

ARRAYS

It is collection of homogeneous [same type] variables.

Array is nothing but collection of contiguous memory locations, where we can store and manage more than one value of same type under one name.

It is a derived data type.

It is an implicit / internal pointer.

It is a implicit const pointer

It is one of data structure.

Advantages:

Generally to store several values of same type, we have to declare several variables. Here we have to remember all these variable names also. When the program is too big, it is very difficult to remember all the variable names. In this situation, the only solution is array.

Array reduce program length.

Array minimize the errors.

In functions to carry several values of same type at a time, we are using arrays.

It allows to arrange our data in a order.

Disadvantage:

Array size is Constant Positive Integer value. Due to this we are not able to change the array size at run time. Sometimes it causes memory wastage / shortage.

In C language we are using

1. One dimensional arrays
2. Multi dimensional arrays

One dimensional arrays:

- An array with one row and several columns.
- An array with single subscripting operator **[]** is called one dimensional array.
- It is an implicit single pointer.

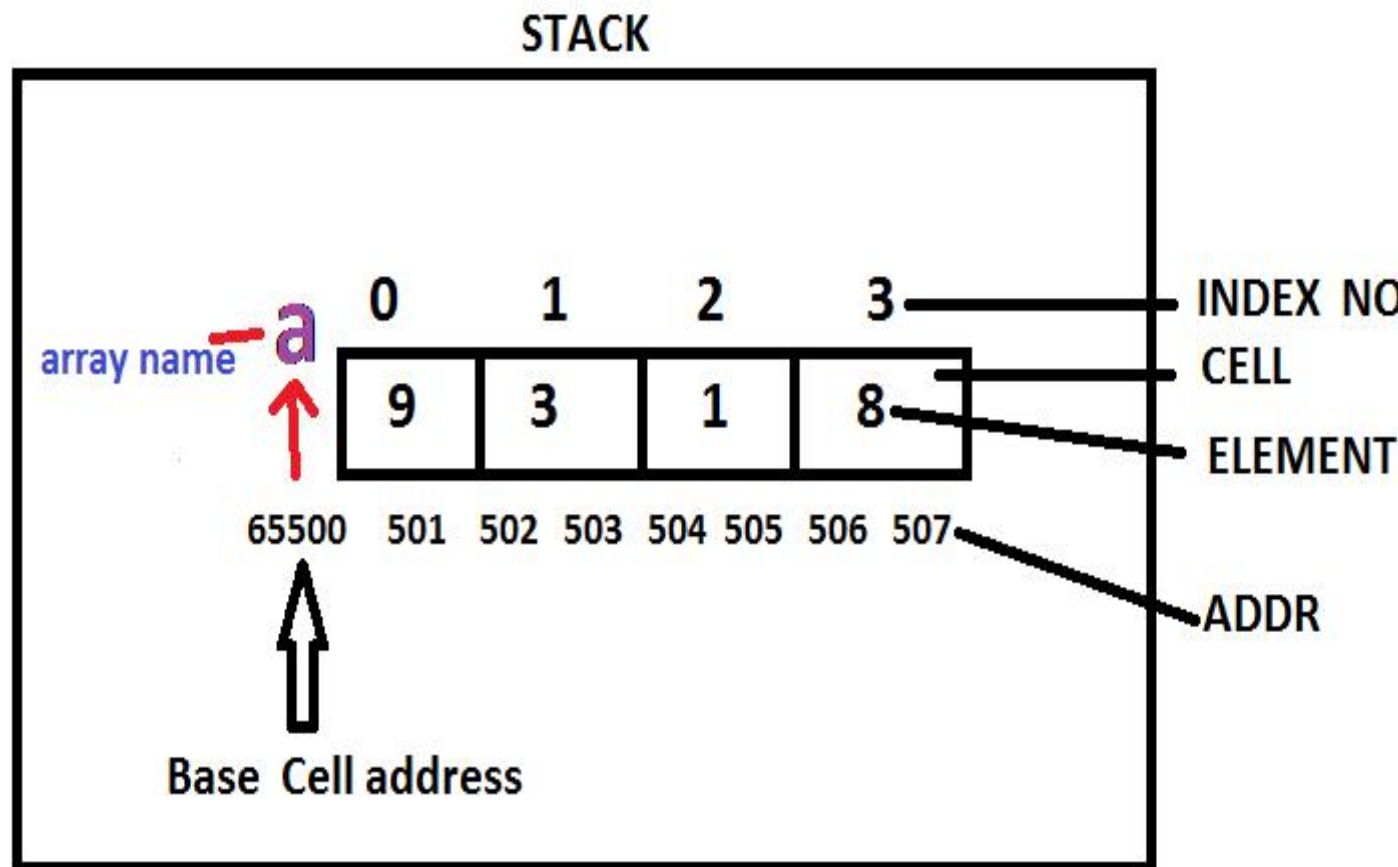
Syntax:

datatype variable[size] = {elements};

Eg:

```
int a[4] = { 9, 3, 1, 8 };
```

Memory allocation for array:



Array is implicit pointer because of array variable stores base cell [0 cell 1st byte] address. Hence array variable value and 0 cell address both are same.

Array declaration methods:

`int a[3];` Ok

`int a[];` No

`int a[3]={1,2,3};` Ok

`int a[]={1,2,3};` Ok

int a[0]={1,2,3}; Ok

int a[-5]; No

int a[5.5]; No

int n = 5, a[n]; No

int a[3]={10,20}; Ok

int a[3]={1, 2, 3, 4}; No

int a[0]; error

#define n 5 /* macro */

int a[n]; Ok

const int n=5, a[n]; No

int a[5>3]; → int a[1]; Ok

int a[3<2]; → int a[0]; No

int a[2+3]; → int a[5]; Ok

int a[5%3]; → int a[2]; Ok

int a[5%5]; → int a[0]; No

int a[1,2,3]; → error

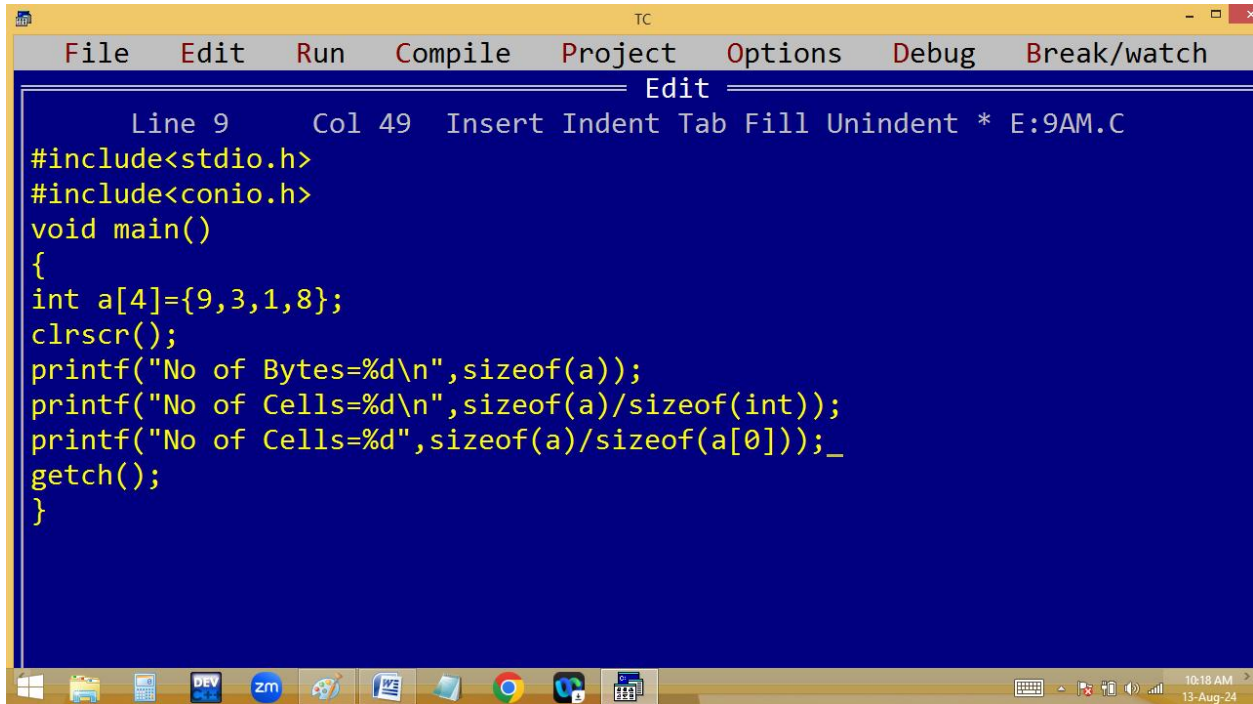
int a[40000]; → 40000 * 2 = 80000 bytes → No

Note: Stack size is 65536 bytes(64kb) Only.

