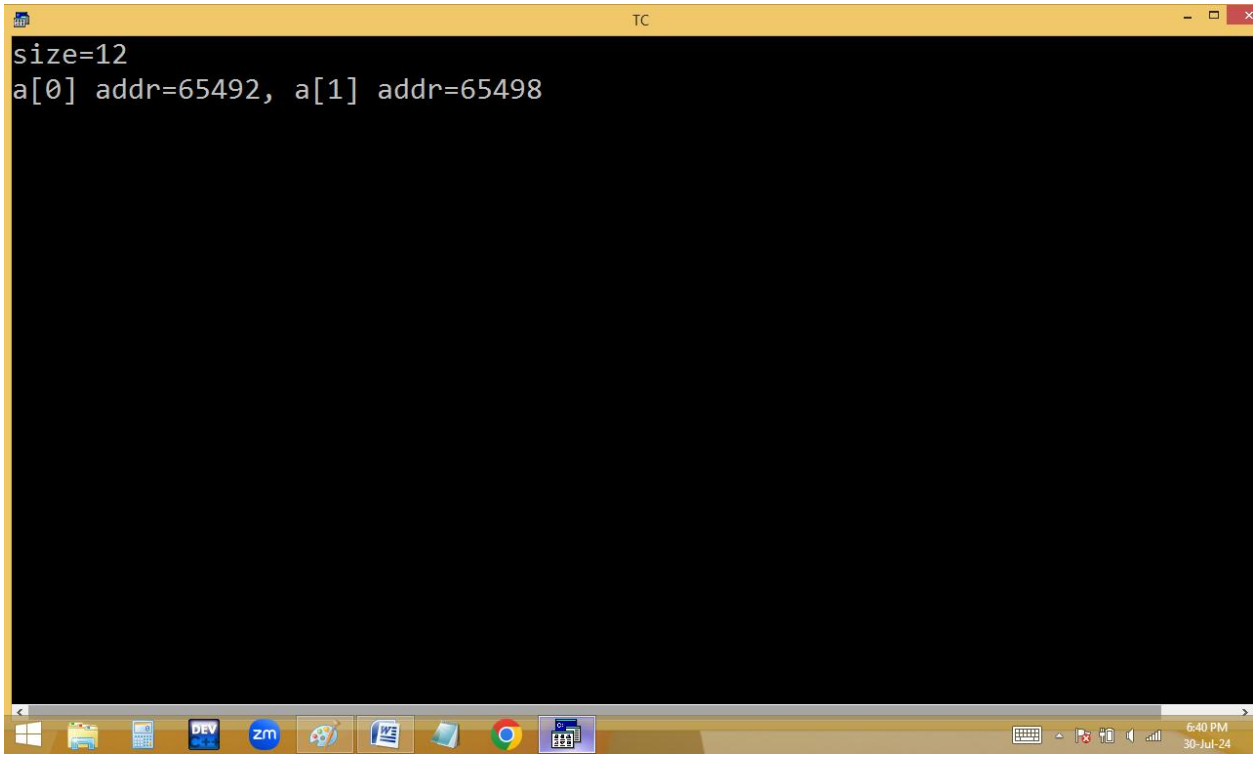
65500+0*2=65500=>value at 65500=10

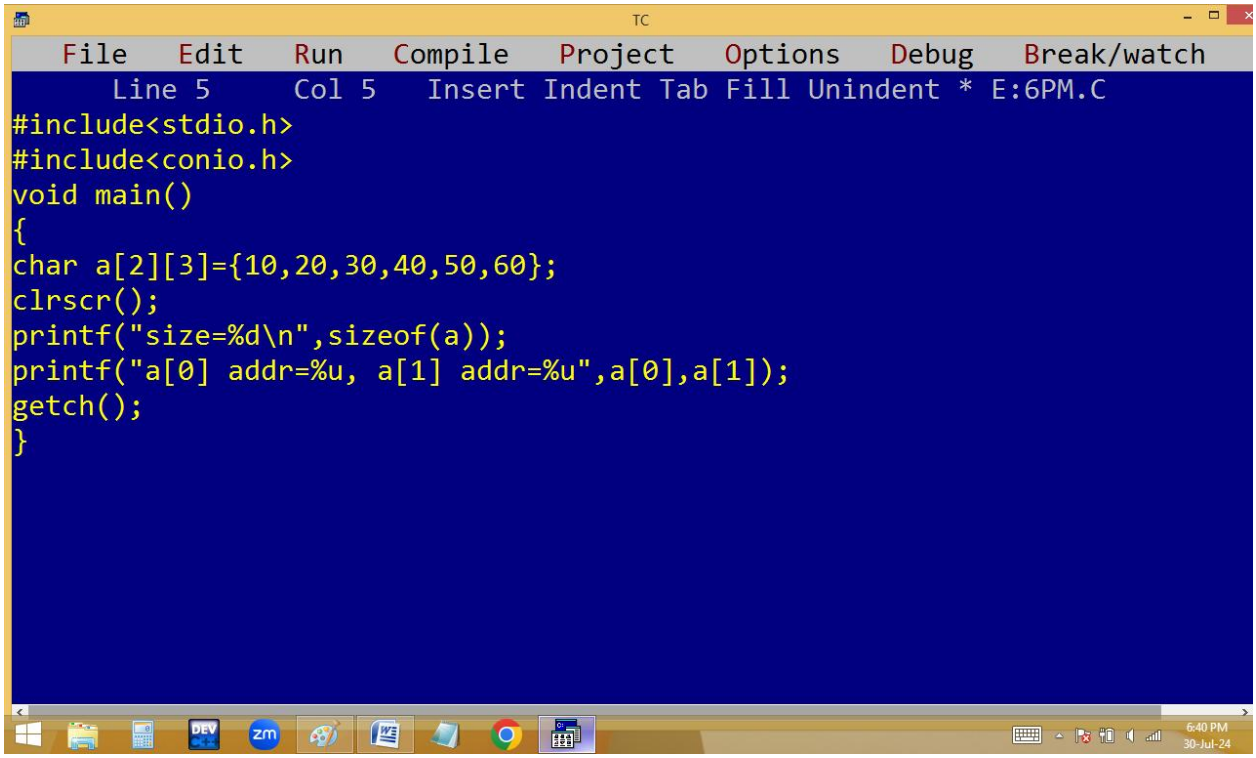
p("%d",a[1][2])==>60

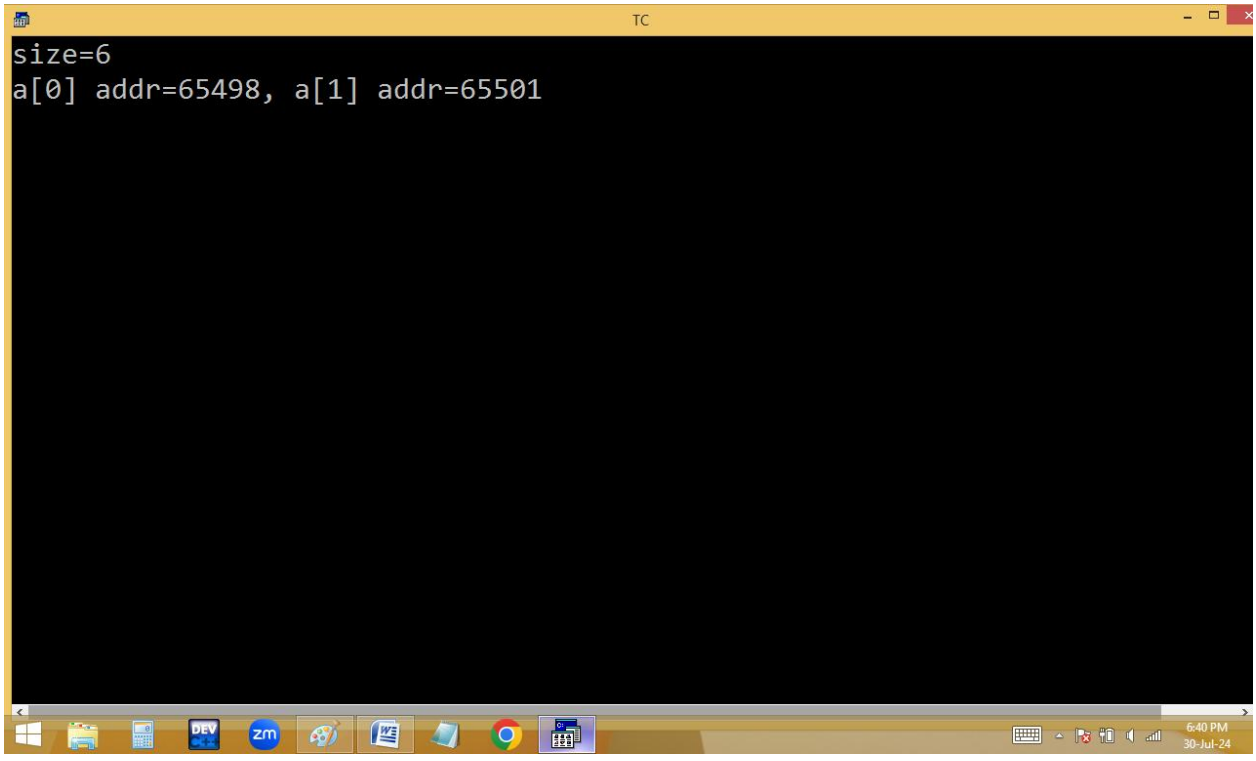
65506+2*2=65510==>value at 65510=>60

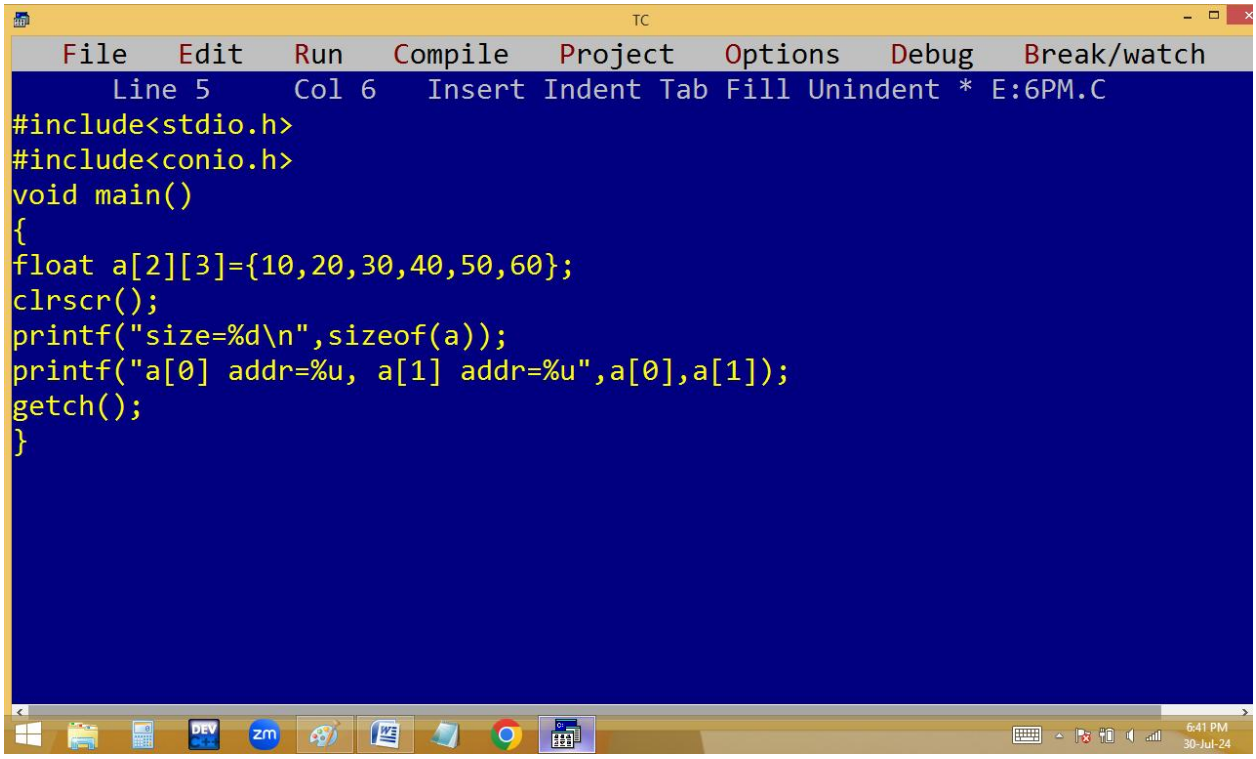
Finding array size and address:

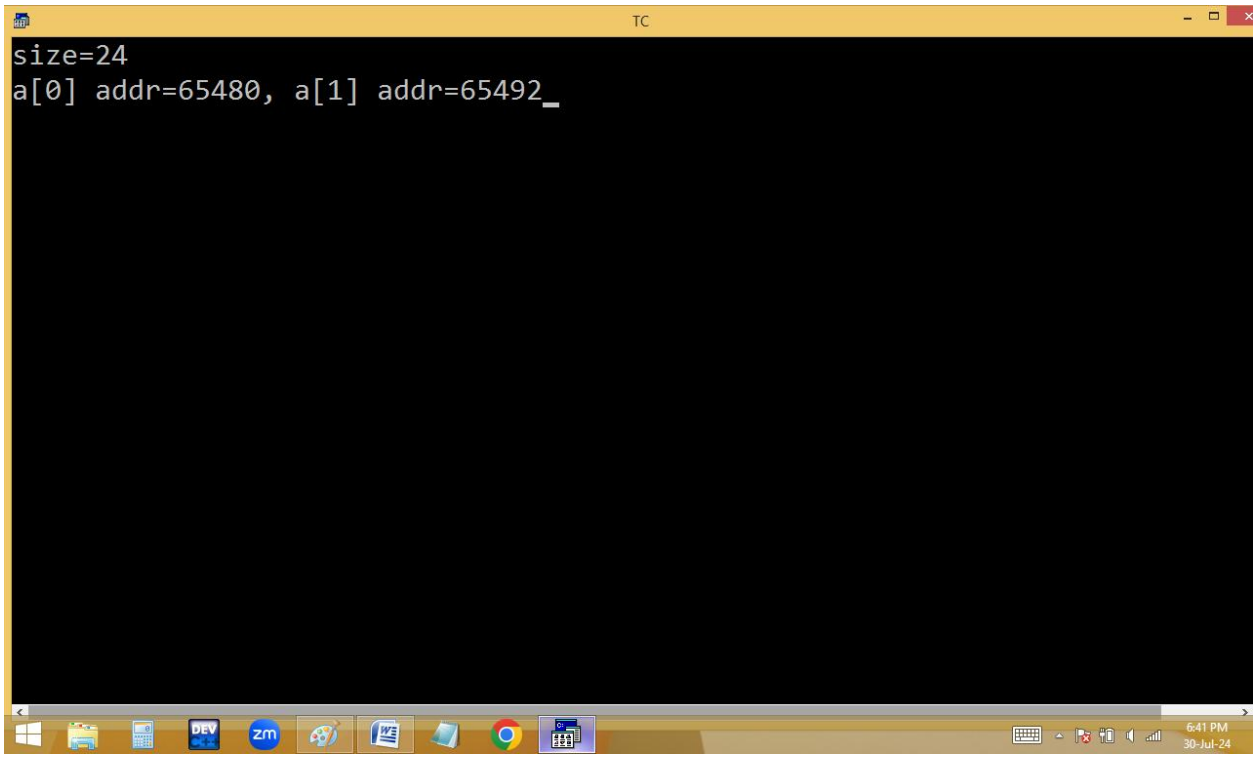

TC
File Edit Run Compile Project Options Debug Break/watch
Line 1 Col 18 Insert Indent Tab Fill Unindent * E:6PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[2][3]={10,20,30,40,50,60};
clrscr();
printf("size=%d\n",sizeof(a));
printf("a[0] addr=%u, a[1] addr=%u",a[0],a[1]);
getch();
}


TC
size=12
a[0] addr=65492, a[1] addr=65498

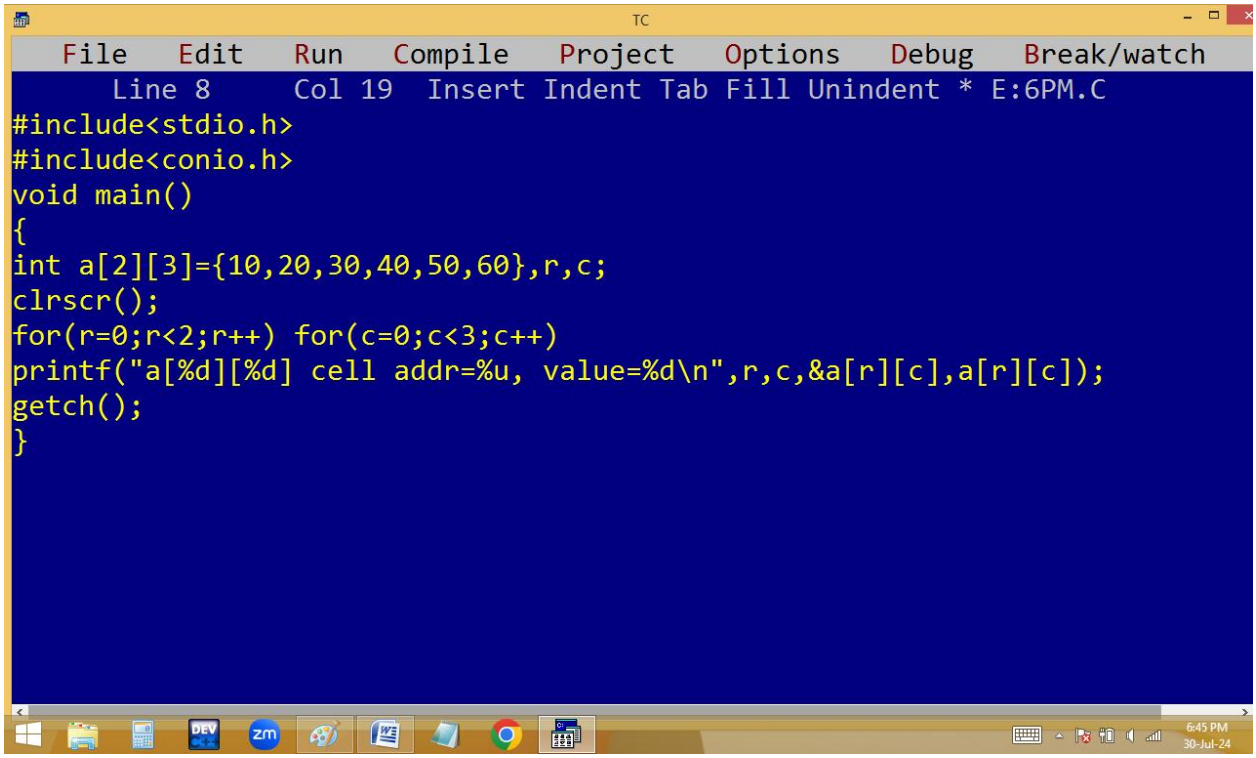

TC
File Edit Run Compile Project Options Debug Break/watch
Line 5 Col 5 Insert Indent Tab Fill Unindent * E:6PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
char a[2][3]={10,20,30,40,50,60};
clrscr();
printf("size=%d\n",sizeof(a));
printf("a[0] addr=%u, a[1] addr=%u",a[0],a[1]);
getch();
}