float a[10000]; Ok → 10000 * 4 = 40000 bytes

float a[20000]; No → 20000 * 4 = 80000 bytes

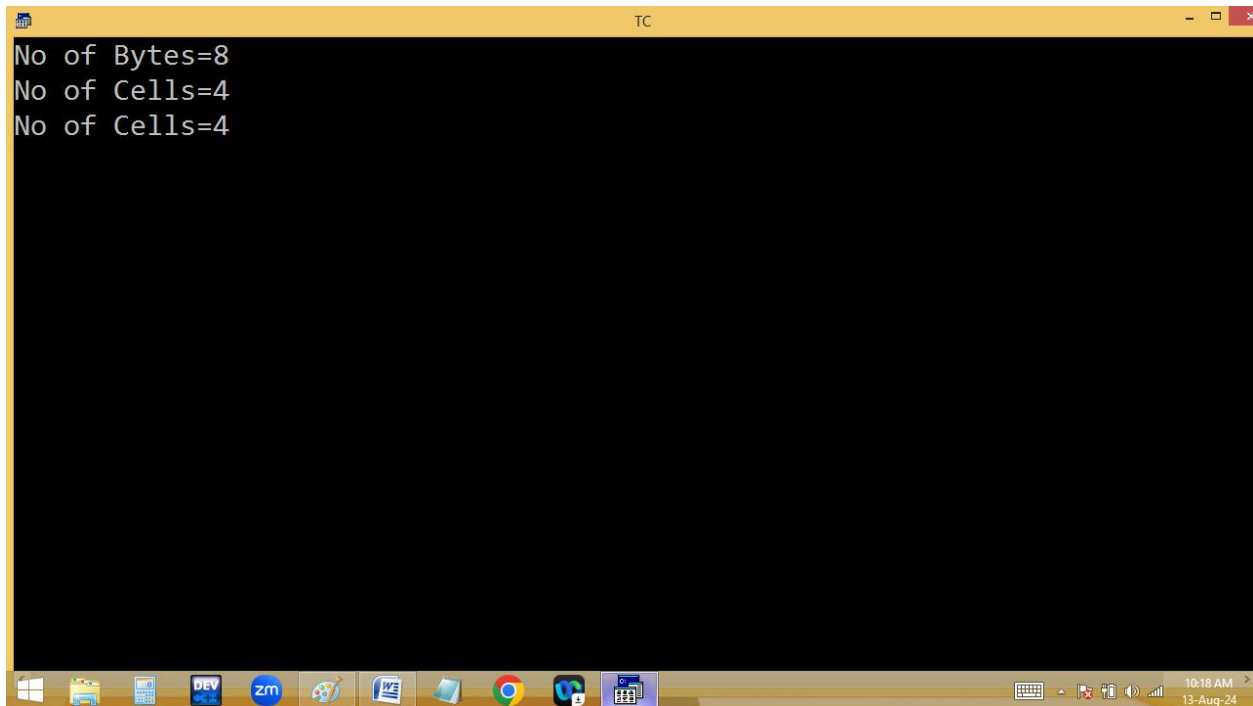
Finding array size:



The screenshot shows the Turbo C++ (TC) IDE with a menu bar (File, Edit, Run, Compile, Project, Options, Debug, Break/watch) and a toolbar. The main editing area has a blue background and contains the following C code:

```
Line 9      Col 49  Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={9,3,1,8};
clrscr();
printf("No of Bytes=%d\n",sizeof(a));
printf("No of Cells=%d\n",sizeof(a)/sizeof(int));
printf("No of Cells=%d",sizeof(a)/sizeof(a[0]));_
getch();
}
```

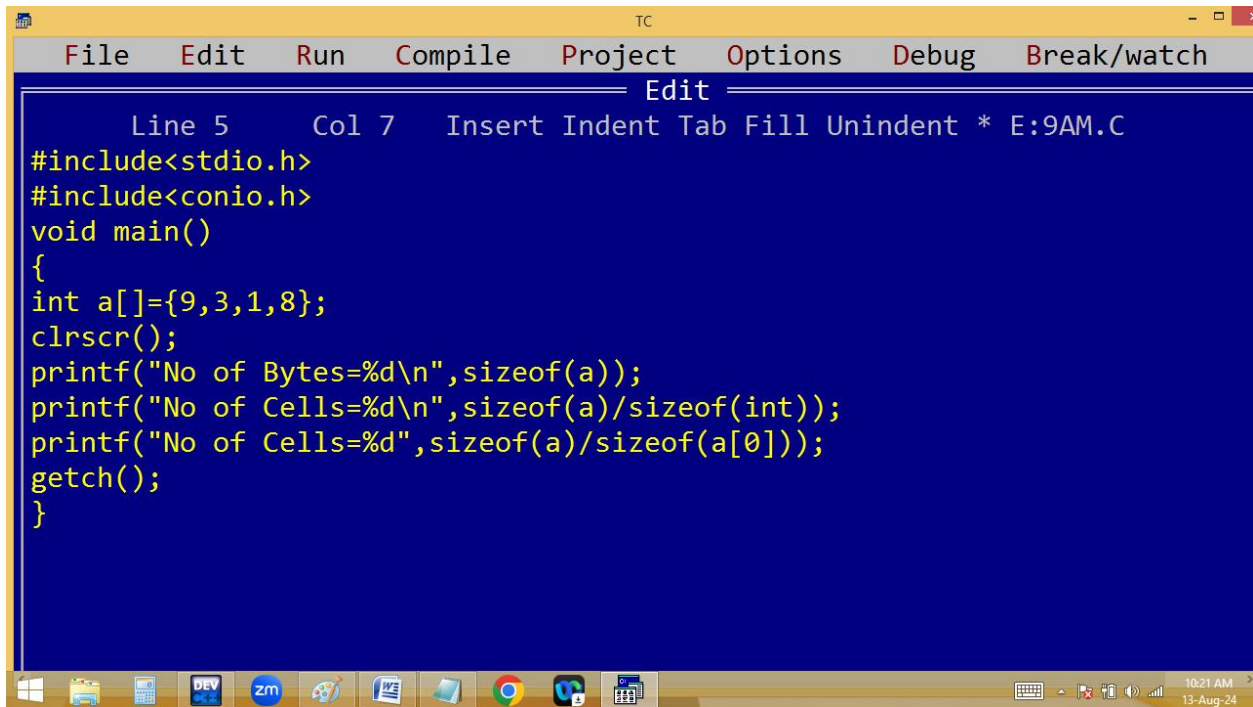
The Windows taskbar at the bottom shows various application icons and the system clock indicating 10:18 AM on 13-Aug-24.



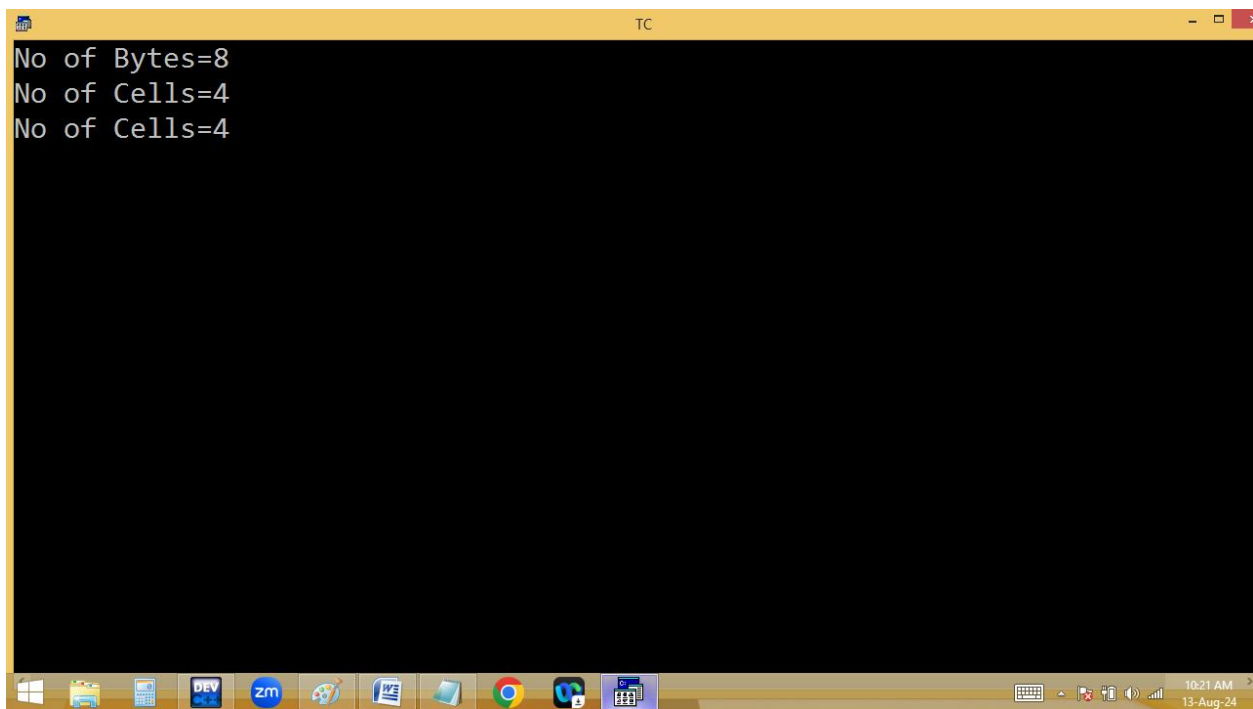
The screenshot shows the Turbo C++ (TC) IDE after the program has been executed. The output is displayed in the main editing area:

```
No of Bytes=8
No of Cells=4
No of Cells=4
```

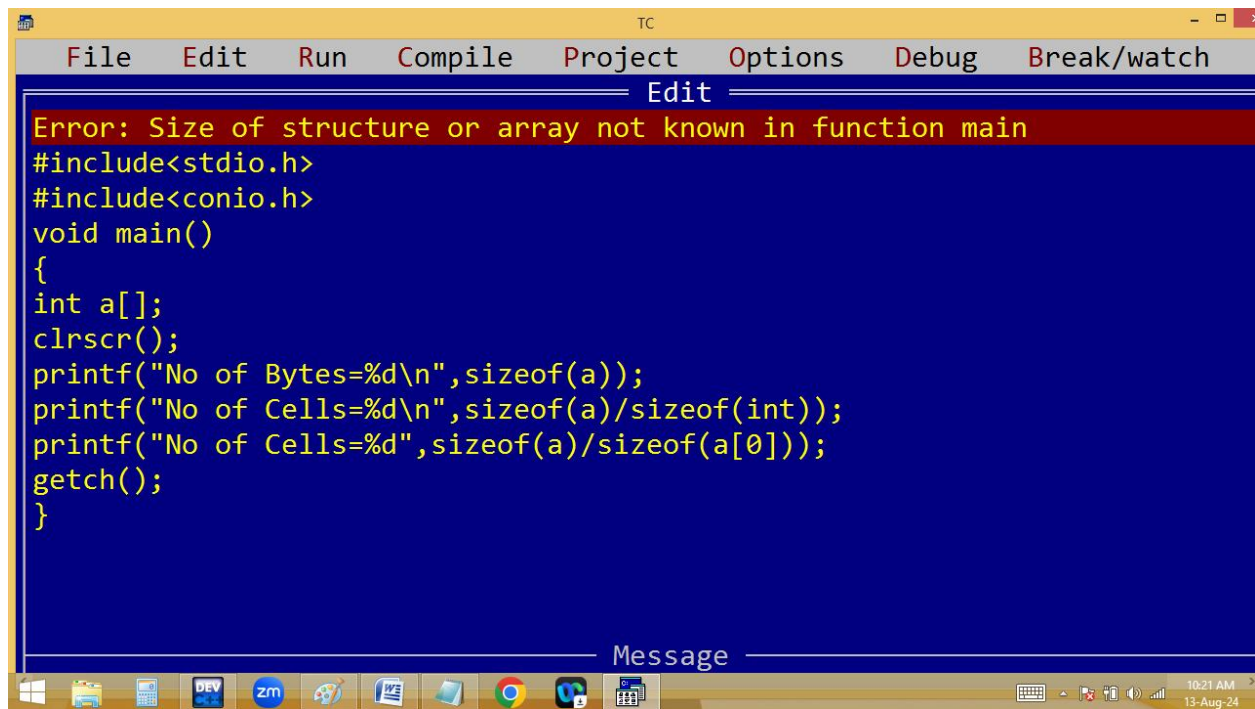
The Windows taskbar at the bottom remains the same, showing the system clock at 10:18 AM on 13-Aug-24.



```
TC
File Edit Run Compile Project Options Debug Break/watch
Edit
Line 5 Col 7 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[]={9,3,1,8};
clrscr();
printf("No of Bytes=%d\n",sizeof(a));
printf("No of Cells=%d\n",sizeof(a)/sizeof(int));
printf("No of Cells=%d",sizeof(a)/sizeof(a[0]));
getch();
}
```



```
TC
No of Bytes=8
No of Cells=4
No of Cells=4
10:21 AM
13-Aug-24
```

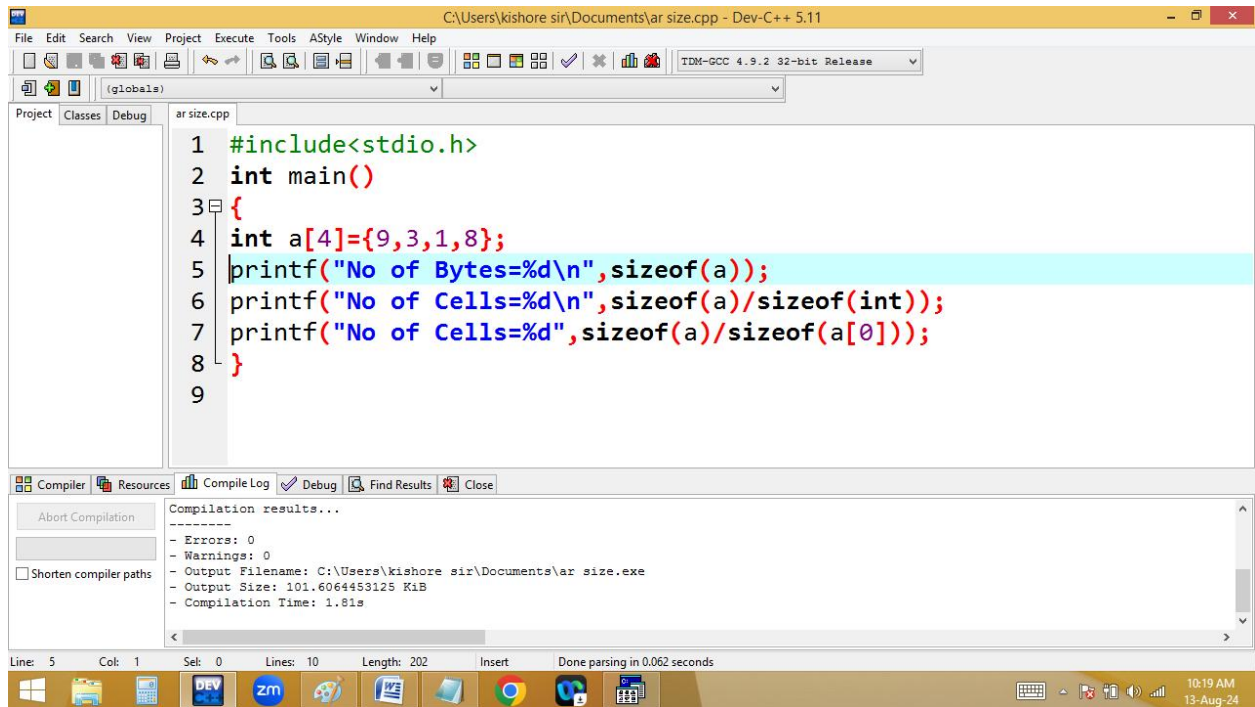


The screenshot shows the Turbo C++ (TC) IDE interface. The menu bar at the top includes File, Edit, Run, Compile, Project, Options, Debug, and Break/watch. The main editing area has a blue background and displays a C program with a compilation error. The error message, "Error: Size of structure or array not known in function main", is shown in a red banner at the top of the editor. The code in the editor is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a[];
clrscr();
printf("No of Bytes=%d\n",sizeof(a));
printf("No of Cells=%d\n",sizeof(a)/sizeof(int));
printf("No of Cells=%d",sizeof(a)/sizeof(a[0]));
getch();
}
```

At the bottom of the IDE, there is a "Message" window which is currently empty. The Windows taskbar is visible at the very bottom, showing various application icons and the system clock indicating 10:21 AM on 13-Aug-24.

In online / devc++ / vscode etc:

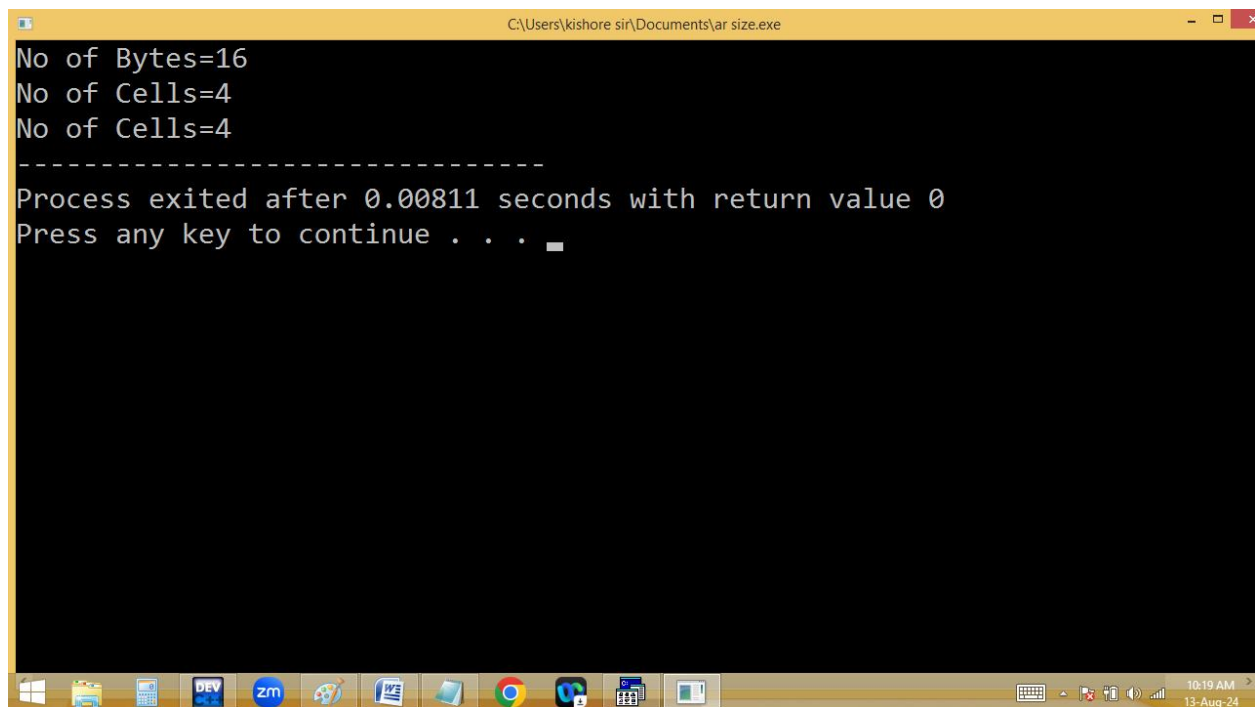