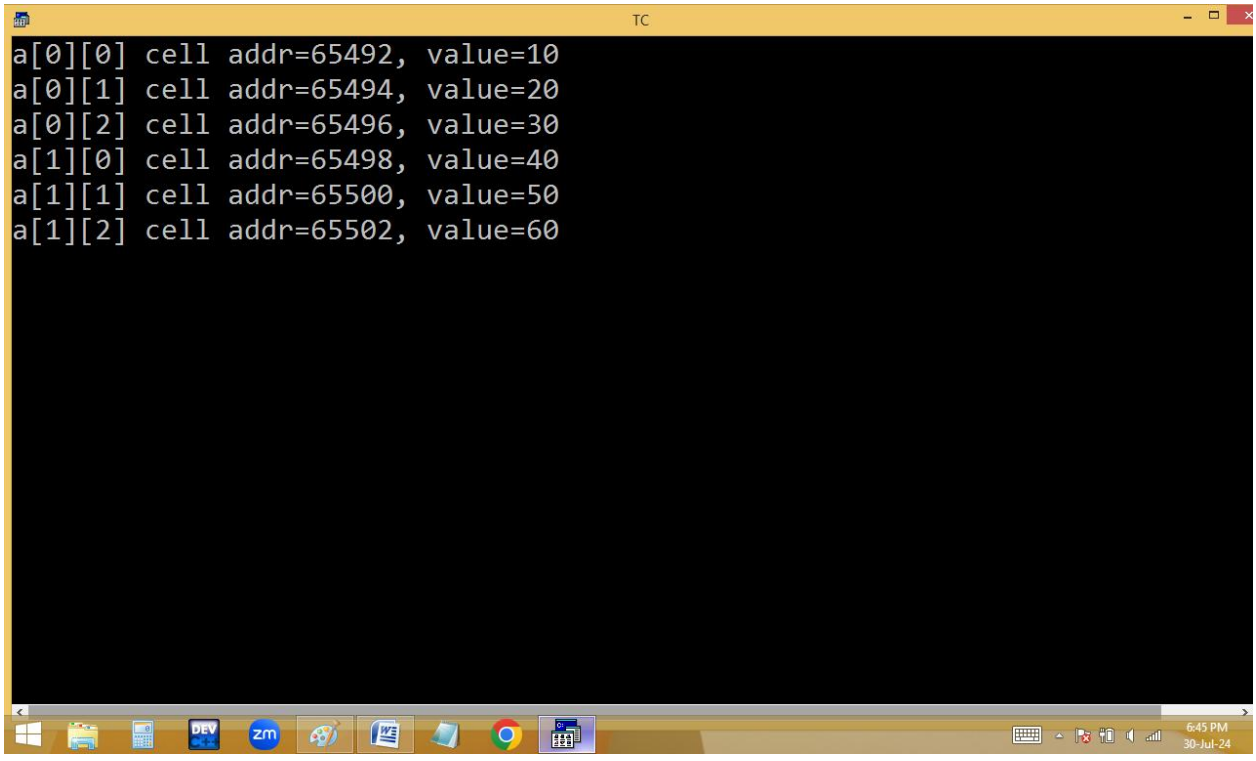

TC
size=6
a[0] addr=65498, a[1] addr=65501

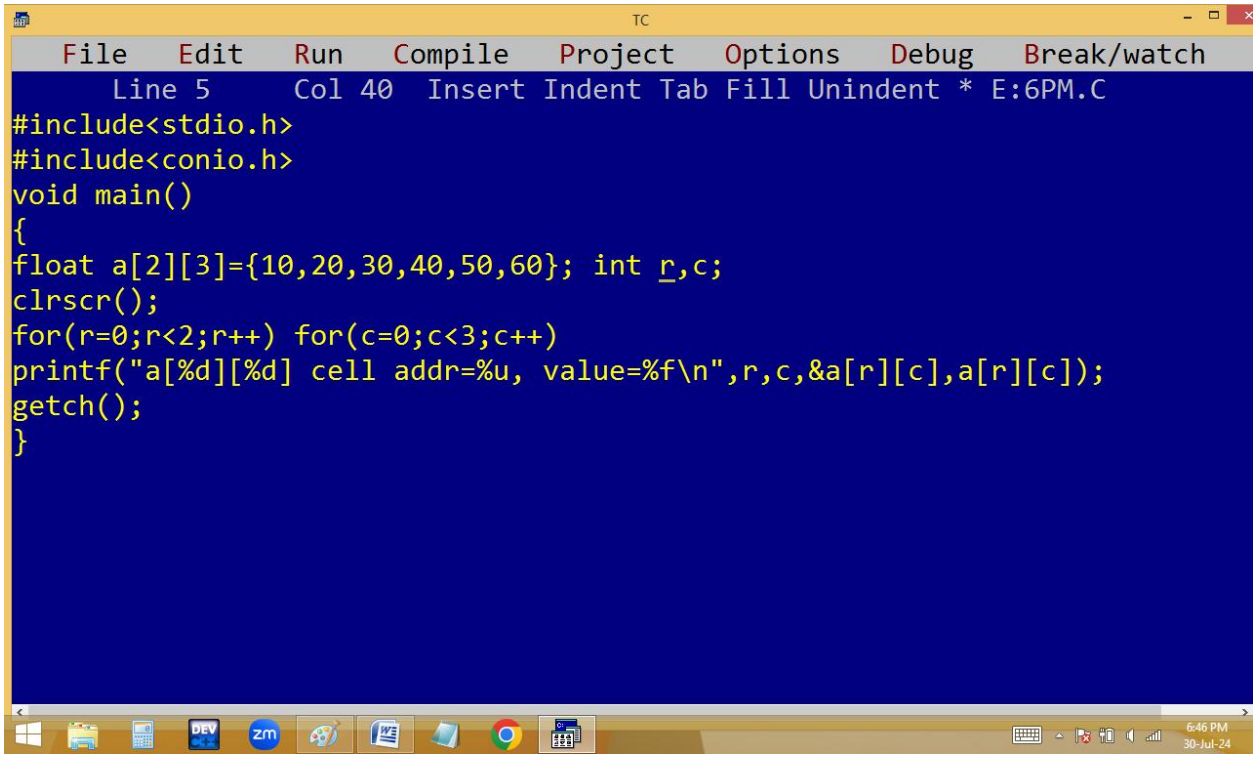


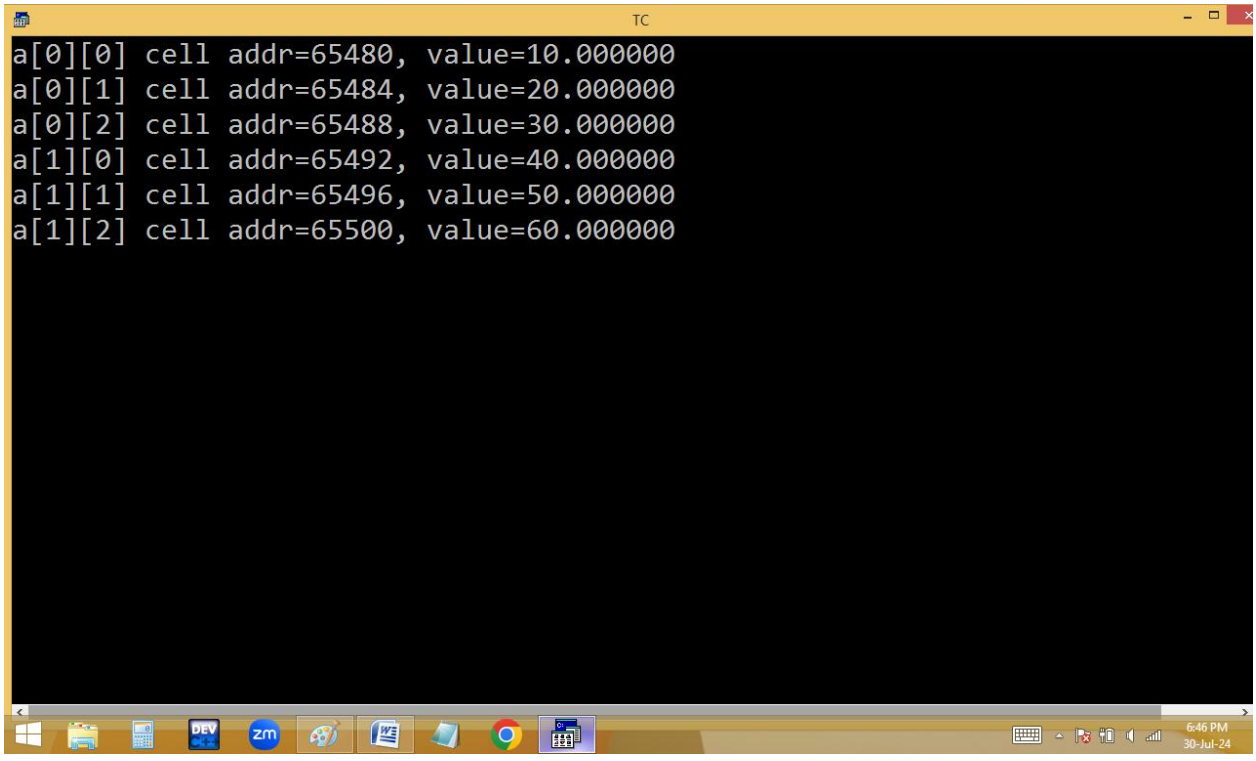


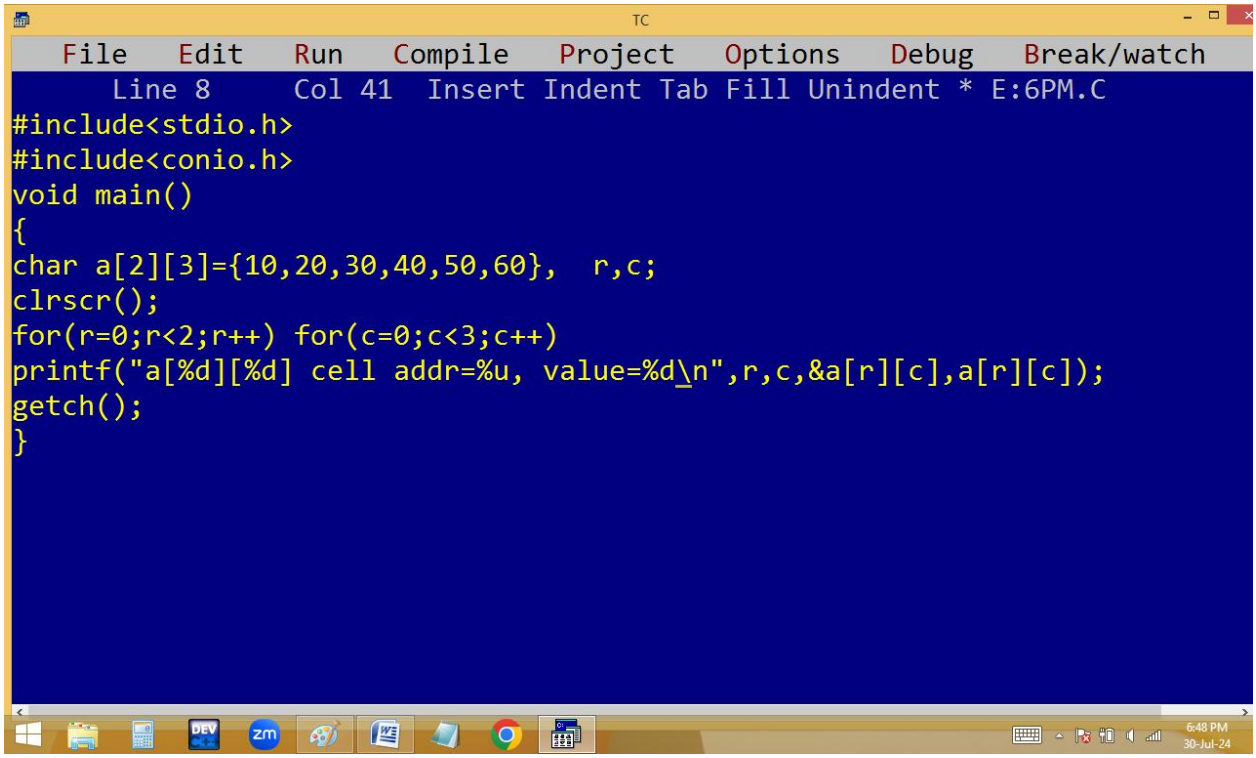
Finding each array element, cell no, address:

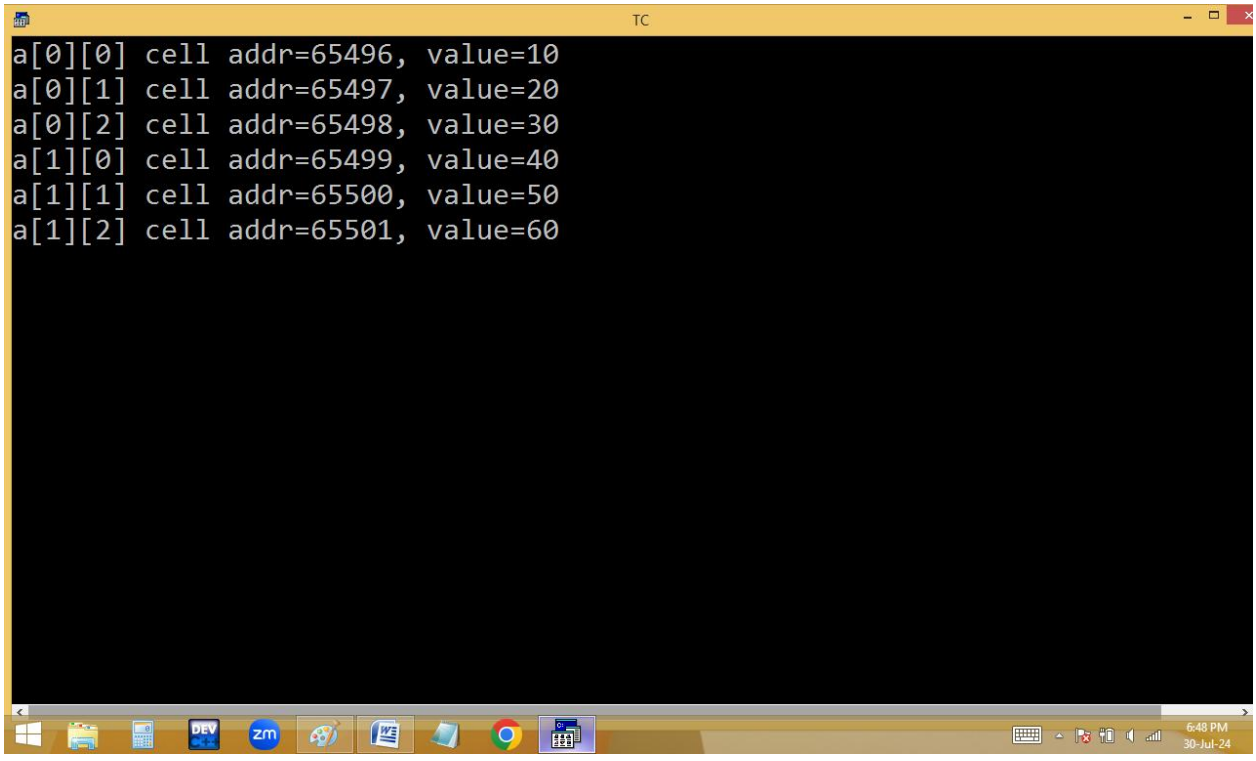

TC
File Edit Run Compile Project Options Debug Break/watch
Line 8 Col 19 Insert Indent Tab Fill Unindent * E:6PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[2][3]={10,20,30,40,50,60},r,c;
clrscr();
for(r=0;r<2;r++) for(c=0;c<3;c++)
printf("a[%d][%d] cell addr=%u, value=%d\n",r,c,&a[r][c],a[r][c]);
getch();
}


TC
a[0][0] cell addr=65492, value=10
a[0][1] cell addr=65494, value=20
a[0][2] cell addr=65496, value=30
a[1][0] cell addr=65498, value=40
a[1][1] cell addr=65500, value=50
a[1][2] cell addr=65502, value=60

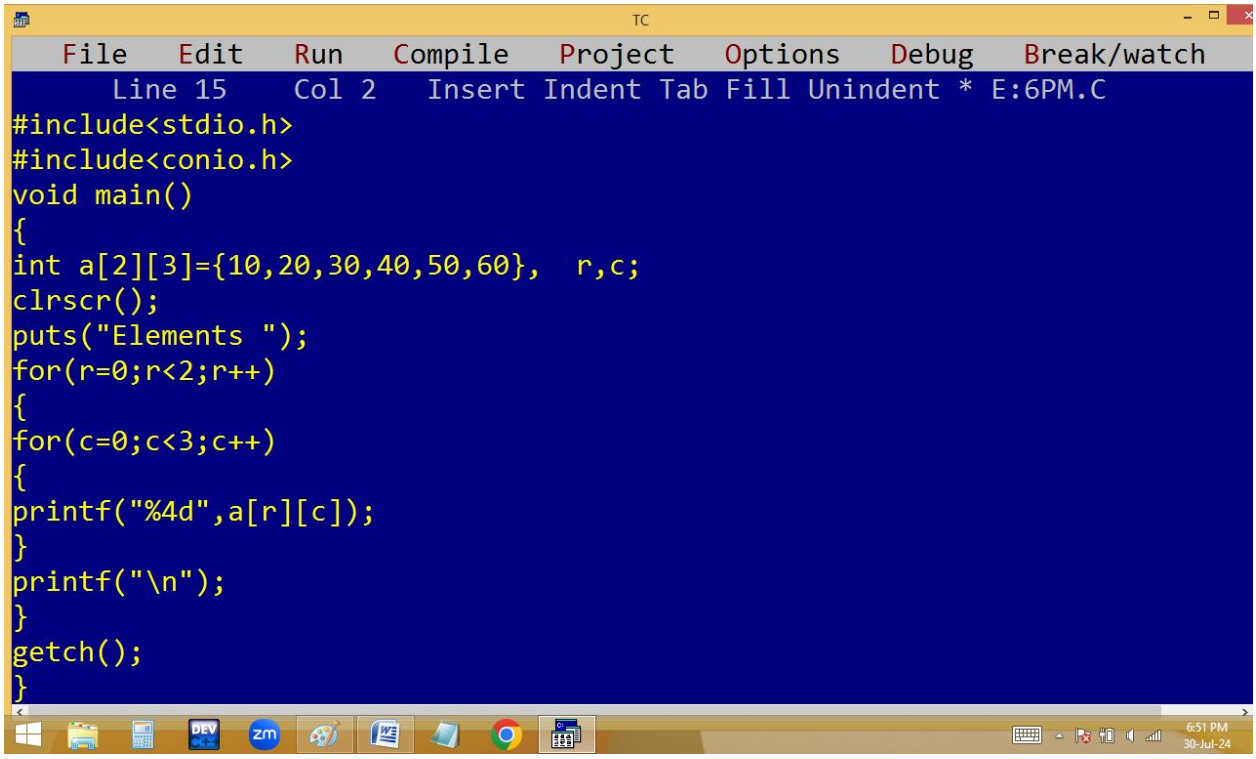

TC
File Edit Run Compile Project Options Debug Break/watch
Line 5 Col 40 Insert Indent Tab Fill Unindent * E:6PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
float a[2][3]={10,20,30,40,50,60}; int r,c;
clrscr();
for(r=0;r<2;r++) for(c=0;c<3;c++)
printf("a[%d][%d] cell addr=%u, value=%f\n",r,c,&a[r][c],a[r][c]);
getch();
}