```
1 #include<stdio.h>
2 int main()
3 {
4     int a[4]={9,3,1,8};
5     printf("No of Bytes=%d\n",sizeof(a));
6     printf("No of Cells=%d\n",sizeof(a)/sizeof(int));
7     printf("No of Cells=%d",sizeof(a)/sizeof(a[0]));
8 }
9
```

Compilation results...

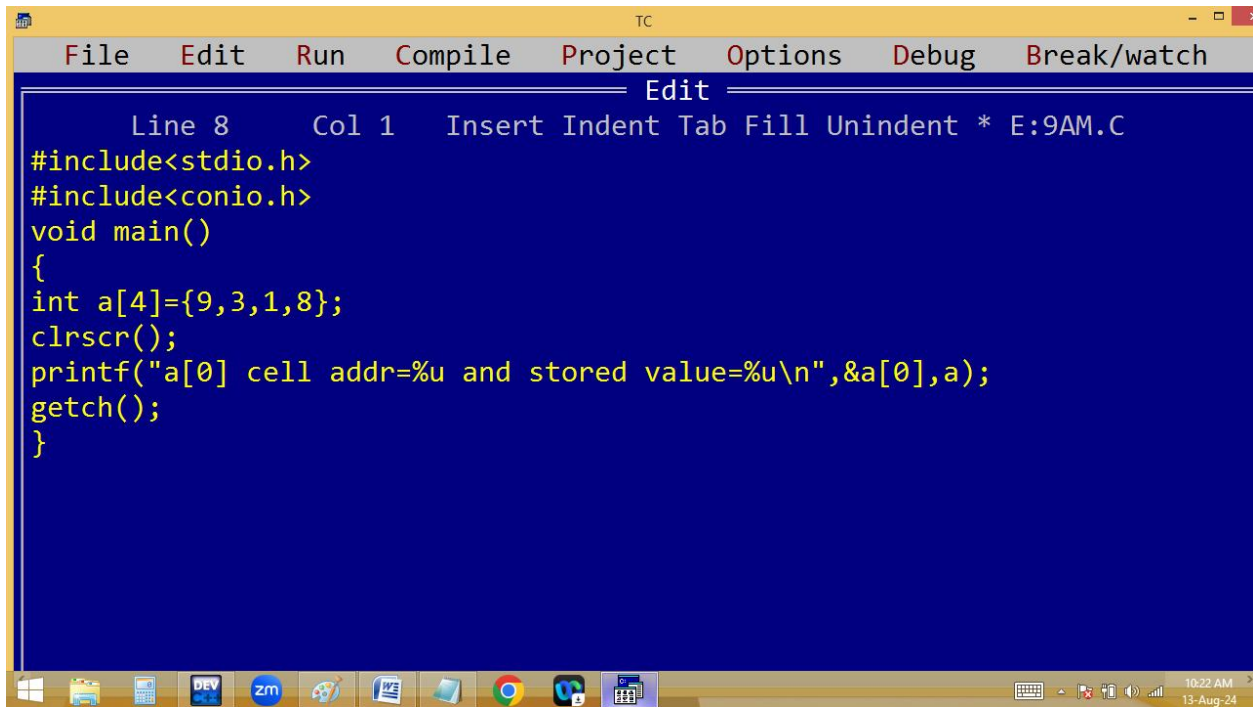
- Errors: 0
- Warnings: 0
- Output Filename: C:\Users\kishore sir\Documents\ar size.exe
- Output Size: 101.6064453125 KiB
- Compilation Time: 1.81s

Line: 5 Col: 1 Sek: 0 Lines: 10 Length: 202 Insert Done parsing in 0.062 seconds



```
No of Bytes=16
No of Cells=4
No of Cells=4
-----
Process exited after 0.00811 seconds with return value 0
Press any key to continue . . .
```

Finding array address:



TC

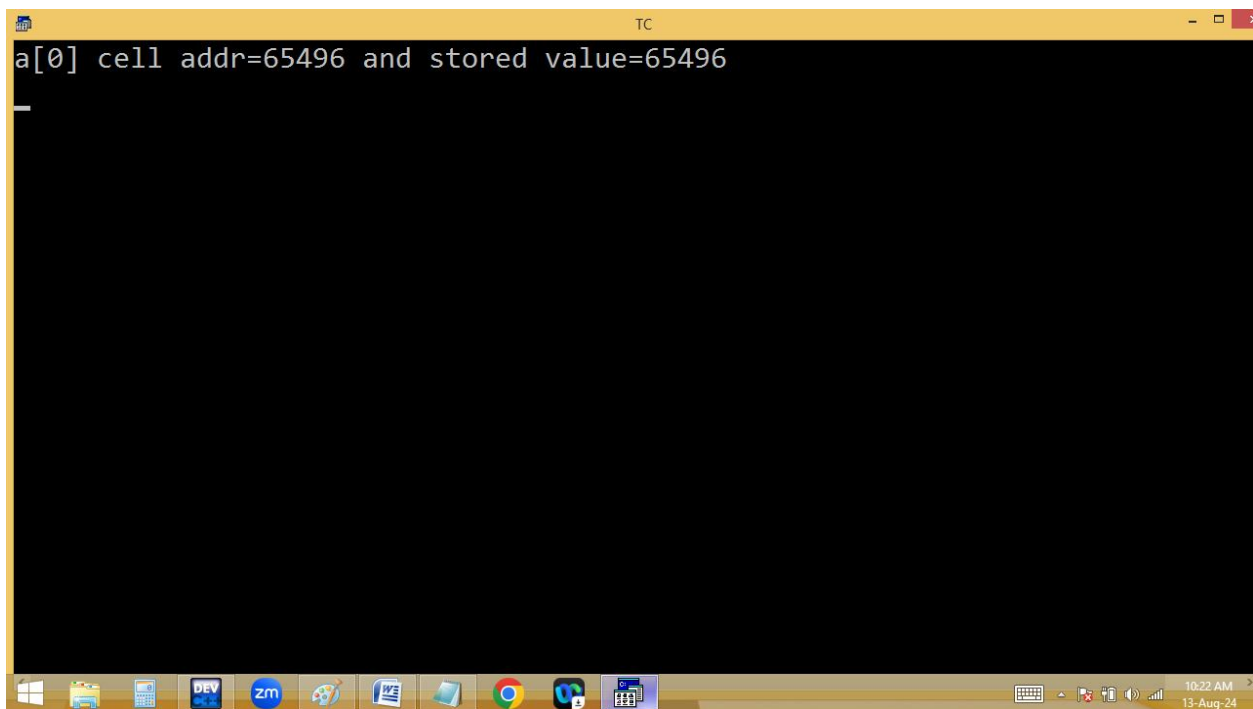
File Edit Run Compile Project Options Debug Break/watch

Edit

Line 8 Col 1 Insert Indent Tab Fill Unindent * E:9AM.C

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={9,3,1,8};
clrscr();
printf("a[0] cell addr=%u and stored value=%u\n",&a[0],a);
getch();
}
```