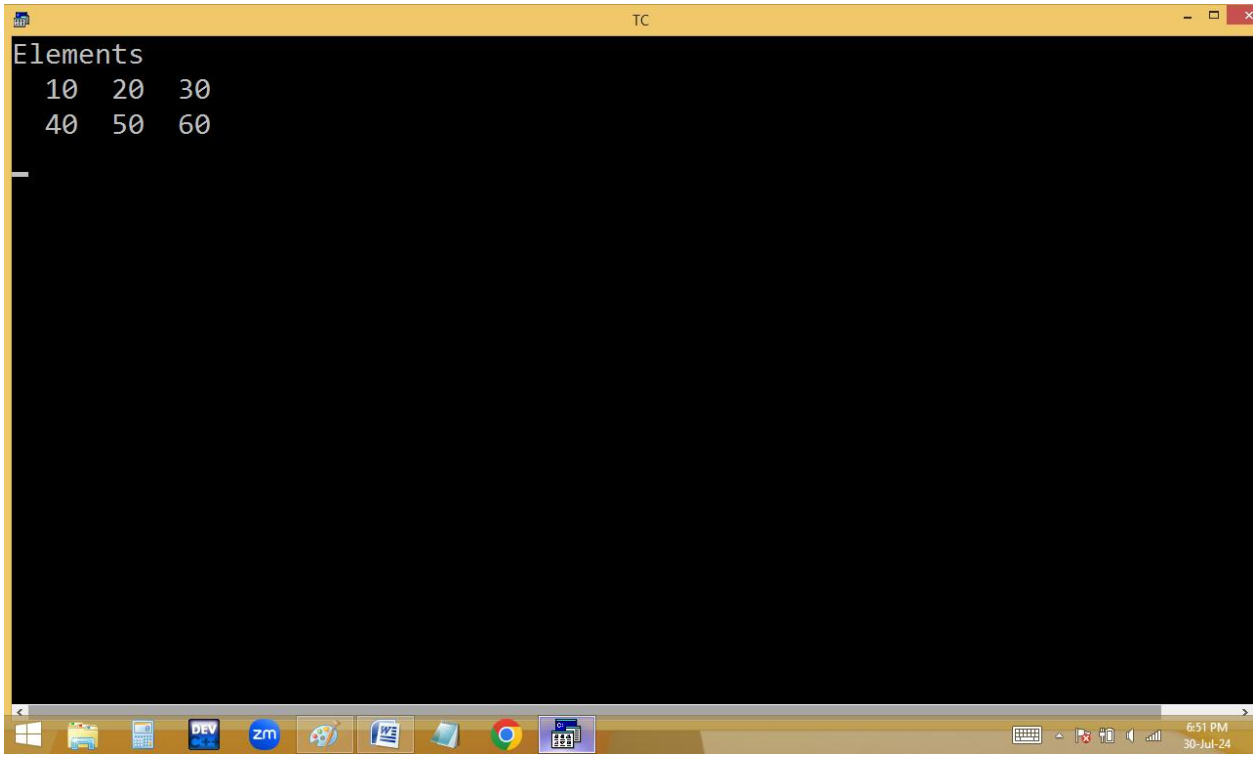

TC
a[0][0] cell addr=65480, value=10.000000
a[0][1] cell addr=65484, value=20.000000
a[0][2] cell addr=65488, value=30.000000
a[1][0] cell addr=65492, value=40.000000
a[1][1] cell addr=65496, value=50.000000
a[1][2] cell addr=65500, value=60.000000

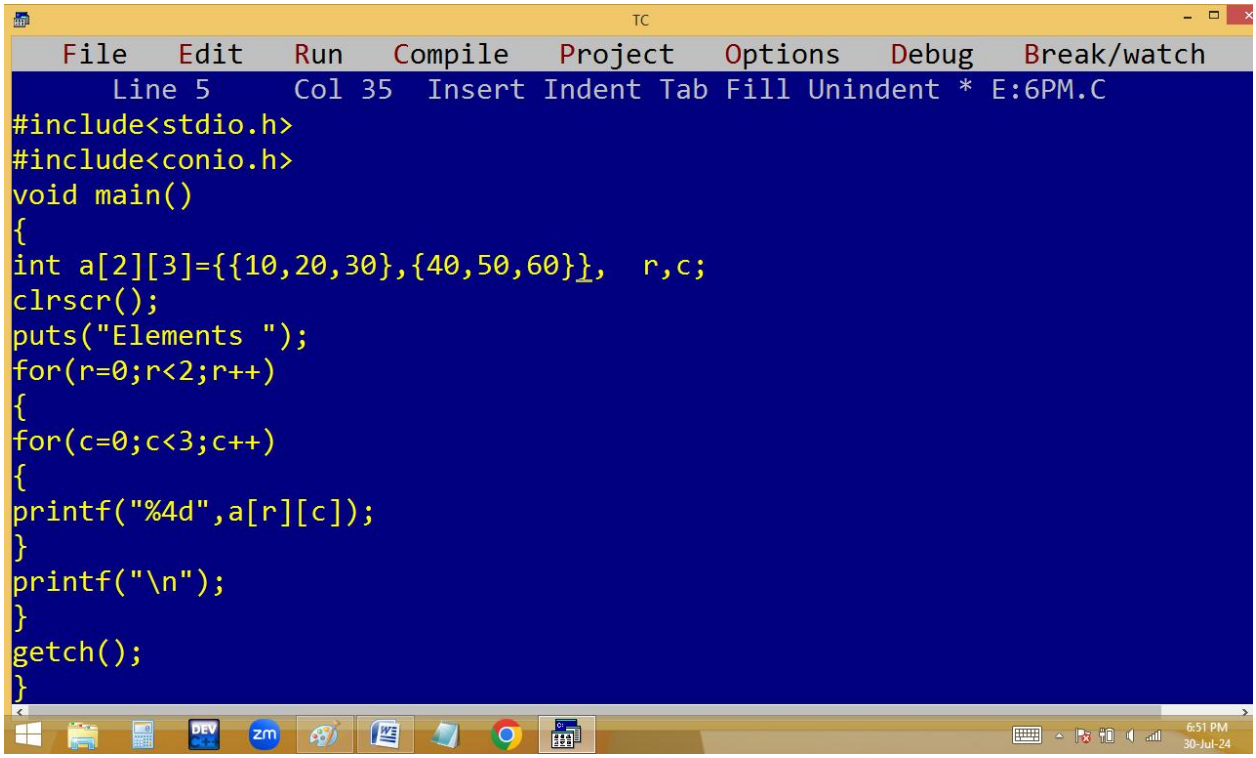

TC
File Edit Run Compile Project Options Debug Break/watch
Line 8 Col 41 Insert Indent Tab Fill Unindent * E:6PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
char a[2][3]={10,20,30,40,50,60}, r,c;
clrscr();
for(r=0;r<2;r++) for(c=0;c<3;c++)
printf("a[%d][%d] cell addr=%u, value=%d\n",r,c,&a[r][c],a[r][c]);
getch();
}

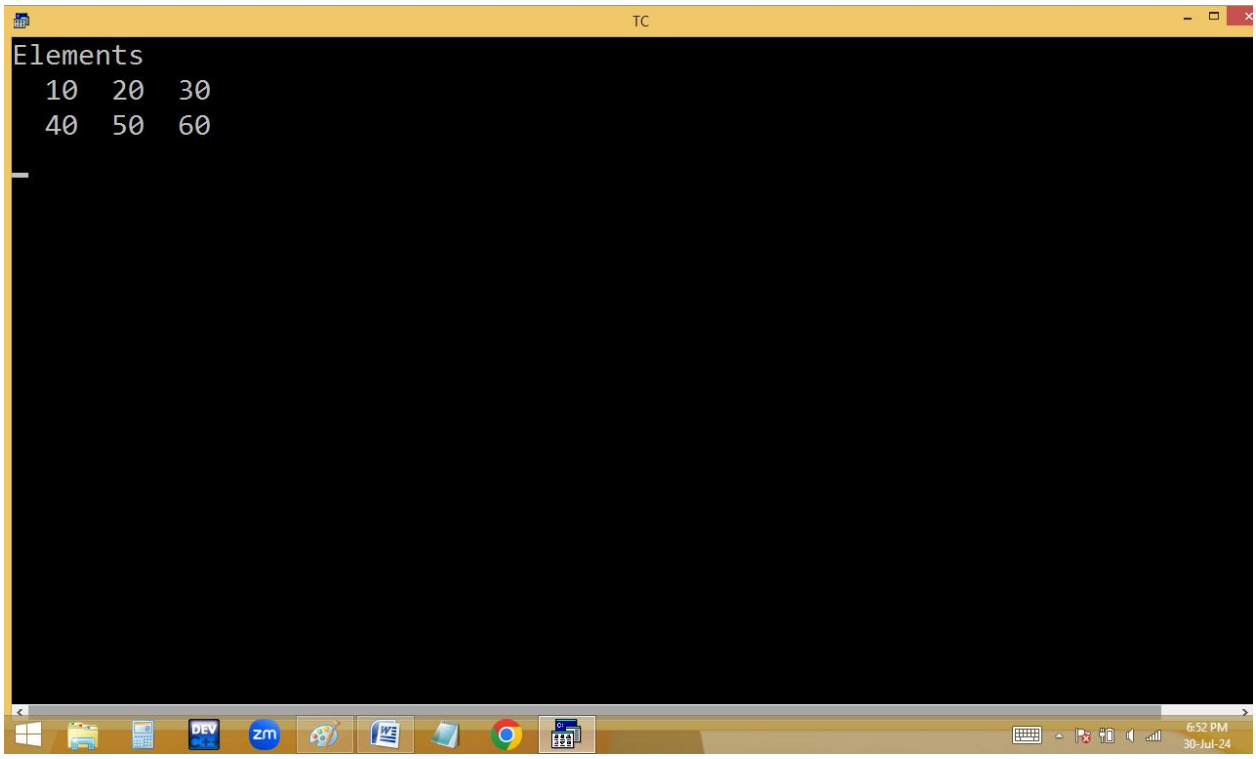

TC
a[0][0] cell addr=65496, value=10
a[0][1] cell addr=65497, value=20
a[0][2] cell addr=65498, value=30
a[1][0] cell addr=65499, value=40
a[1][1] cell addr=65500, value=50
a[1][2] cell addr=65501, value=60

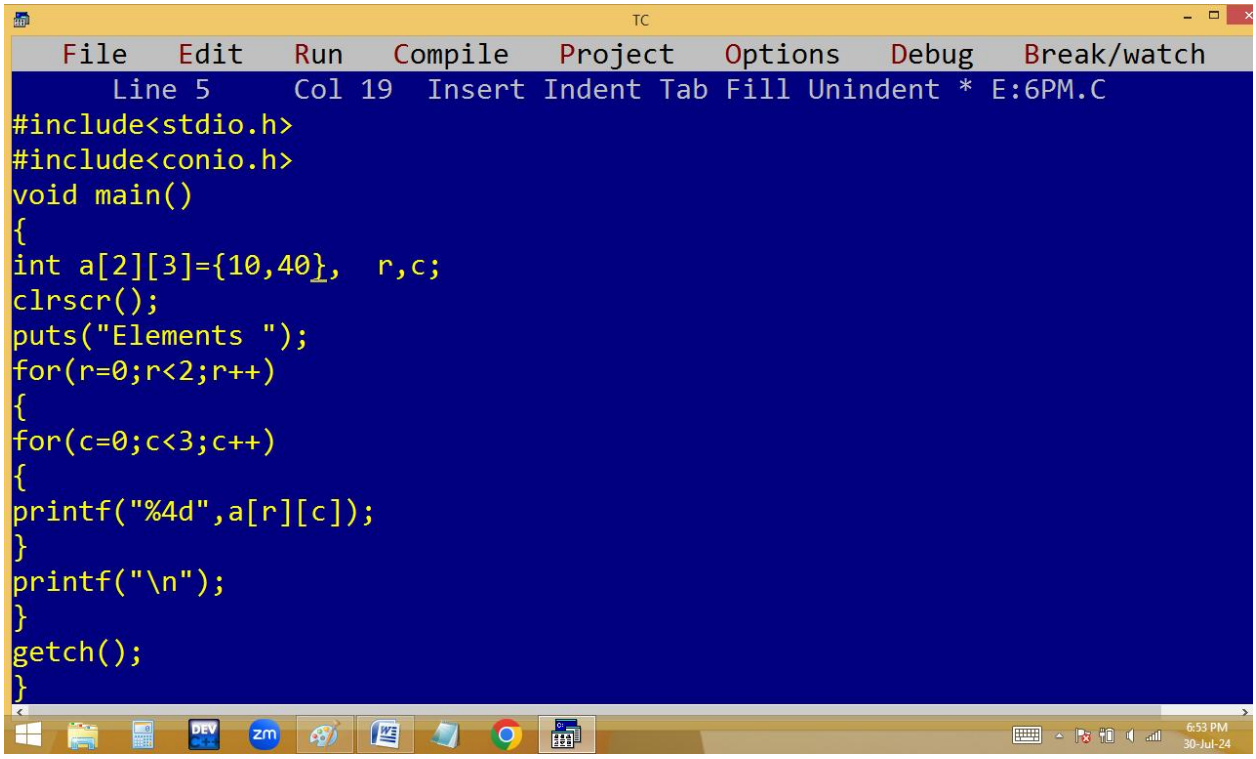
Direct initialization of array elements:

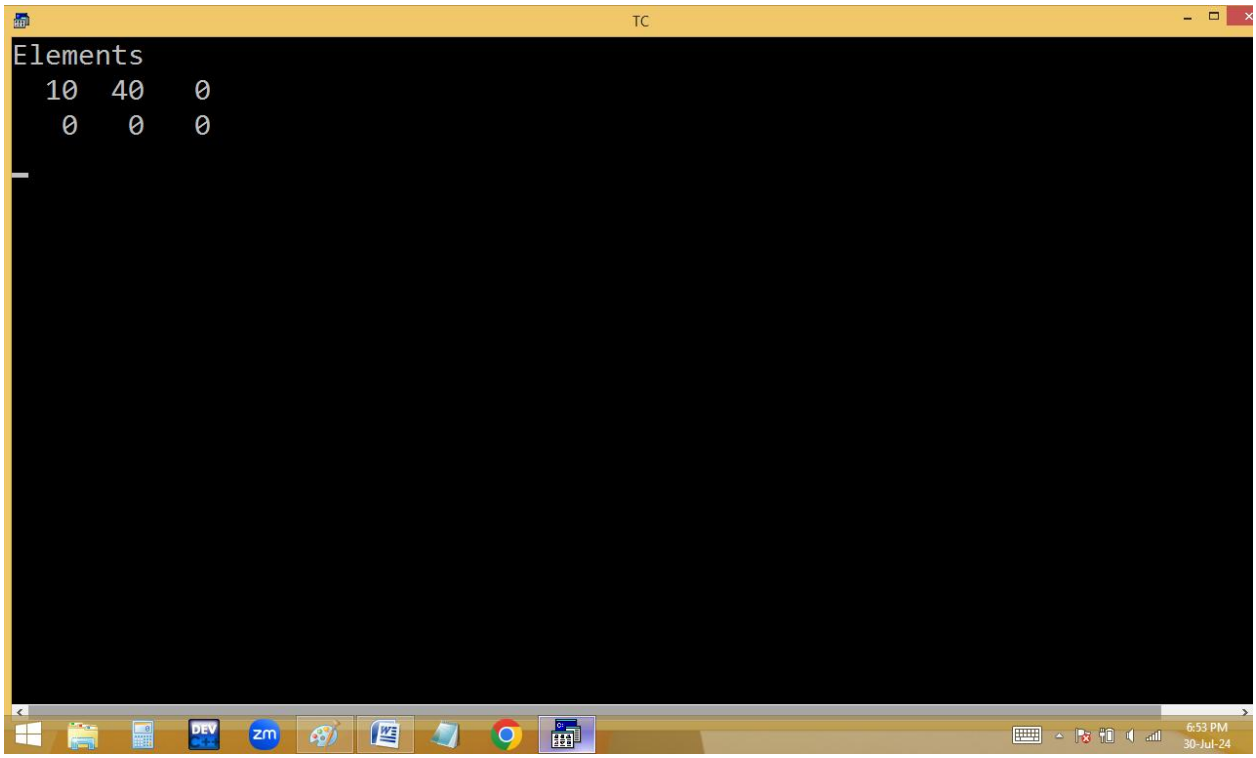


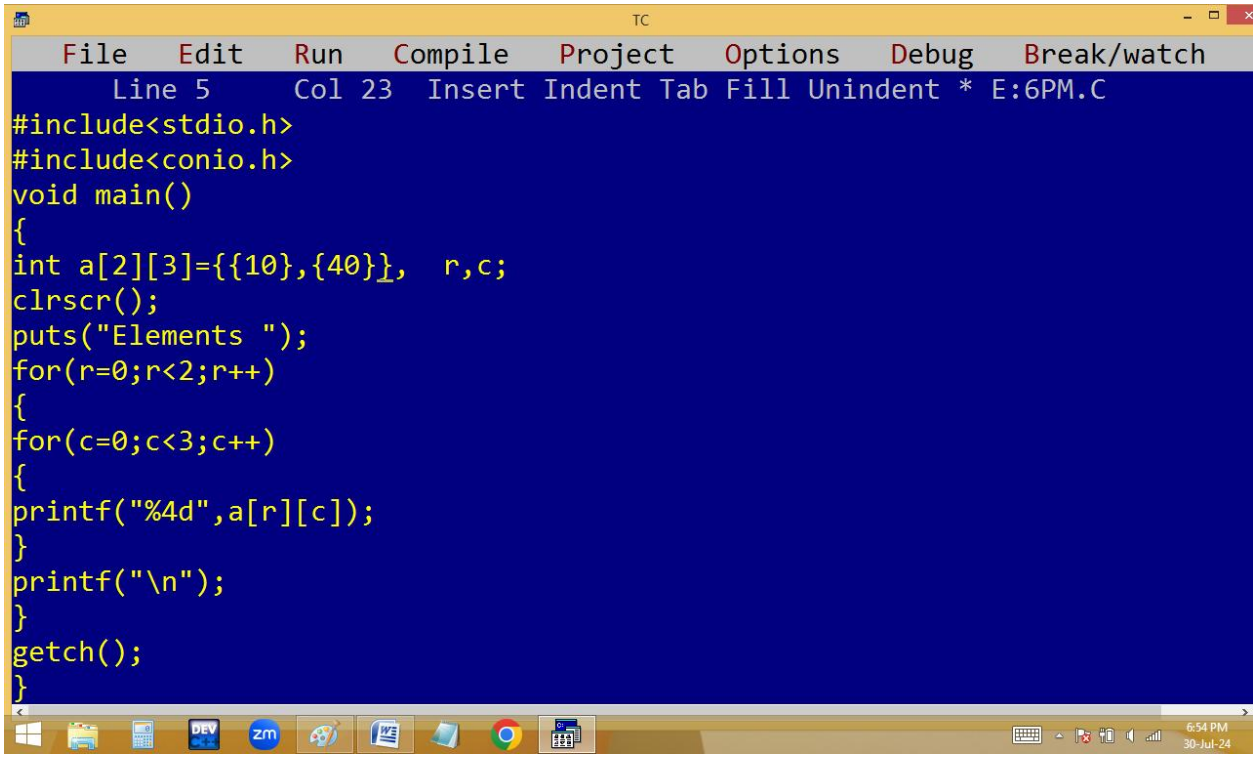


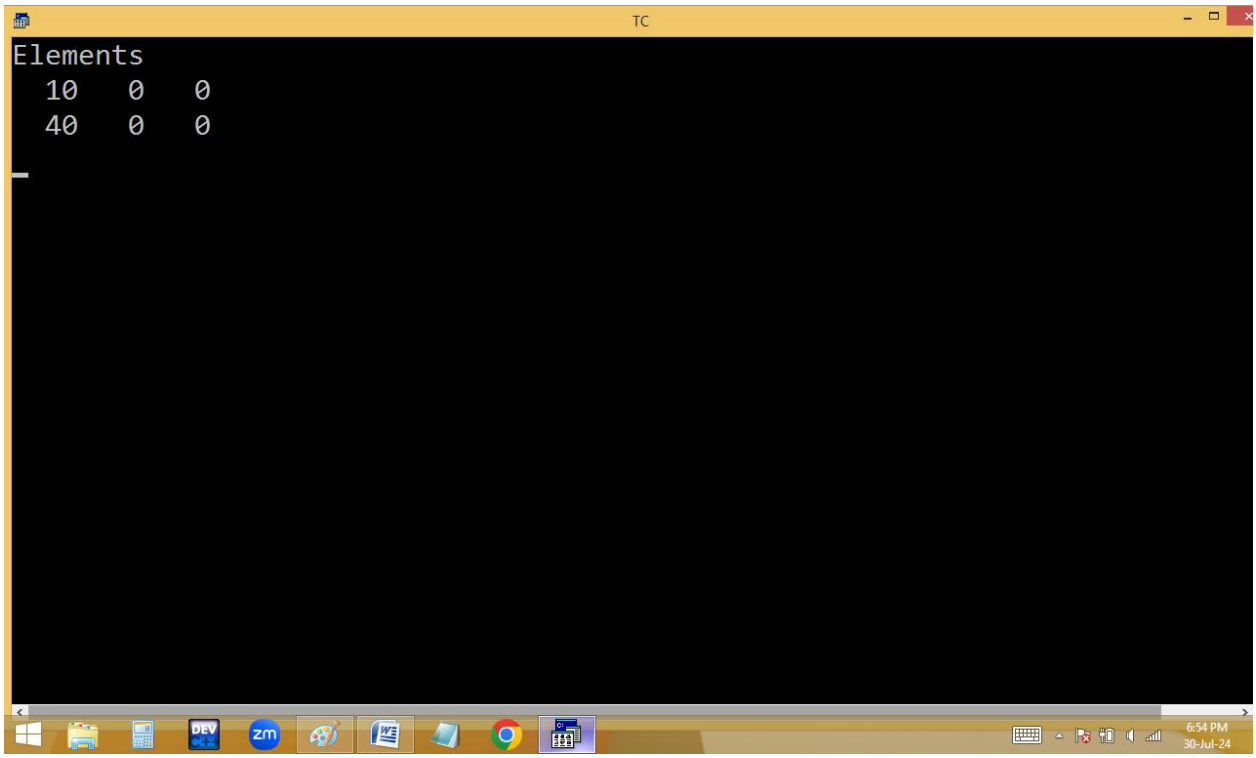

TC
File Edit Run Compile Project Options Debug Break/watch
Line 5 Col 35 Insert Indent Tab Fill Unindent * E:6PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[2][3]={{10,20,30},{40,50,60}}, r,c;
clrscr();
puts("Elements ");
for(r=0;r<2;r++)
{
for(c=0;c<3;c++)
{
printf("%4d",a[r][c]);
}
printf("\n");
}
getch();
}