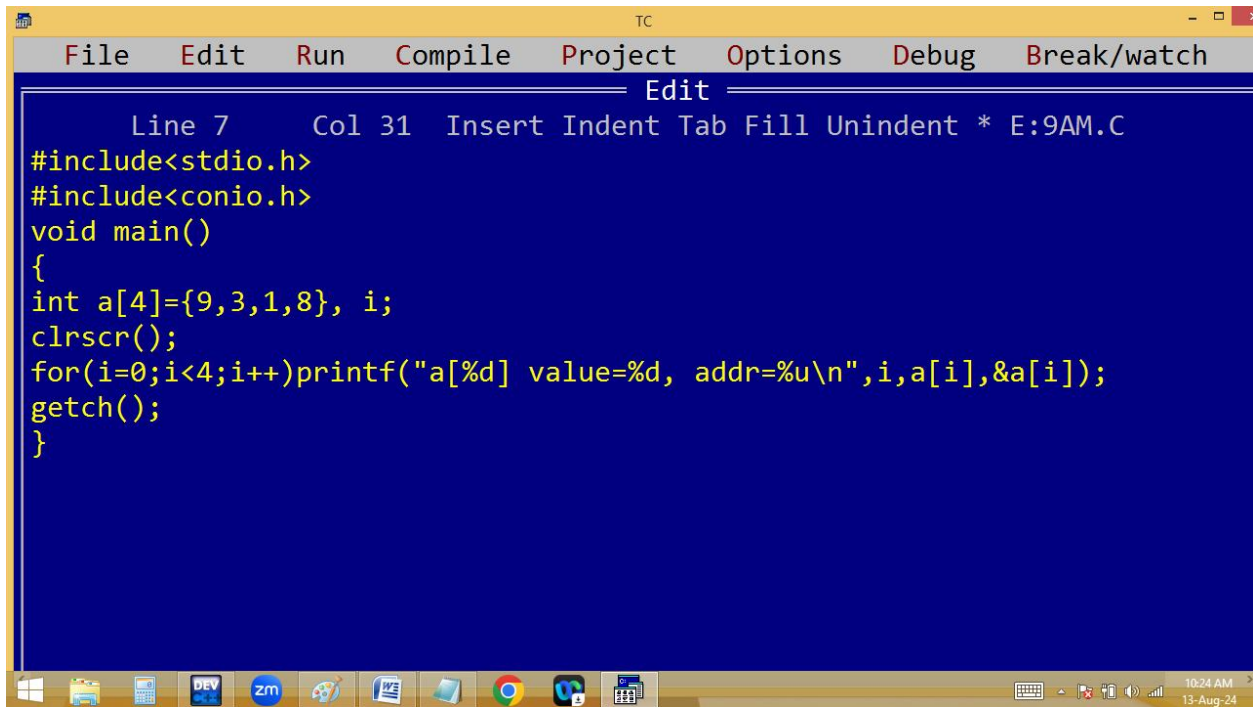
10:22 AM 13-Aug-24



TC

a[0] cell addr=65496 and stored value=65496

10:22 AM 13-Aug-24



TC

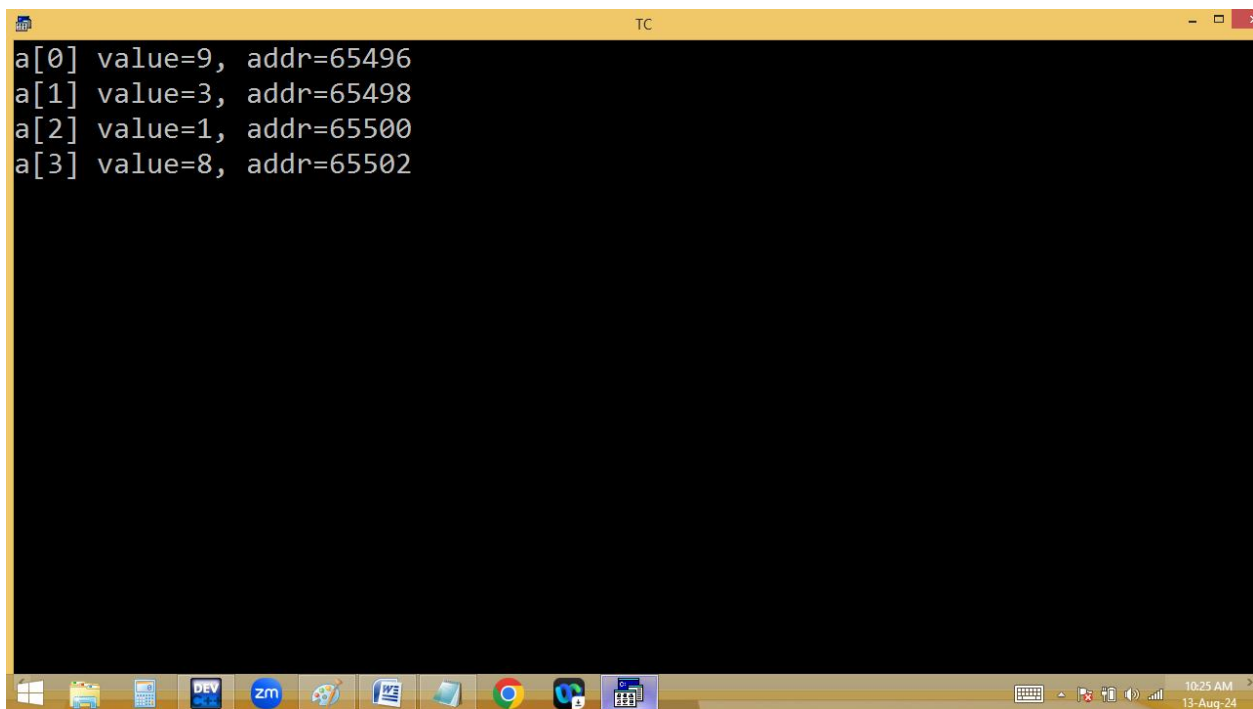
File Edit Run Compile Project Options Debug Break/watch

Edit

Line 7 Col 31 Insert Indent Tab Fill Unindent * E:9AM.C

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={9,3,1,8}, i;
clrscr();
for(i=0;i<4;i++)printf("a[%d] value=%d, addr=%u\n",i,a[i],&a[i]);
getch();
}
```

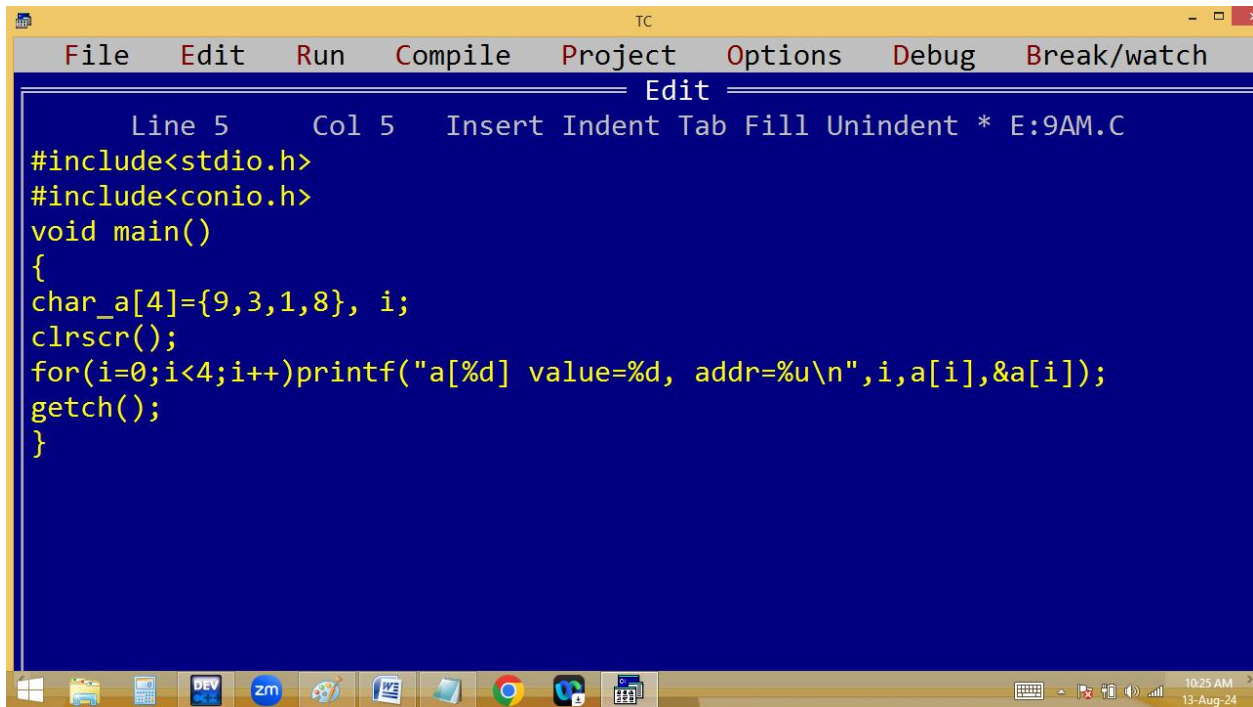
10:24 AM 13-Aug-24



TC

```
a[0] value=9, addr=65496
a[1] value=3, addr=65498
a[2] value=1, addr=65500
a[3] value=8, addr=65502
```

10:25 AM 13-Aug-24



TC

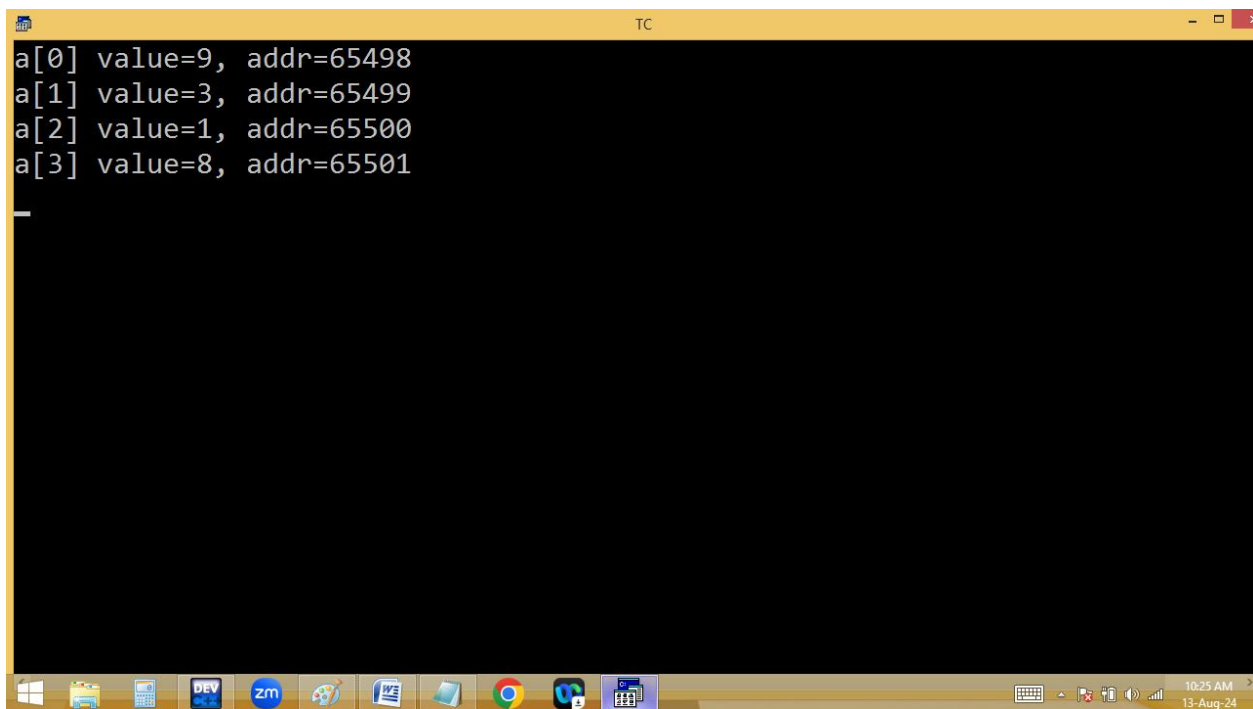
File Edit Run Compile Project Options Debug Break/watch

Edit

Line 5 Col 5 Insert Indent Tab Fill Unindent * E:9AM.C

```
#include<stdio.h>
#include<conio.h>
void main()
{
char_a[4]={9,3,1,8}, i;
clrscr();
for(i=0;i<4;i++)printf("a[%d] value=%d, addr=%u\n",i,a[i],&a[i]);
getch();
}
```

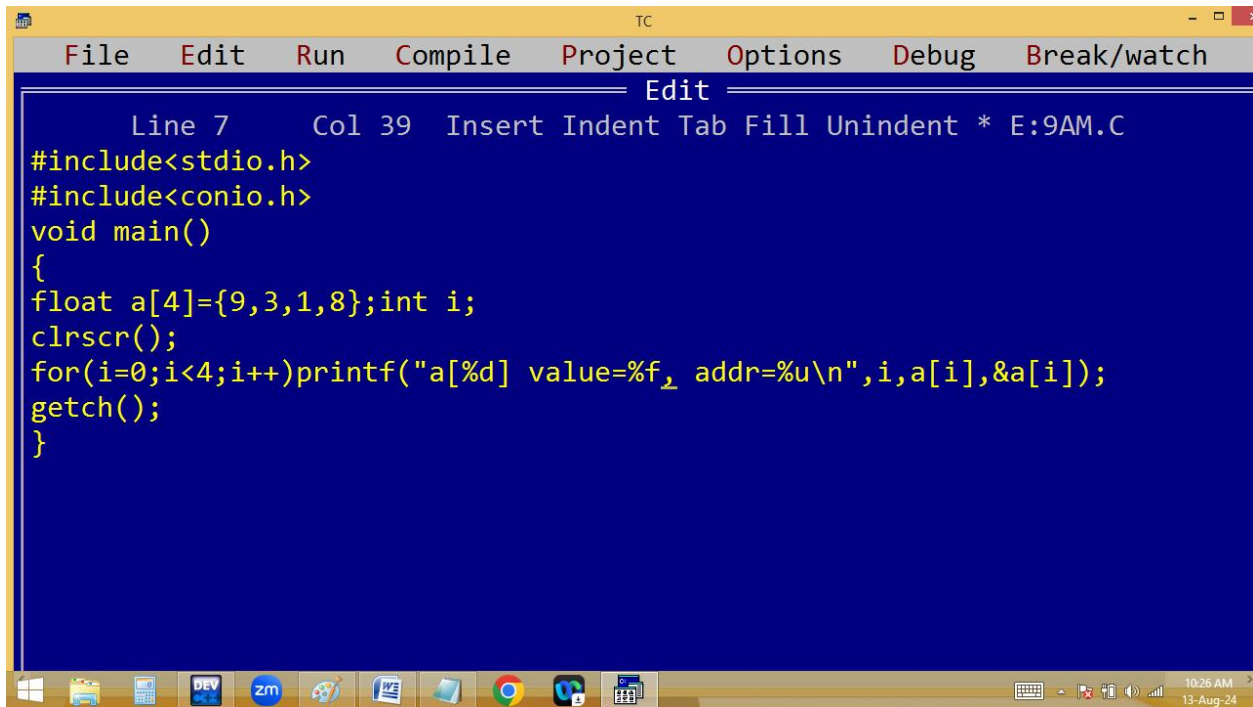
10:25 AM 13-Aug-24



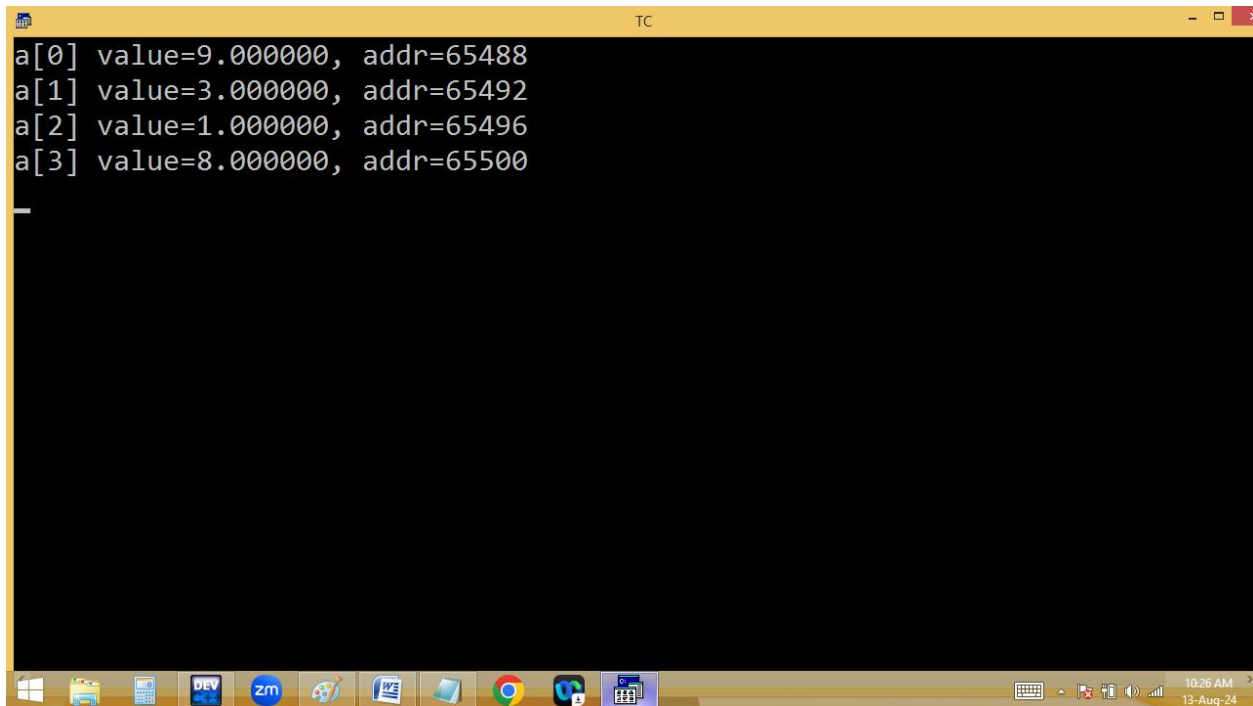
TC

```
a[0] value=9, addr=65498
a[1] value=3, addr=65499
a[2] value=1, addr=65500
a[3] value=8, addr=65501
```

10:25 AM 13-Aug-24

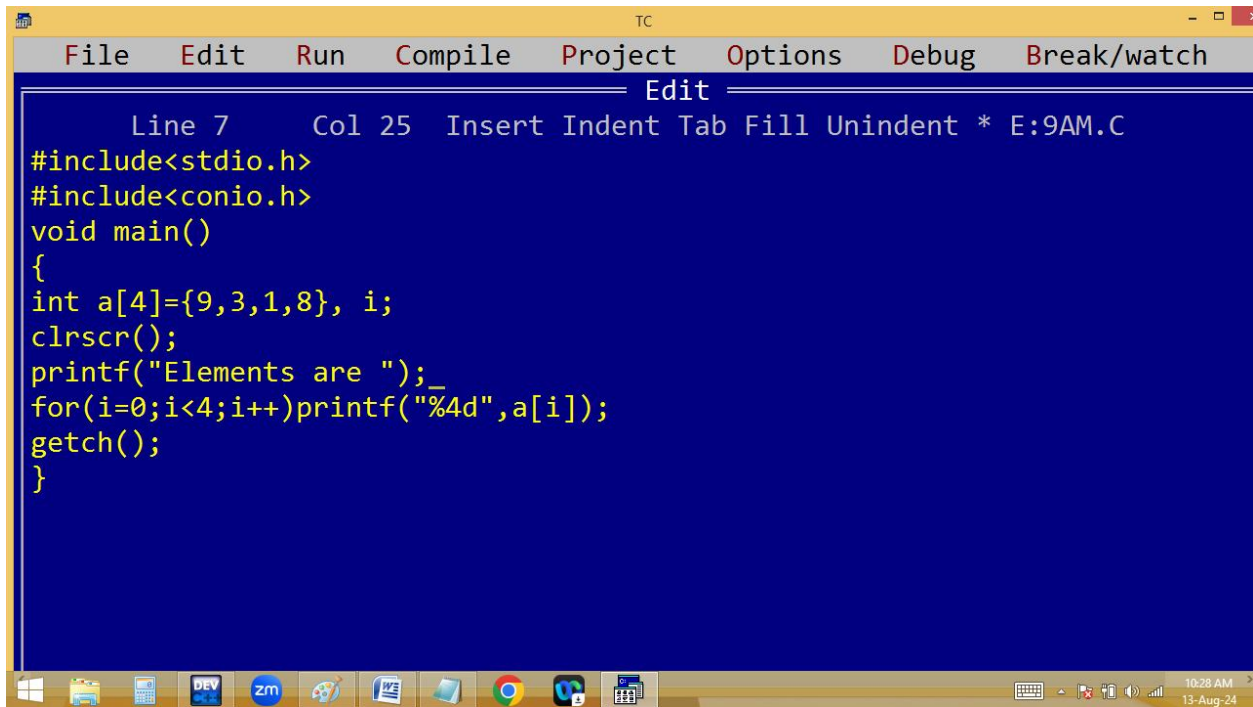