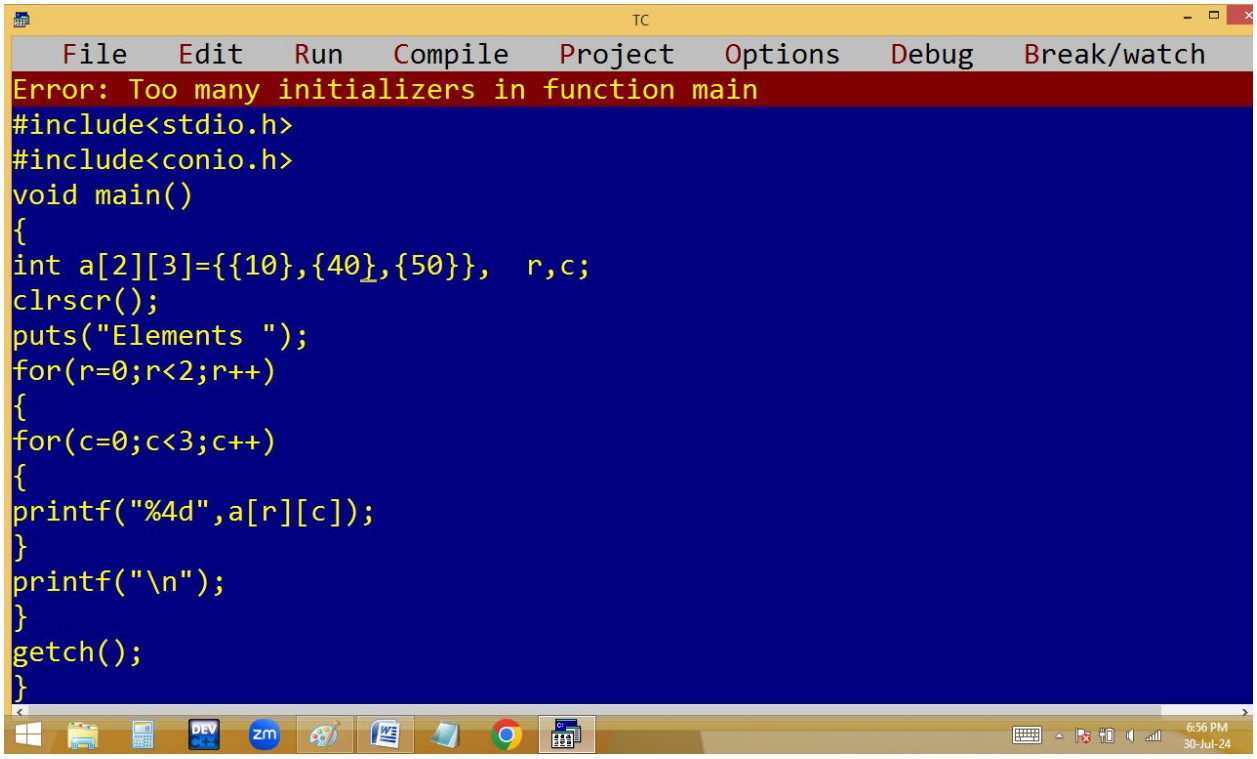

TC
Elements
10 20 30
40 50 60

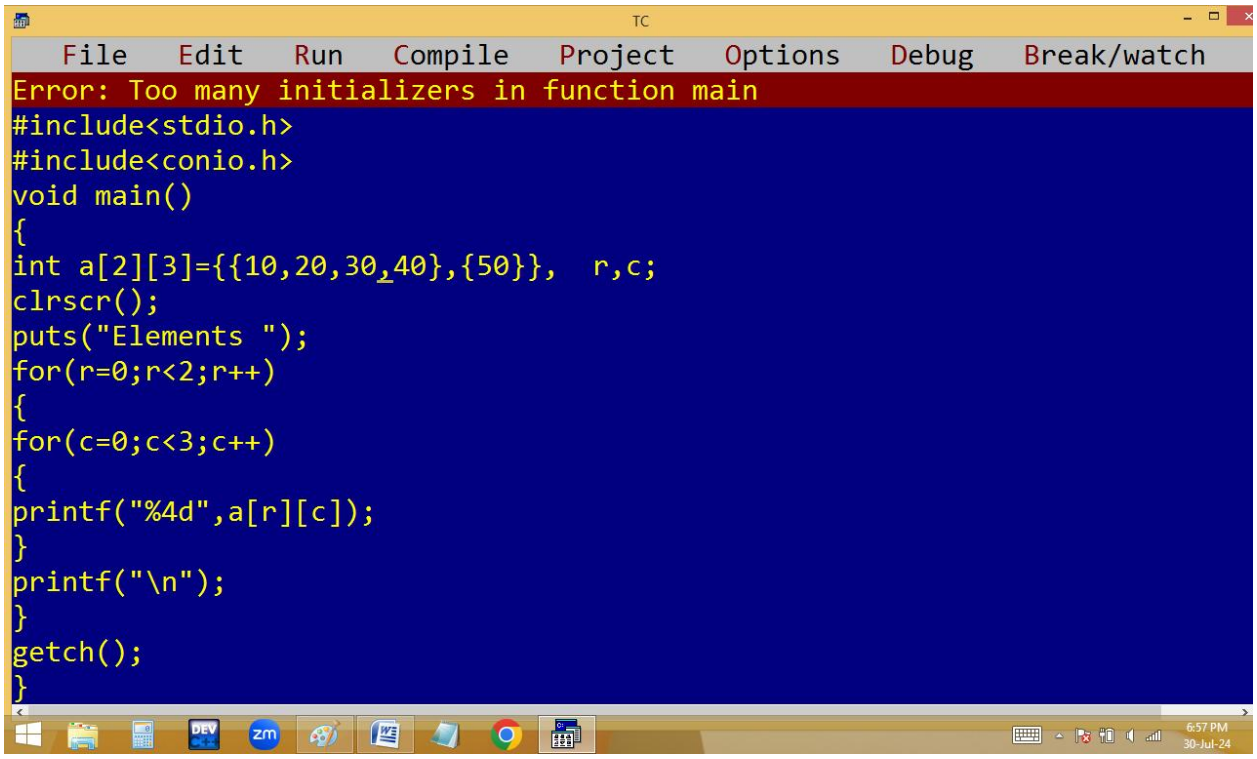

TC
File Edit Run Compile Project Options Debug Break/watch
Line 5 Col 19 Insert Indent Tab Fill Unindent * E:6PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[2][3]={10,40}, r,c;
clrscr();
puts("Elements ");
for(r=0;r<2;r++)
{
for(c=0;c<3;c++)
{
printf("%4d",a[r][c]);
}
printf("\n");
}
getch();
}

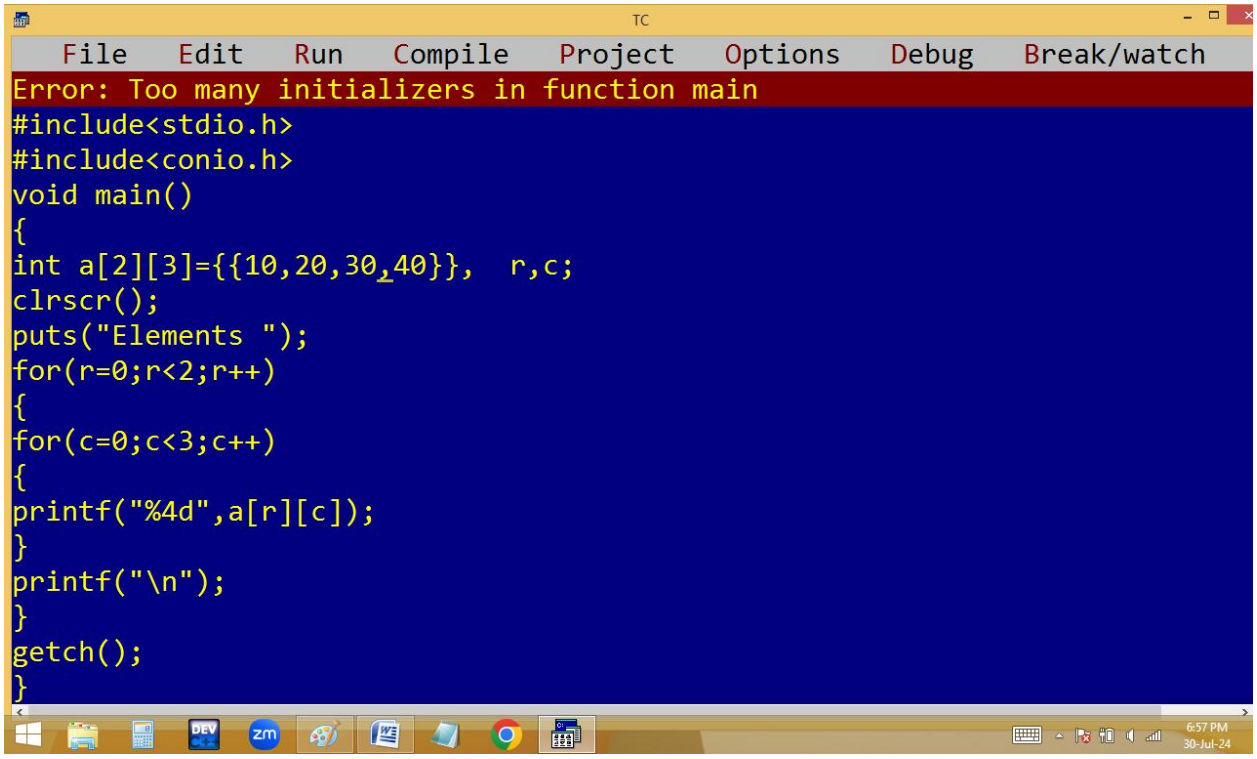

TC
Elements
10 40 0
0 0 0

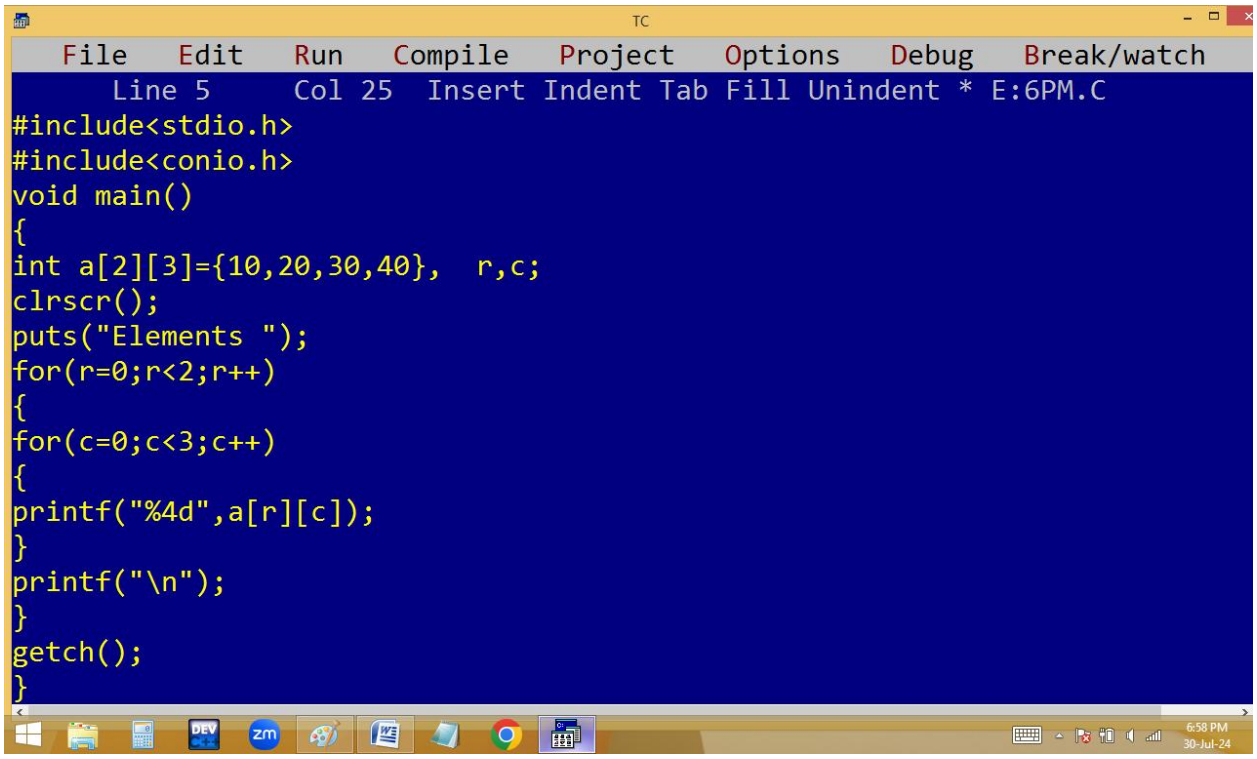

TC
File Edit Run Compile Project Options Debug Break/watch
Line 5 Col 23 Insert Indent Tab Fill Unindent * E:6PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[2][3]={{10},{40}}, r,c;
clrscr();
puts("Elements ");
for(r=0;r<2;r++)
{
for(c=0;c<3;c++)
{
printf("%4d",a[r][c]);
}
printf("\n");
}
getch();
}

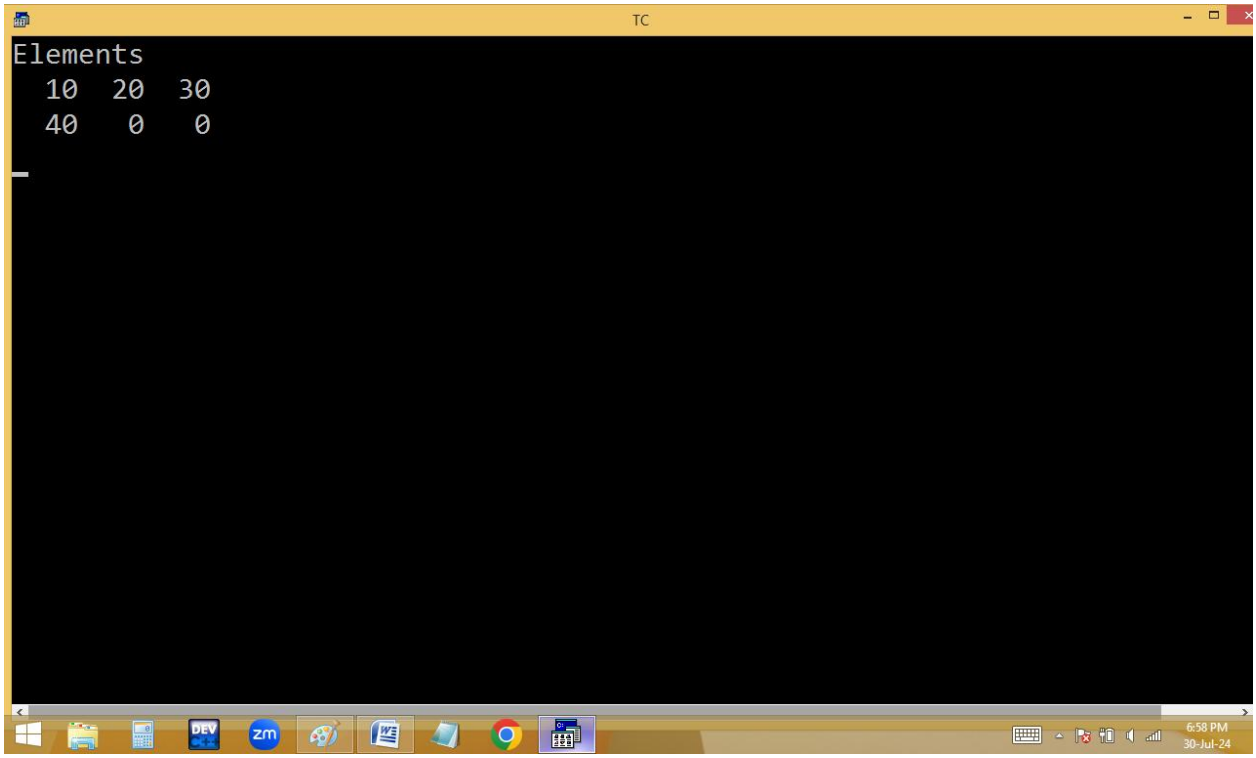

TC
Elements
10 0 0
40 0 0

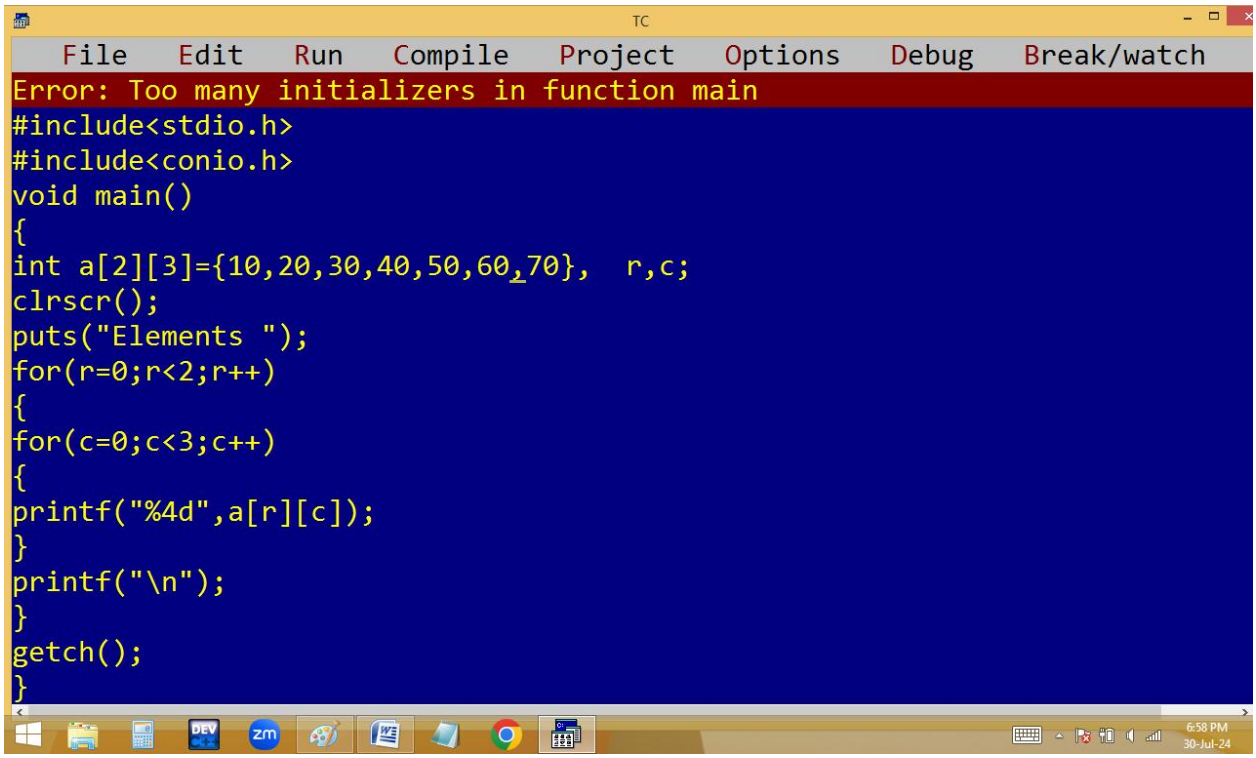

TC
File Edit Run Compile Project Options Debug Break/watch
Error: Too many initializers in function main
#include<stdio.h>
#include<conio.h>
void main()
{
int a[2][3]={{10},{40},{50}}, r,c;
clrscr();
puts("Elements ");
for(r=0;r<2;r++)
{
for(c=0;c<3;c++)
{
printf("%4d",a[r][c]);
}
printf("\n");
}
getch();
}

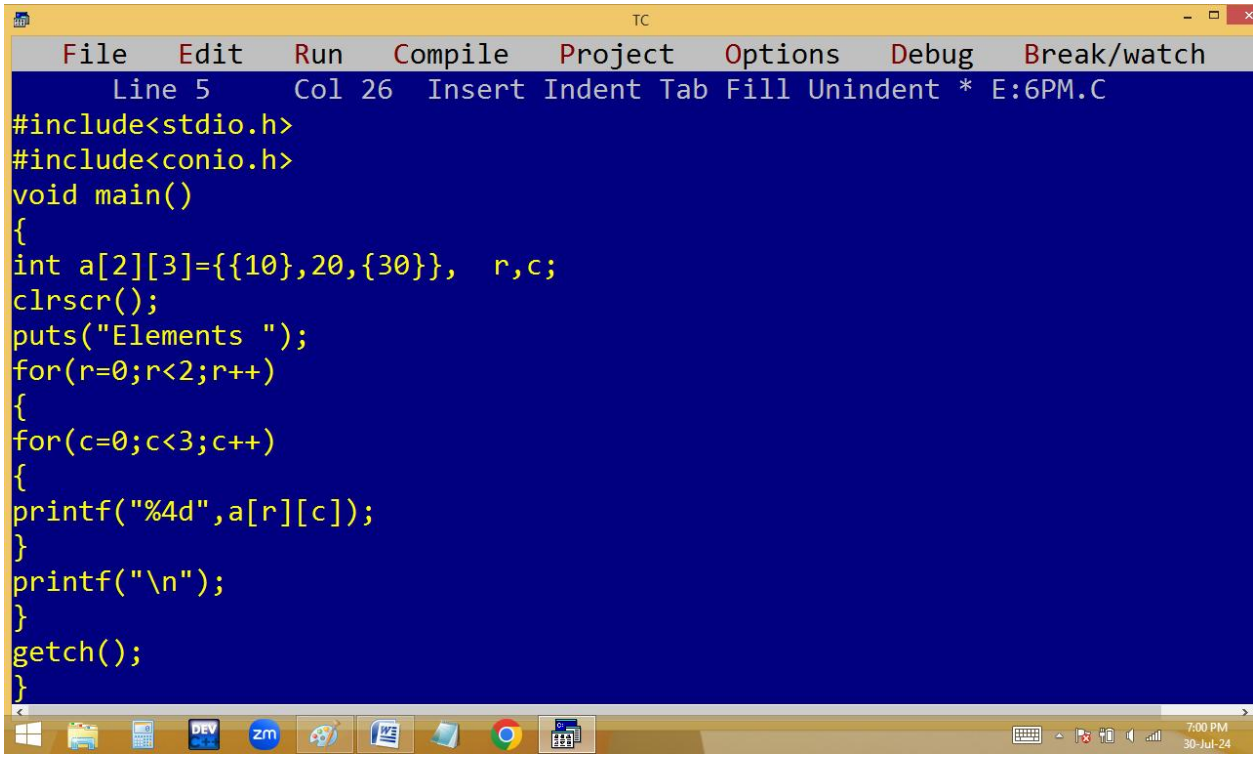

TC
File Edit Run Compile Project Options Debug Break/watch
Error: Too many initializers in function main
#include<stdio.h>
#include<conio.h>
void main()
{
int a[2][3]={{10,20,30,40},{50}}, r,c;
clrscr();
puts("Elements ");
for(r=0;r<2;r++)
{
for(c=0;c<3;c++)
{
printf("%4d",a[r][c]);
}
printf("\n");
}
getch();
}

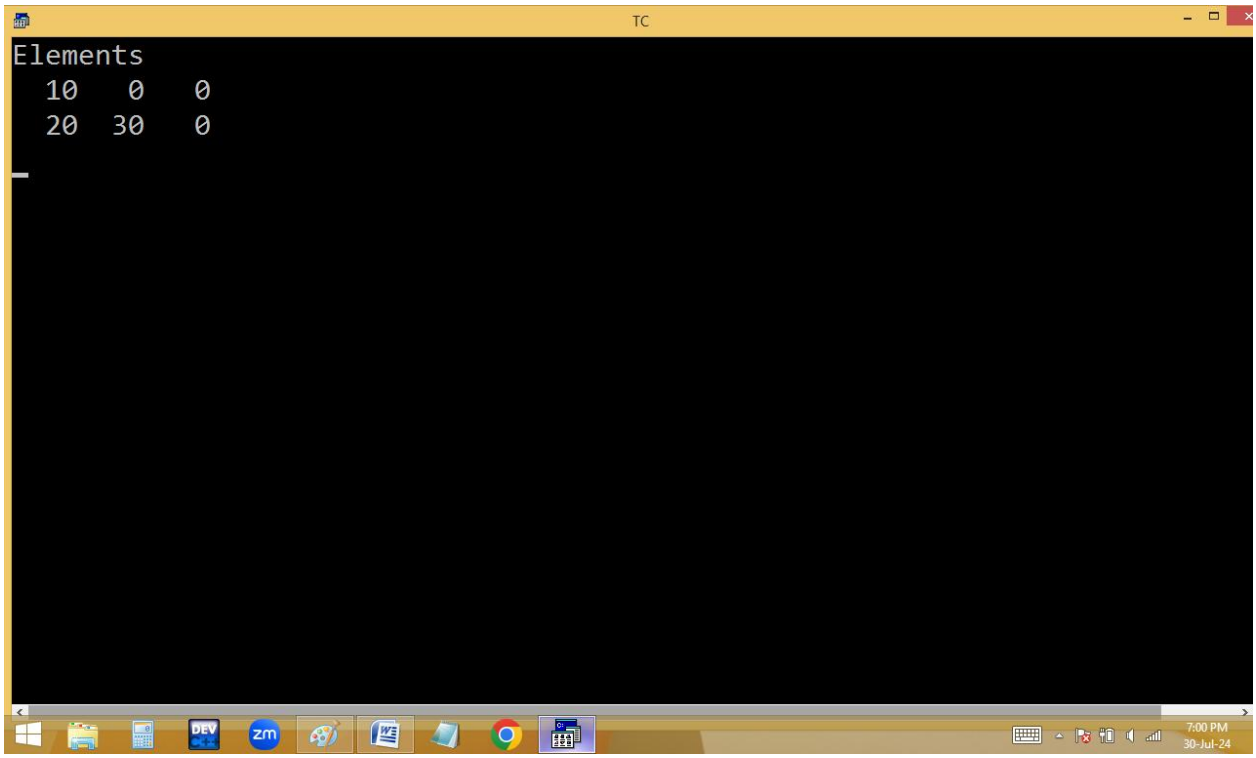

TC
File Edit Run Compile Project Options Debug Break/watch
Error: Too many initializers in function main
#include<stdio.h>
#include<conio.h>
void main()
{
int a[2][3]={{10,20,30,40}}, r,c;
clrscr();
puts("Elements ");
for(r=0;r<2;r++)
{
for(c=0;c<3;c++)
{
printf("%4d",a[r][c]);
}
printf("\n");
}
getch();
}

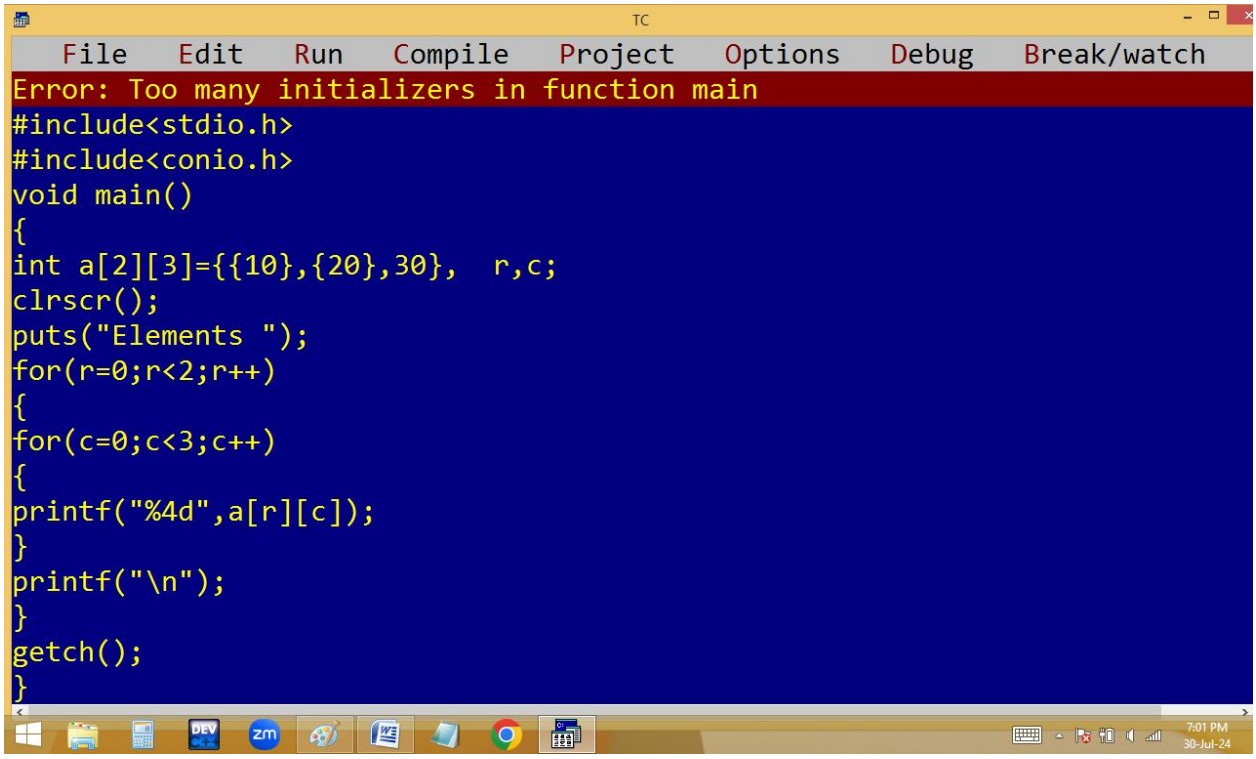

TC
File Edit Run Compile Project Options Debug Break/watch
Line 5 Col 25 Insert Indent Tab Fill Unindent * E:6PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[2][3]={10,20,30,40}, r,c;
clrscr();
puts("Elements ");
for(r=0;r<2;r++)
{
for(c=0;c<3;c++)
{
printf("%4d",a[r][c]);
}
printf("\n");
}
getch();
}

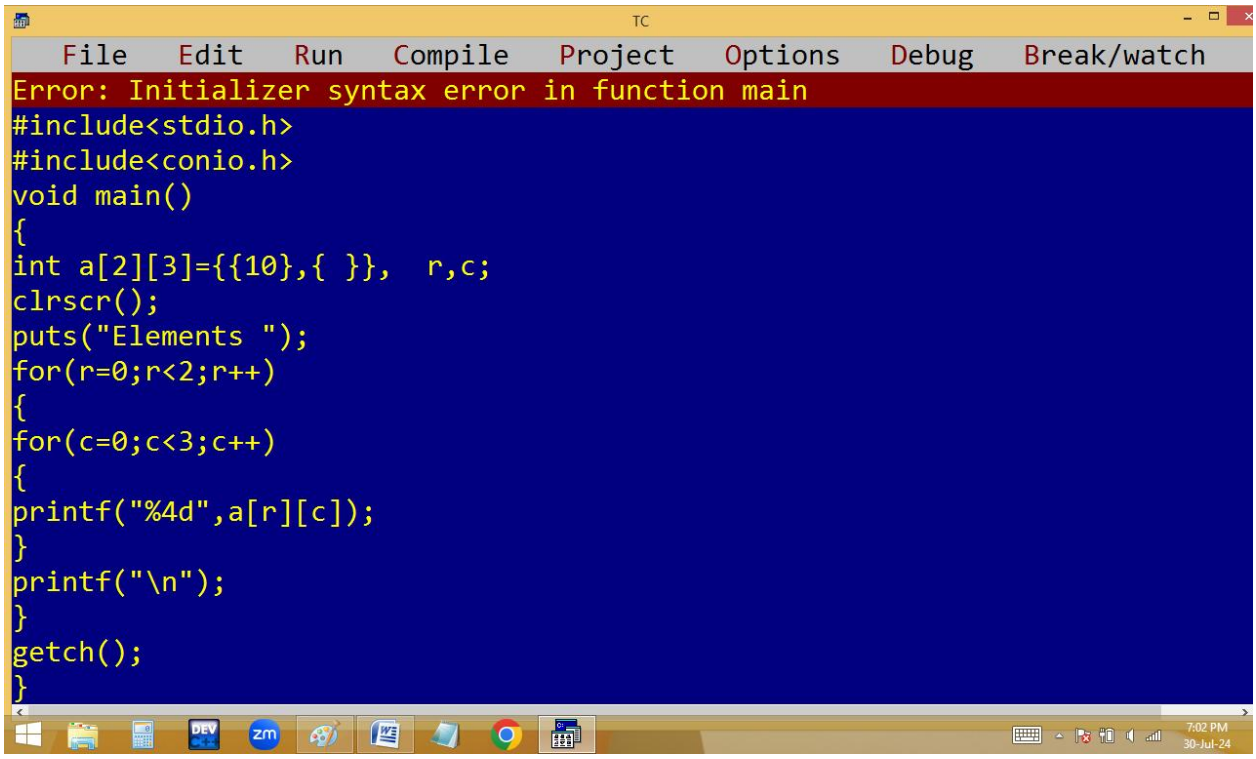

TC
Elements
10 20 30
40 0 0

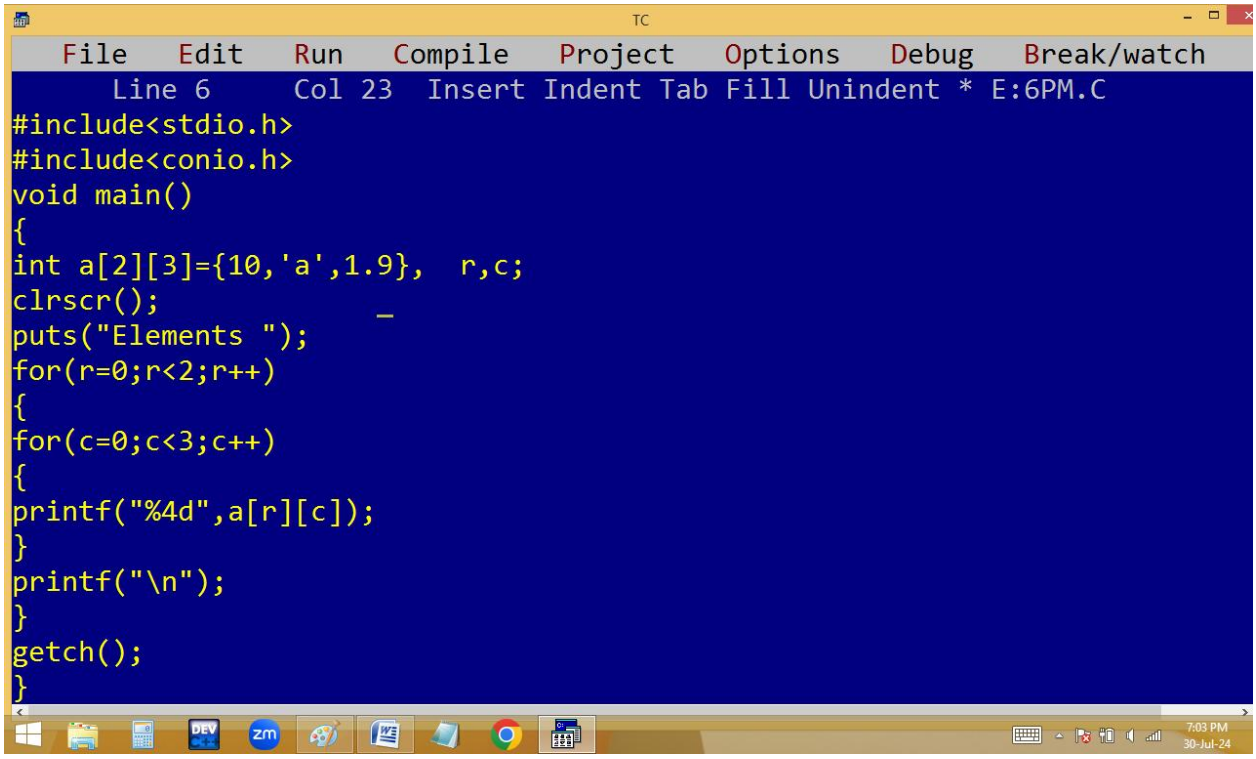

TC
File Edit Run Compile Project Options Debug Break/watch
Error: Too many initializers in function main
#include<stdio.h>
#include<conio.h>
void main()
{
int a[2][3]={10,20,30,40,50,60,70}, r,c;
clrscr();
puts("Elements ");
for(r=0;r<2;r++)
{
for(c=0;c<3;c++)
{
printf("%4d",a[r][c]);
}
printf("\n");
}
getch();
}