```
TC
File Edit Run Compile Project Options Debug Break/watch
Edit
Line 7 Col 39 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
float a[4]={9,3,1,8};int i;
clrscr();
for(i=0;i<4;i++)printf("a[%d] value=%f, addr=%u\n",i,a[i],&a[i]);
getch();
}
```

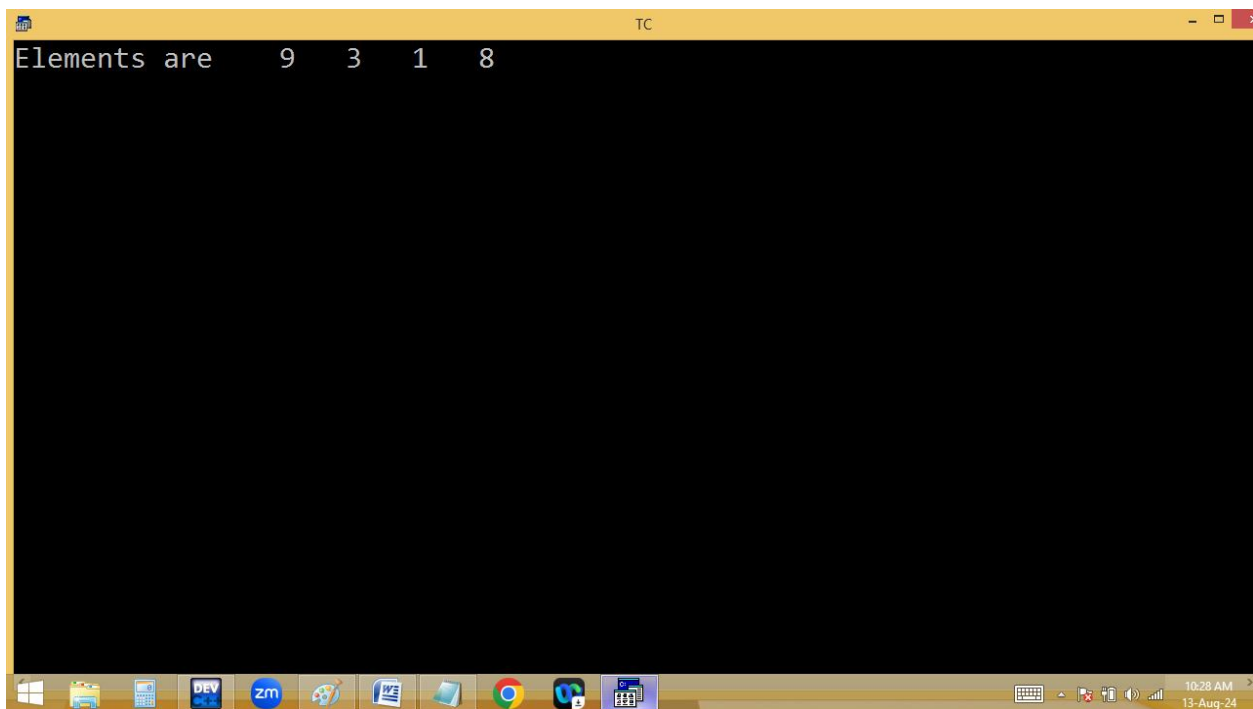


```
TC
a[0] value=9.000000, addr=65488
a[1] value=3.000000, addr=65492
a[2] value=1.000000, addr=65496
a[3] value=8.000000, addr=65500
_
```

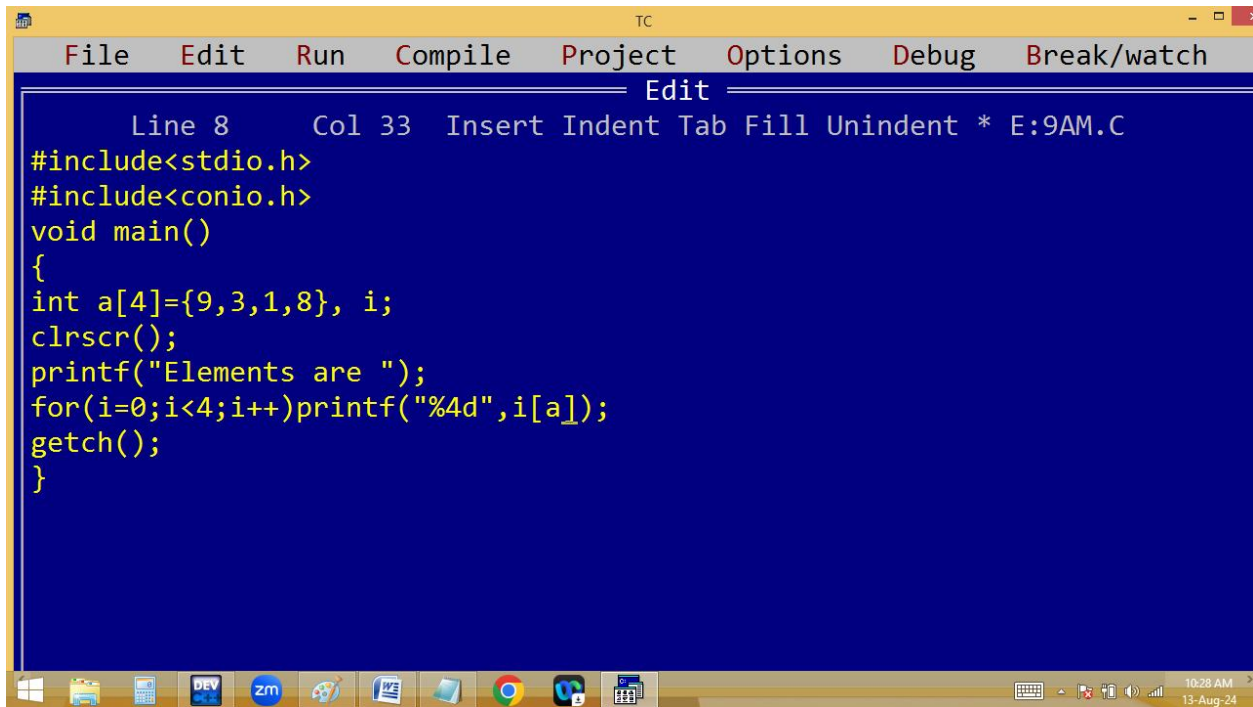
Direct initialization of array elements:



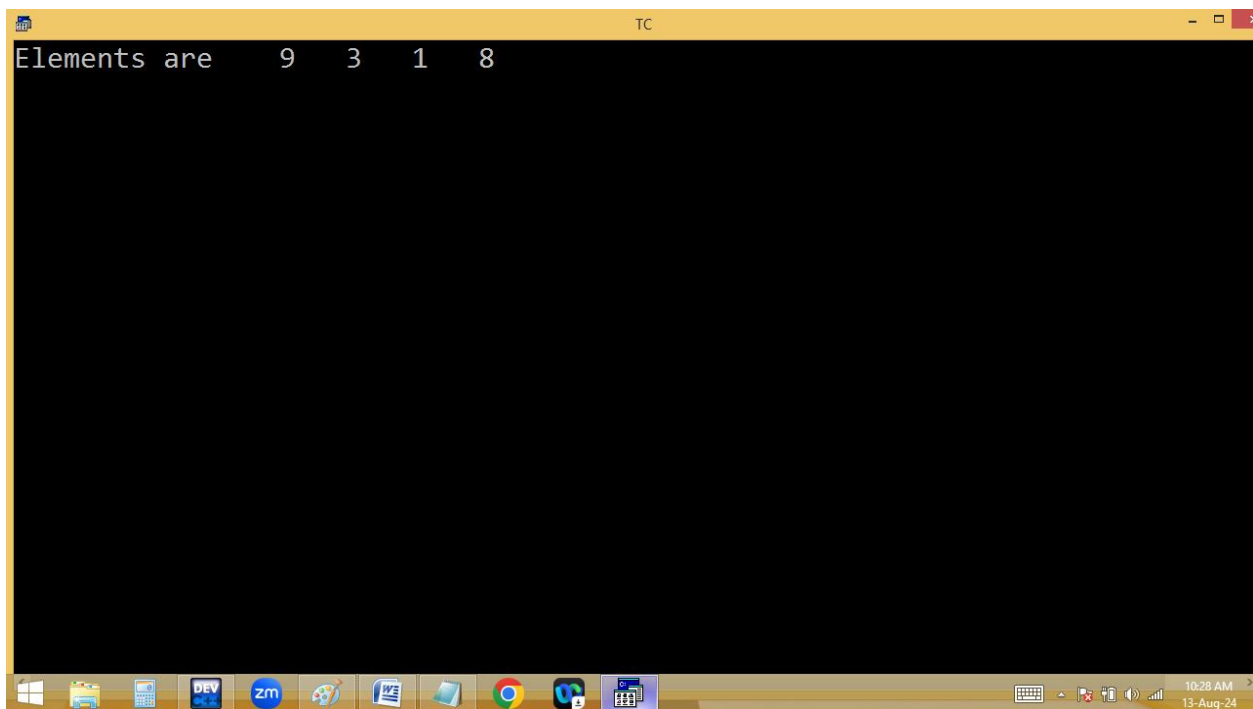
```
TC
File Edit Run Compile Project Options Debug Break/watch
Edit
Line 7 Col 25 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={9,3,1,8}, i;
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",a[i]);
getch();
}
```



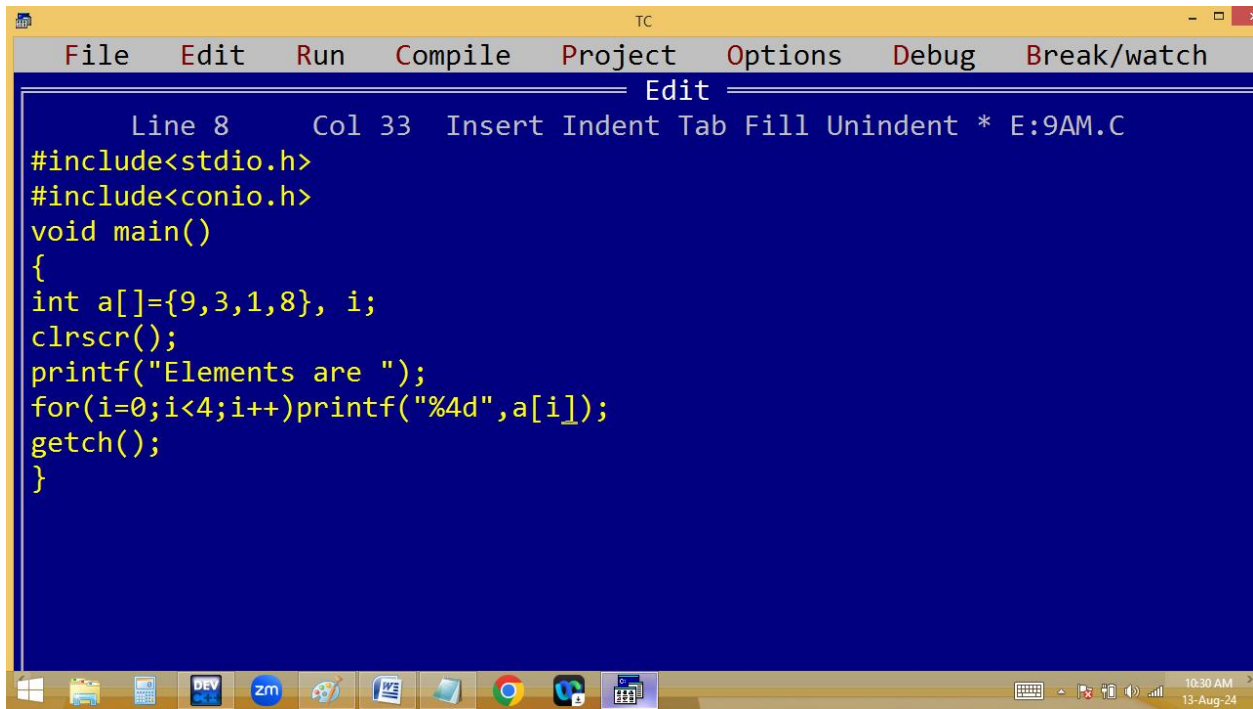
```
TC
Elements are 9 3 1 8
```