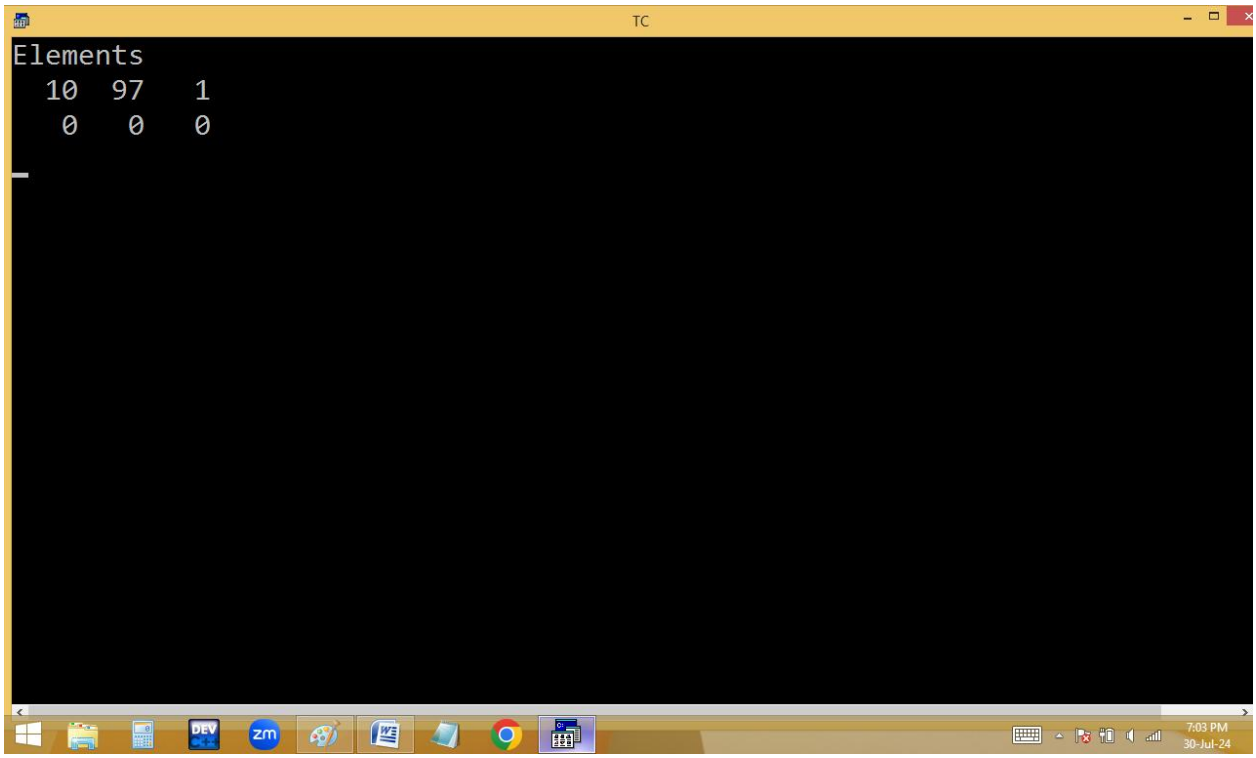

TC
File Edit Run Compile Project Options Debug Break/watch
Line 5 Col 26 Insert Indent Tab Fill Unindent * E:6PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[2][3]={{10},20,{30}}, r,c;
clrscr();
puts("Elements ");
for(r=0;r<2;r++)
{
for(c=0;c<3;c++)
{
printf("%4d",a[r][c]);
}
printf("\n");
}
getch();
}

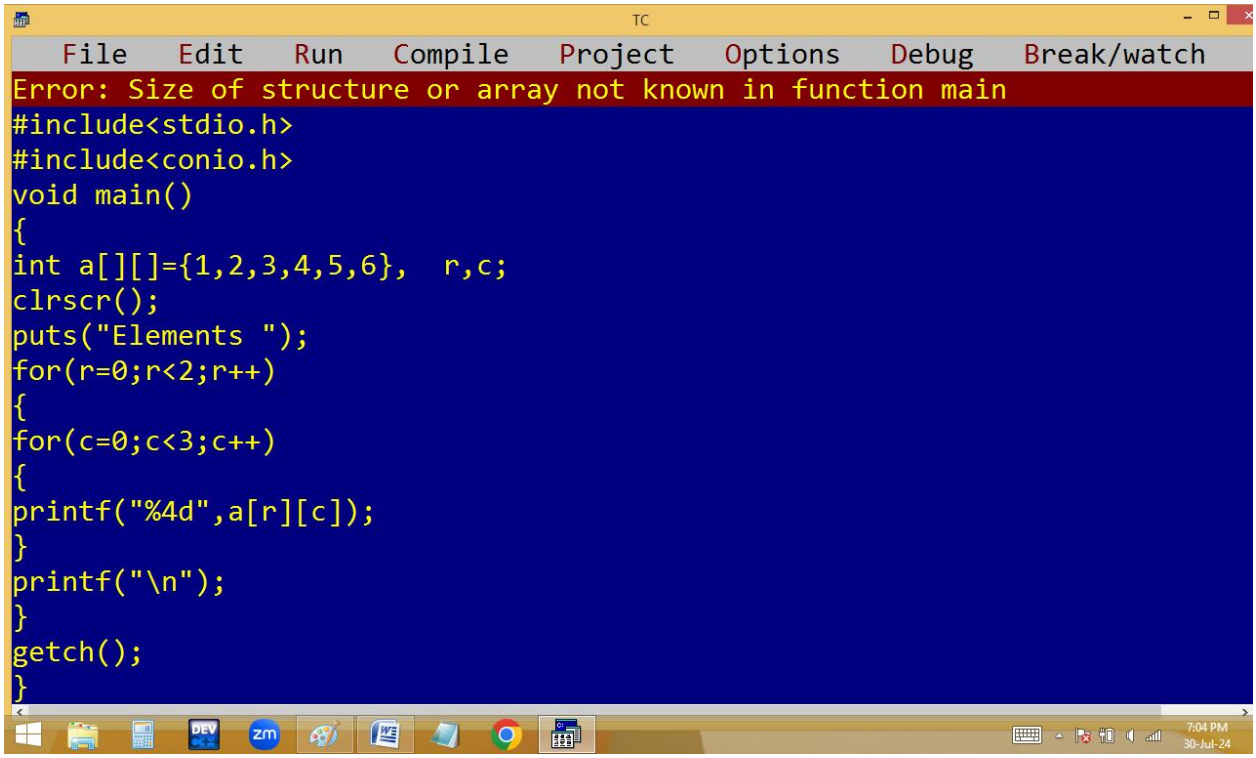

TC
Elements
10 0 0
20 30 0

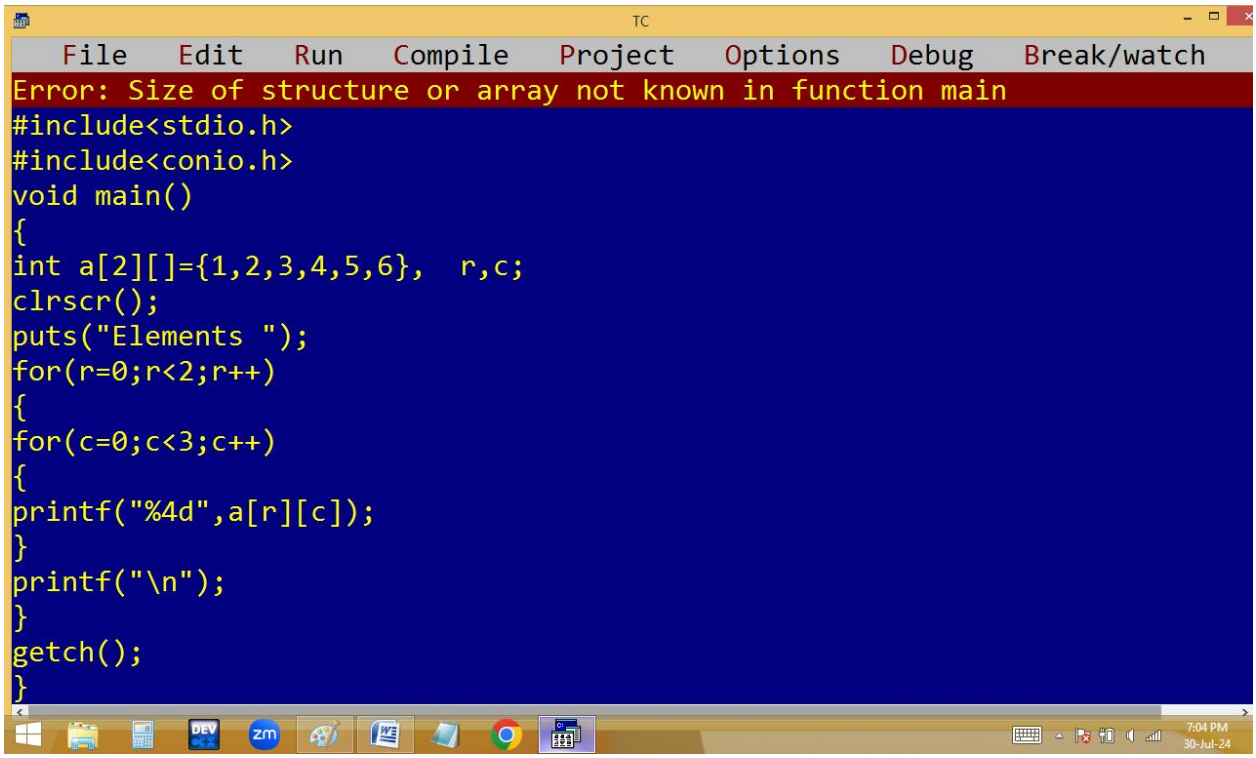

TC
File Edit Run Compile Project Options Debug Break/watch
Error: Too many initializers in function main
#include<stdio.h>
#include<conio.h>
void main()
{
int a[2][3]={{10},{20},30}, r,c;
clrscr();
puts("Elements ");
for(r=0;r<2;r++)
{
for(c=0;c<3;c++)
{
printf("%4d",a[r][c]);
}
printf("\n");
}
getch();
}

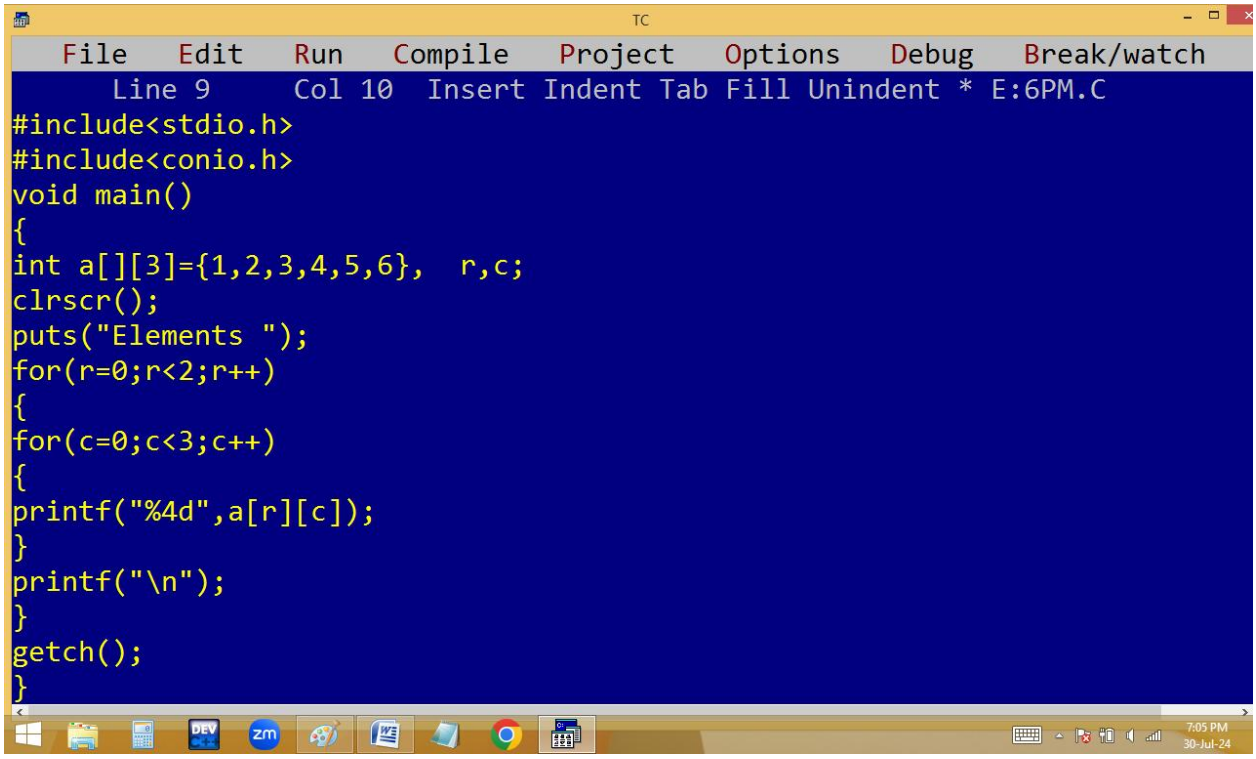

TC
File Edit Run Compile Project Options Debug Break/watch
Error: Initializer syntax error in function main
#include<stdio.h>
#include<conio.h>
void main()
{
int a[2][3]={{10},{ }}, r,c;
clrscr();
puts("Elements ");
for(r=0;r<2;r++)
{
for(c=0;c<3;c++)
{
printf("%4d",a[r][c]);
}
printf("\n");
}
getch();
}

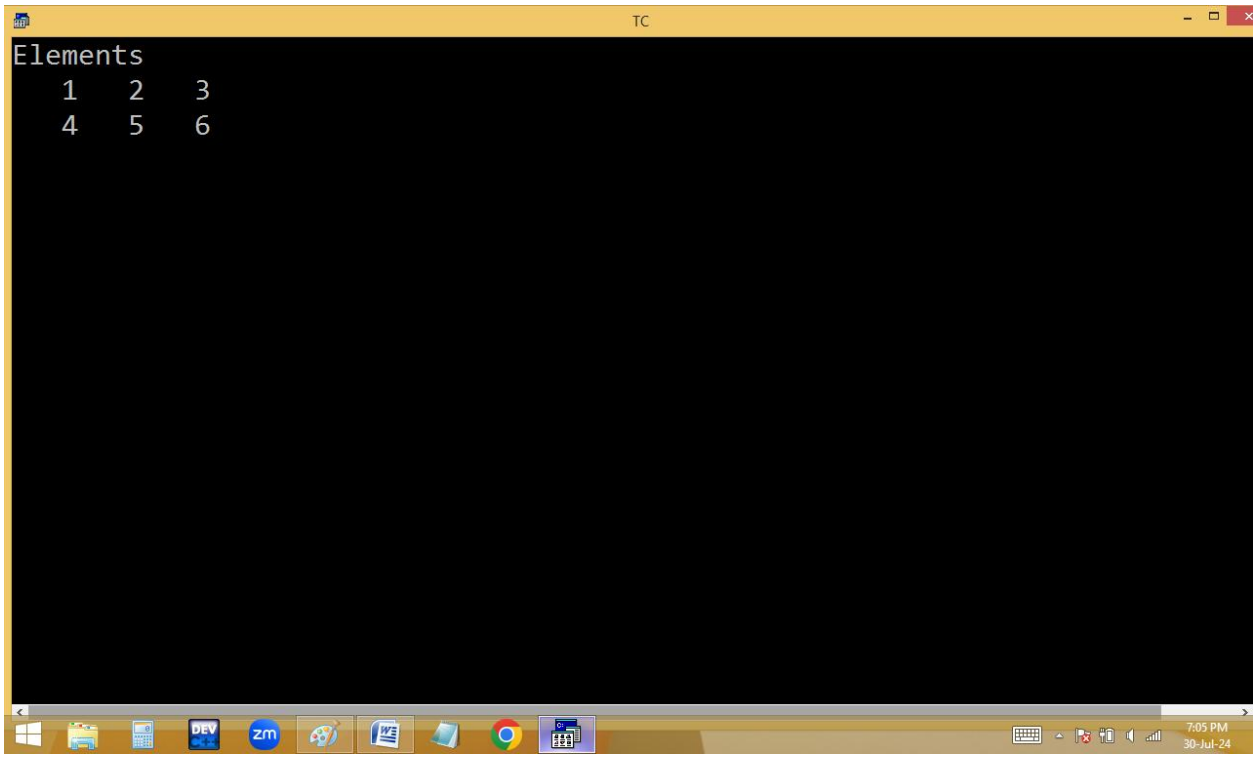

TC
File Edit Run Compile Project Options Debug Break/watch
Line 6 Col 23 Insert Indent Tab Fill Unindent * E:6PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[2][3]={10,'a',1.9}, r,c;
clrscr();
puts("Elements ");
for(r=0;r<2;r++)
{
for(c=0;c<3;c++)
{
printf("%4d",a[r][c]);
}
printf("\n");
}
getch();
}

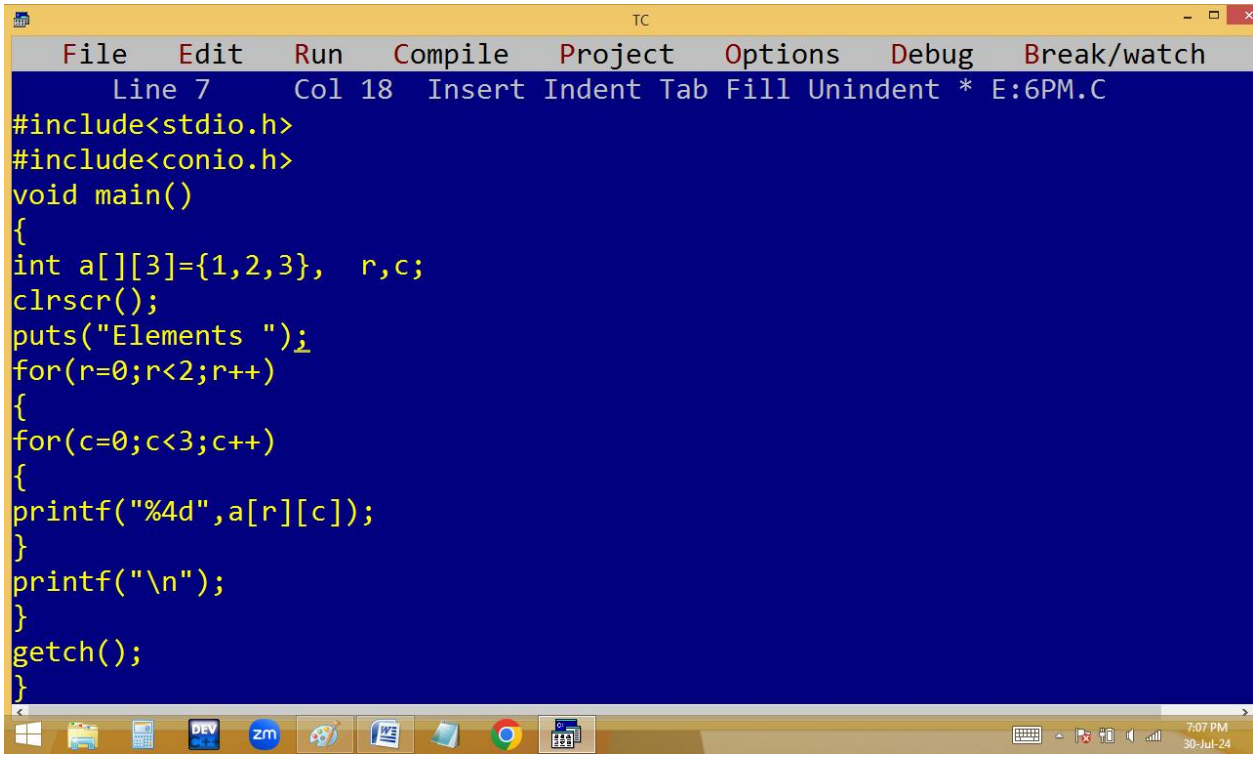

TC
Elements
10 97 1
0 0 0

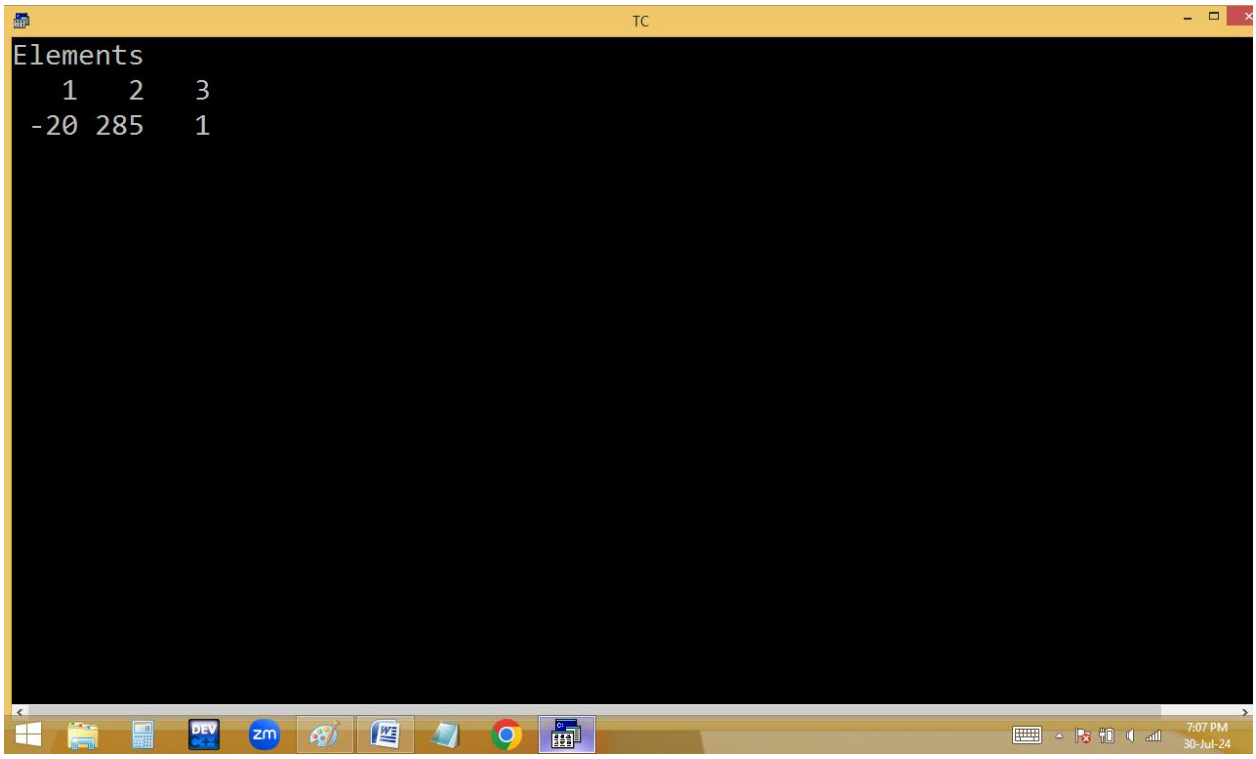

TC
File Edit Run Compile Project Options Debug Break/watch
Error: Size of structure or array not known in function main
#include<stdio.h>
#include<conio.h>
void main()
{
int a[][]={1,2,3,4,5,6}, r,c;
clrscr();
puts("Elements ");
for(r=0;r<2;r++)
{
for(c=0;c<3;c++)
{
printf("%4d",a[r][c]);
}
printf("\n");
}
getch();
}

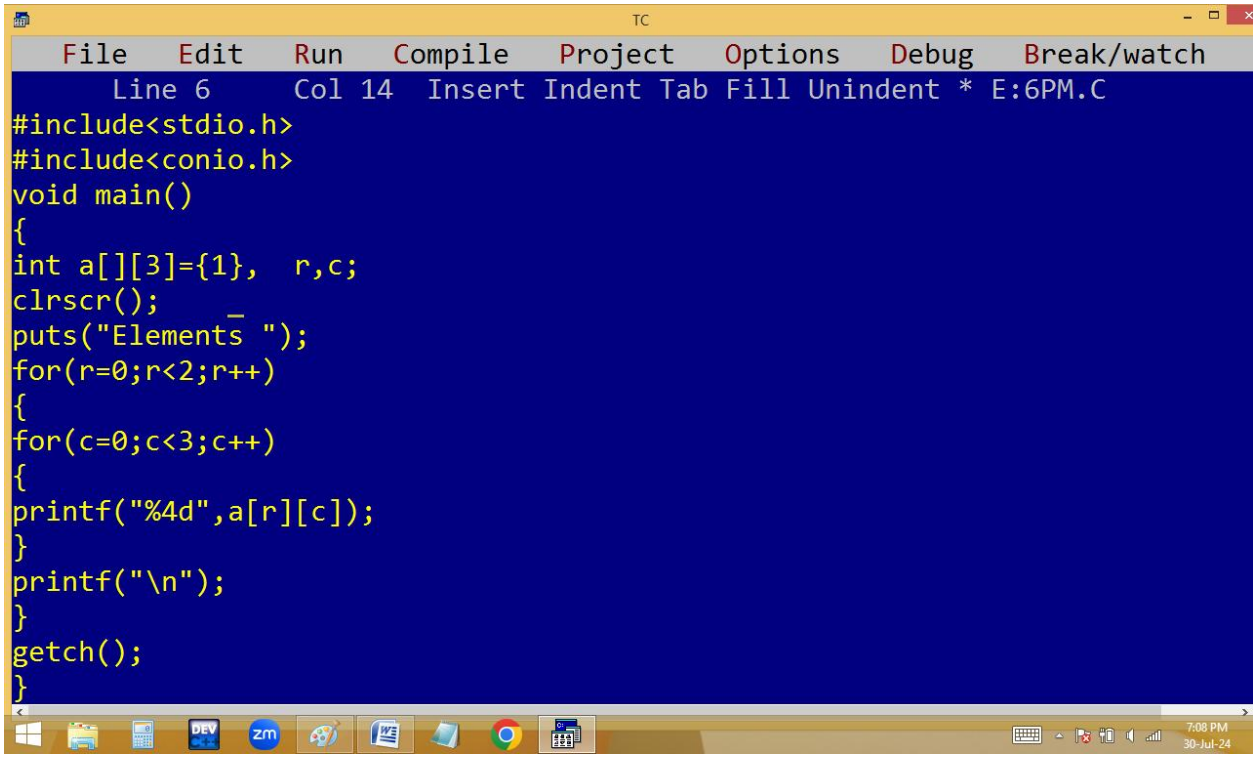

TC
File Edit Run Compile Project Options Debug Break/watch
Error: Size of structure or array not known in function main
#include<stdio.h>
#include<conio.h>
void main()
{
int a[2][]={1,2,3,4,5,6}, r,c;
clrscr();
puts("Elements ");
for(r=0;r<2;r++)
{
for(c=0;c<3;c++)
{
printf("%4d",a[r][c]);
}
printf("\n");
}
getch();
}

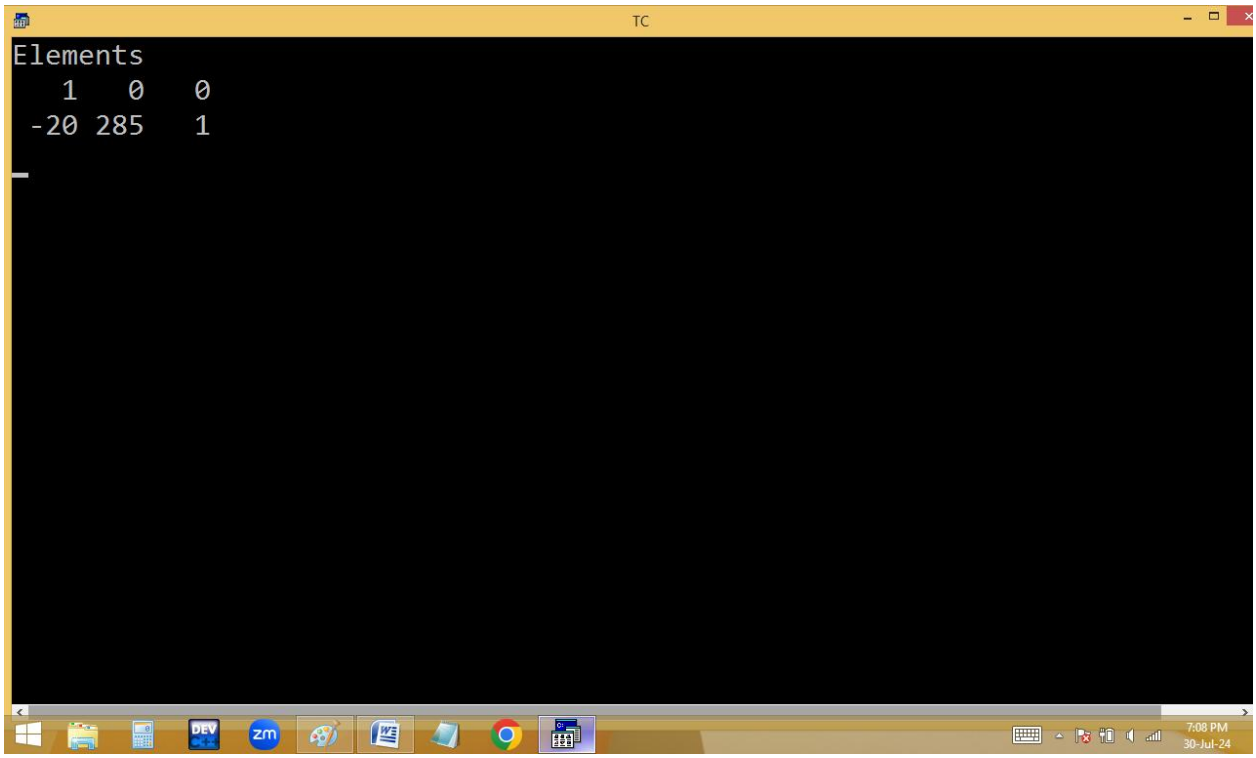

TC
File Edit Run Compile Project Options Debug Break/watch
Line 9 Col 10 Insert Indent Tab Fill Unindent * E:6PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[][3]={1,2,3,4,5,6}, r,c;
clrscr();
puts("Elements ");
for(r=0;r<2;r++)
{
for(c=0;c<3;c++)
{
printf("%4d",a[r][c]);
}
printf("\n");
}
getch();
}

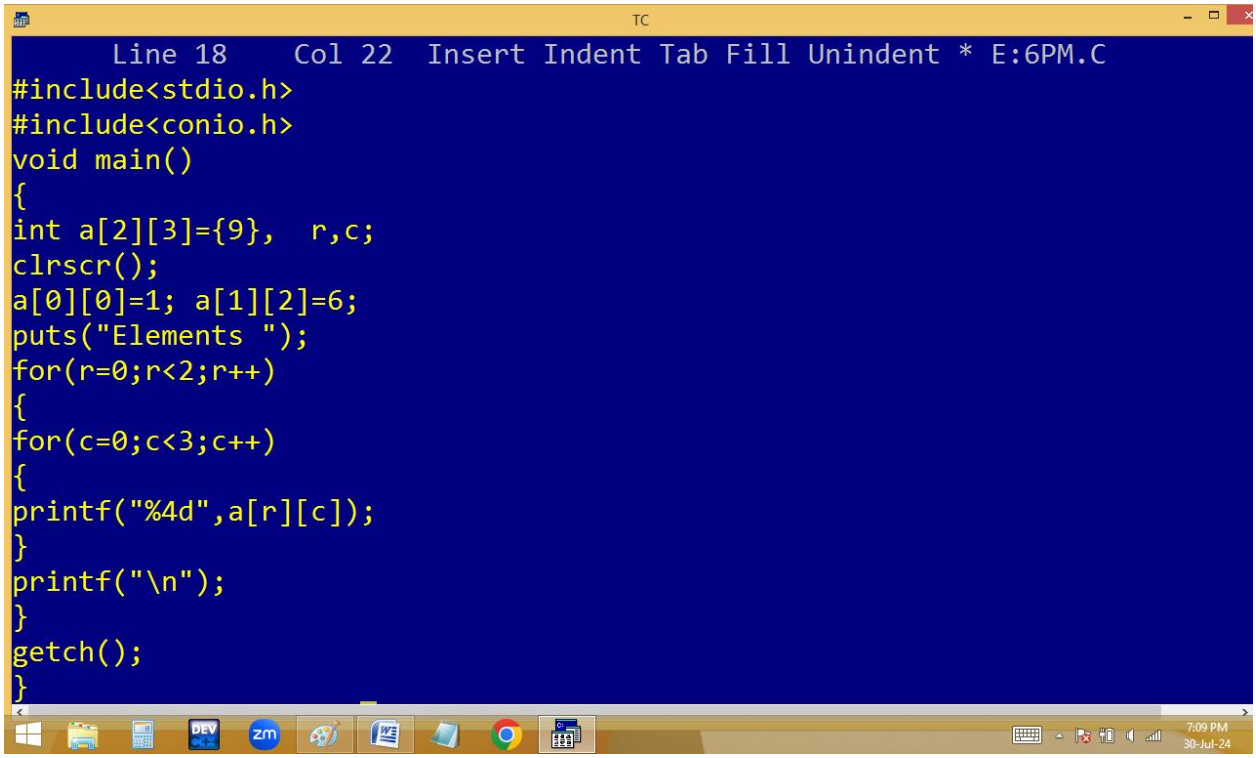

TC
Elements
1 2 3
4 5 6

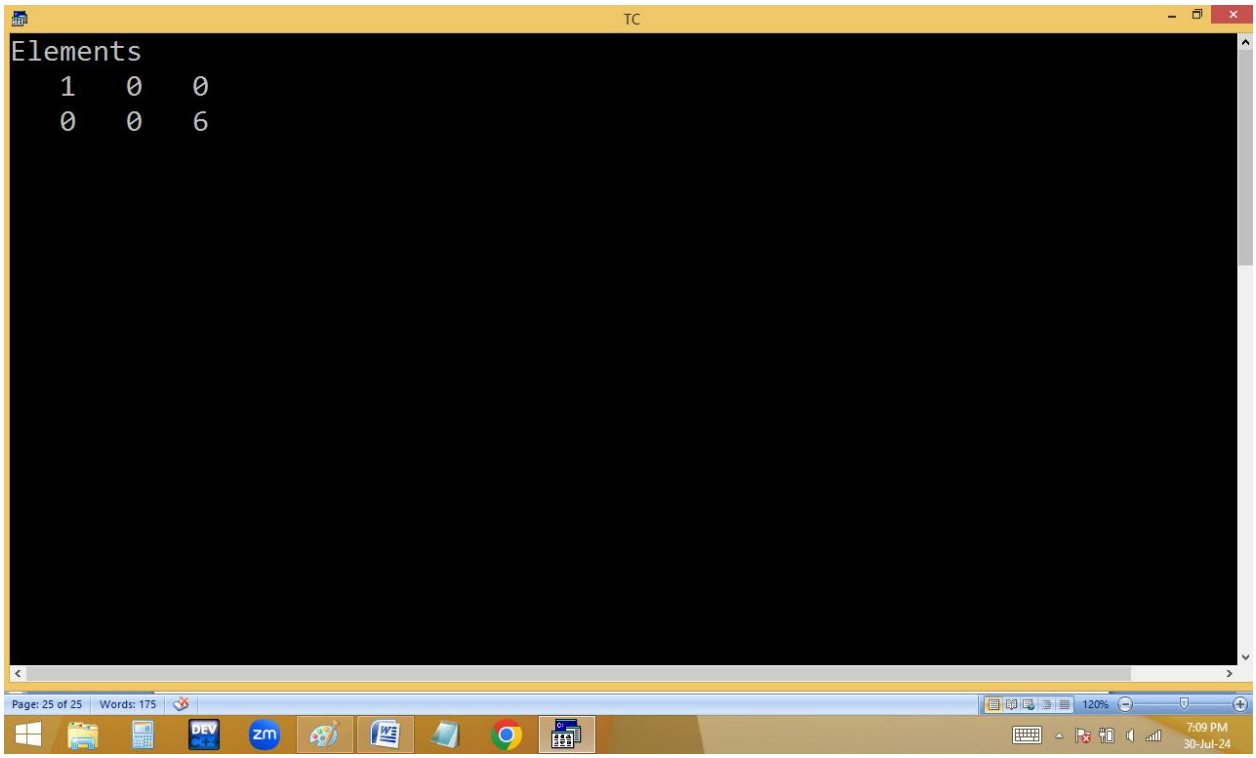

TC
File Edit Run Compile Project Options Debug Break/watch
Line 7 Col 18 Insert Indent Tab Fill Unindent * E:6PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[][3]={1,2,3}, r,c;
clrscr();
puts("Elements ");
for(r=0;r<2;r++)
{
for(c=0;c<3;c++)
{
printf("%4d",a[r][c]);
}
printf("\n");
}
getch();
}

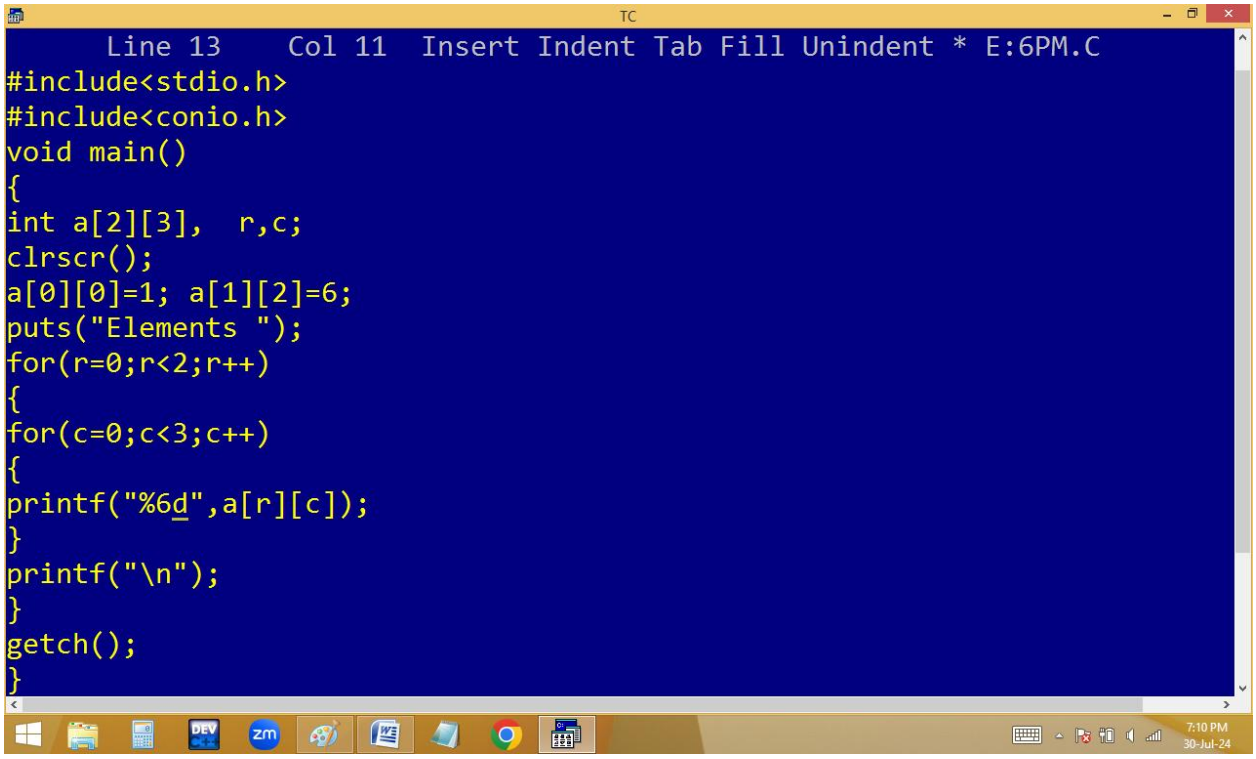

TC
Elements
1 2 3
-20 285 1

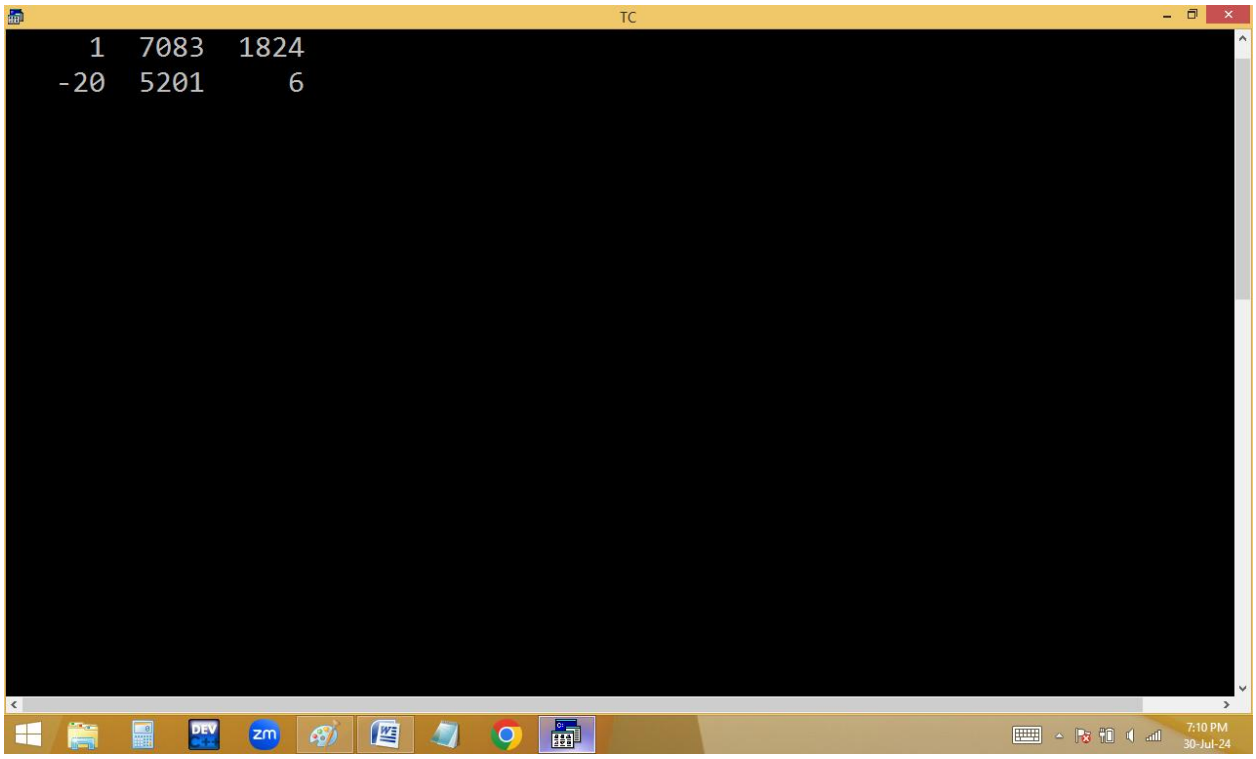

TC
File Edit Run Compile Project Options Debug Break/watch
Line 6 Col 14 Insert Indent Tab Fill Unindent * E:6PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[][3]={1}, r,c;
clrscr();
puts("Elements ");
for(r=0;r<2;r++)
{
for(c=0;c<3;c++)
{
printf("%4d",a[r][c]);
}
printf("\n");
}
getch();
}

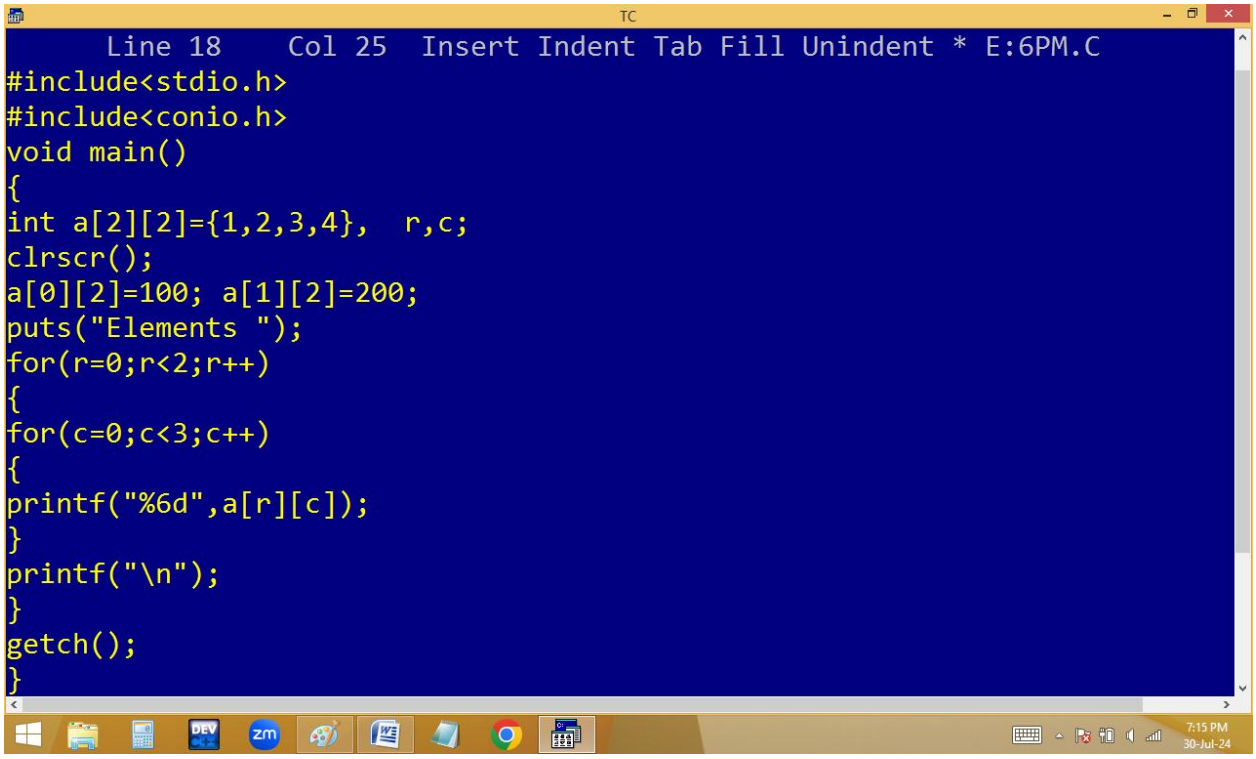

TC
Elements
1 0 0
-20 285 1

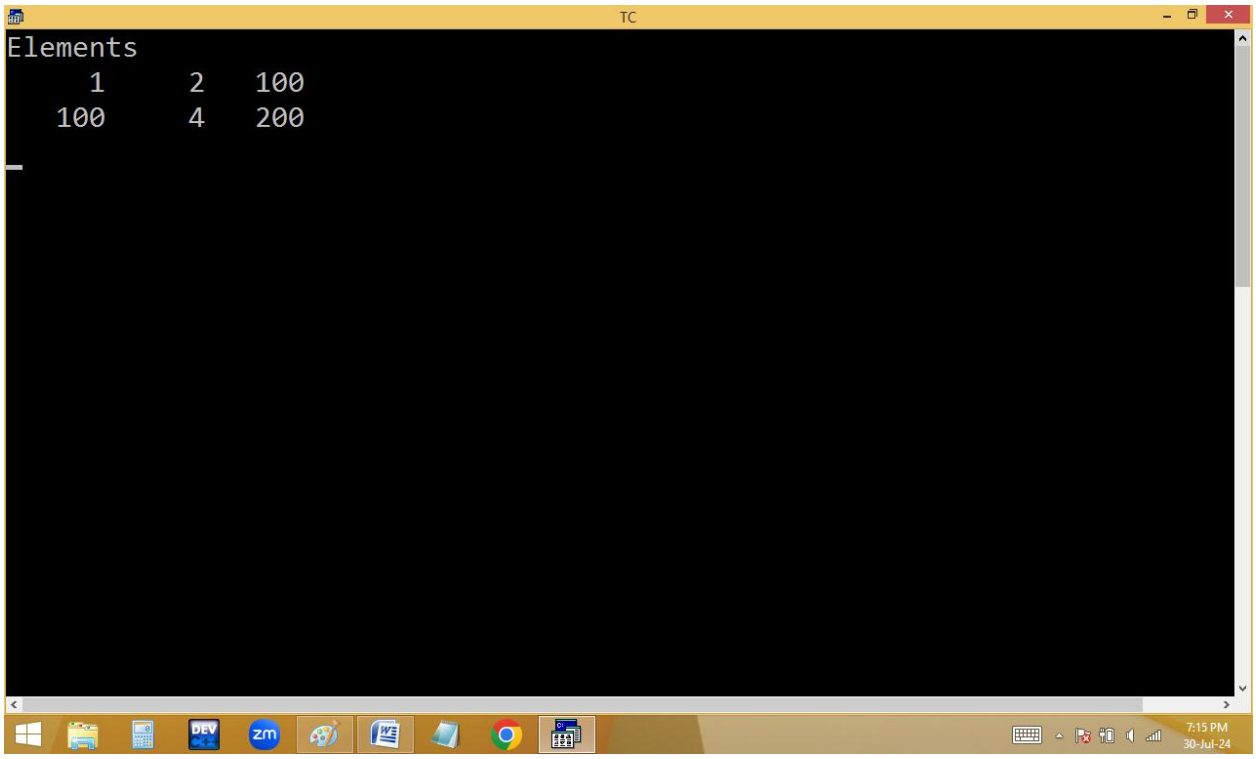

TC
Line 18 Col 22 Insert Indent Tab Fill Unindent * E:6PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[2][3]={9}, r,c;
clrscr();
a[0][0]=1; a[1][2]=6;
puts("Elements ");
for(r=0;r<2;r++)
{
for(c=0;c<3;c++)
{
printf("%4d",a[r][c]);
}
printf("\n");
}
getch();
}

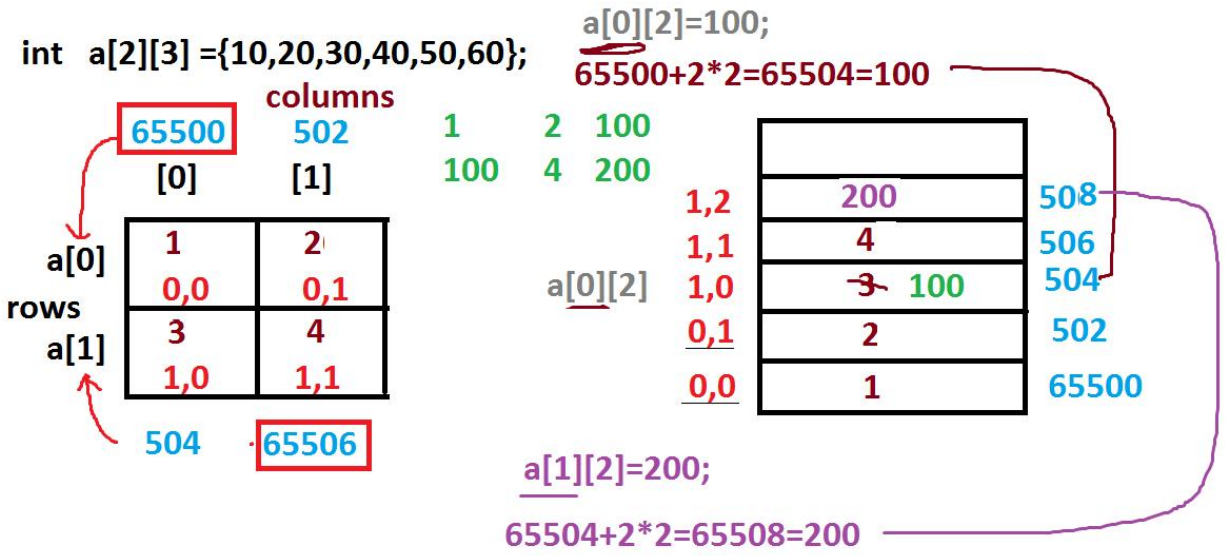

TC
Elements
1 0 0
0 0 6
Page: 25 of 25
Words: 175
120%


TC
Line 13 Col 11 Insert Indent Tab Fill Unindent * E:6PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[2][3], r,c;
clrscr();
a[0][0]=1; a[1][2]=6;
puts("Elements ");
for(r=0;r<2;r++)
{
for(c=0;c<3;c++)
{
printf("%6d",a[r][c]);
}
printf("\n");
}
getch();
}


TC
1 7083 1824
-20 5201 6


TC
Line 18 Col 25 Insert Indent Tab Fill Unindent * E:6PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[2][2]={1,2,3,4}, r,c;
clrscr();
a[0][2]=100; a[1][2]=200;
puts("Elements ");
for(r=0;r<2;r++)
{
for(c=0;c<3;c++)
{
printf("%6d",a[r][c]);
}
printf("\n");
}
getch();
}

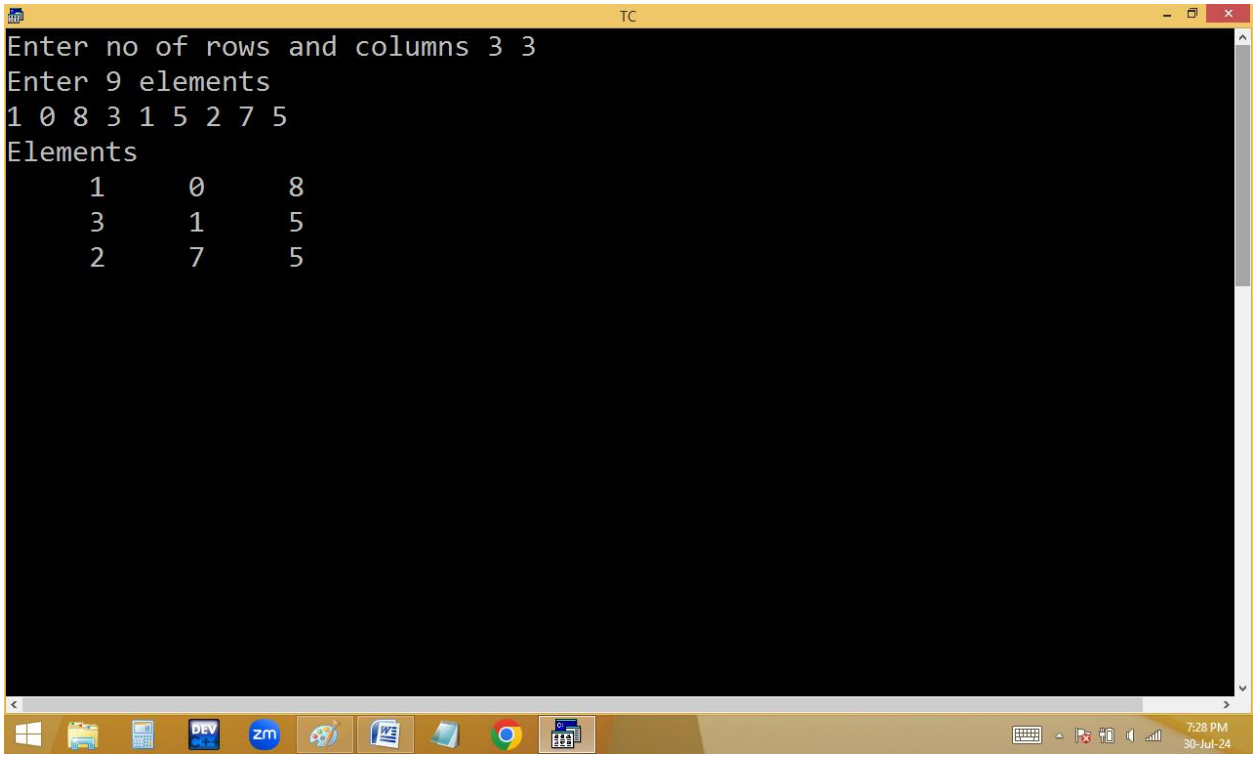

TC
Elements
1 2 100
100 4 200

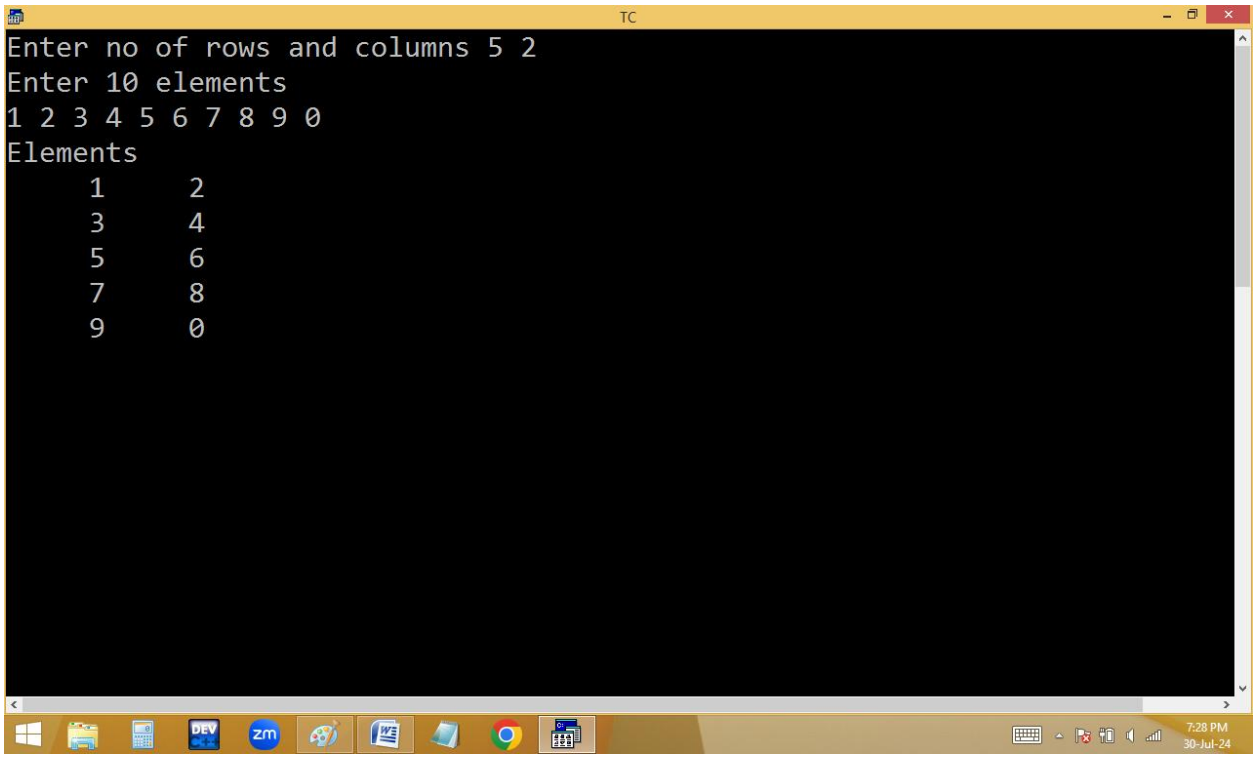


Reading and printing elements of n*n matrix:

TC

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a[10][10],nr,nc, r,c; clrscr();
printf("Enter no of rows and columns ");scanf("%d %d",&nr, &nc);
printf("Enter %d elements\n", nr*nc);
for(r=0;r<nr;r++) for(c=0;c<nc;c++)scanf("%d",&a[r][c]);
puts("Elements ");
for(r=0;r<nr;r++)
{
for(c=0;c<nc;c++)
{
printf("%6d",a[r][c]);
}
printf("\n");
}
getch();
}
```


TC
Enter no of rows and columns 3 3
Enter 9 elements
1 0 8 3 1 5 2 7 5
Elements
1 0 8
3 1 5
2 7 5


TC
Enter no of rows and columns 5 2
Enter 10 elements
1 2 3 4 5 6 7 8 9 0
Elements
1 2
3 4
5 6
7 8
9 0