```
TC
File Edit Run Compile Project Options Debug Break/watch
Edit
Line 8 Col 33 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={9,3,1,8}, i;
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",i[a]);
getch();
}
```



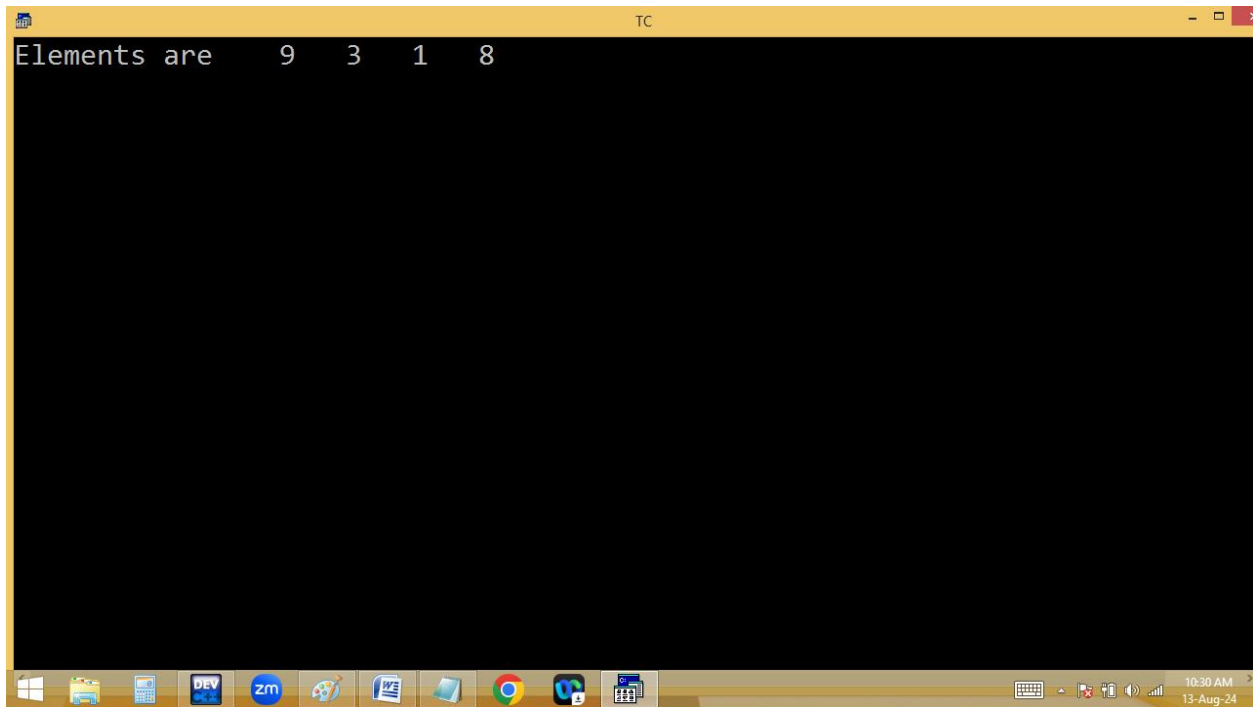
```
TC
Elements are    9    3    1    8
```



The screenshot shows the Turbo C++ (TC) IDE with a yellow title bar and a menu bar containing File, Edit, Run, Compile, Project, Options, Debug, and Break/watch. The 'Edit' menu is open, showing options: Line 8, Col 33, Insert, Indent, Tab, Fill, Unindent, and * E:9AM.C. The code in the editor is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a[]={9,3,1,8}, i;
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",a[i]);
getch();
}
```

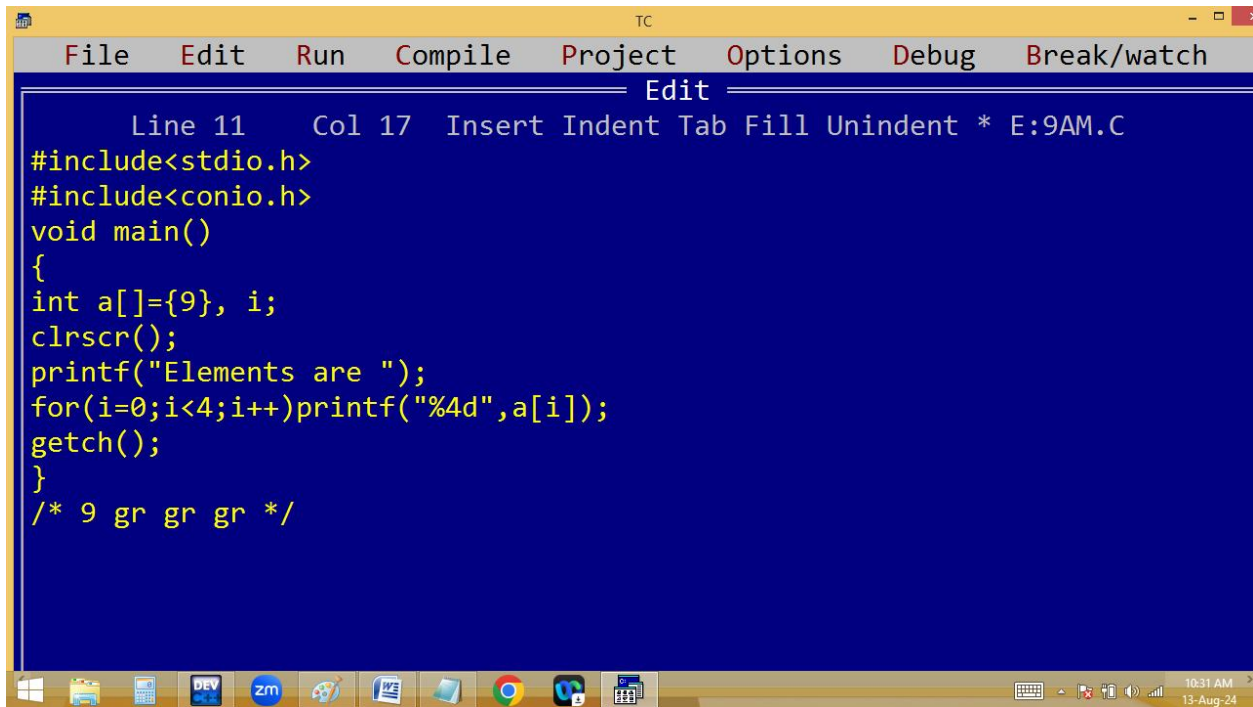
The Windows taskbar at the bottom shows icons for File Explorer, Calculator, DEV C++, Zoom, Paint, Word, and Chrome. The system clock indicates 10:30 AM on 13-Aug-24.



The screenshot shows the Turbo C++ (TC) IDE with a yellow title bar. The output window displays the result of the program execution:

```
Elements are    9    3    1    8
```

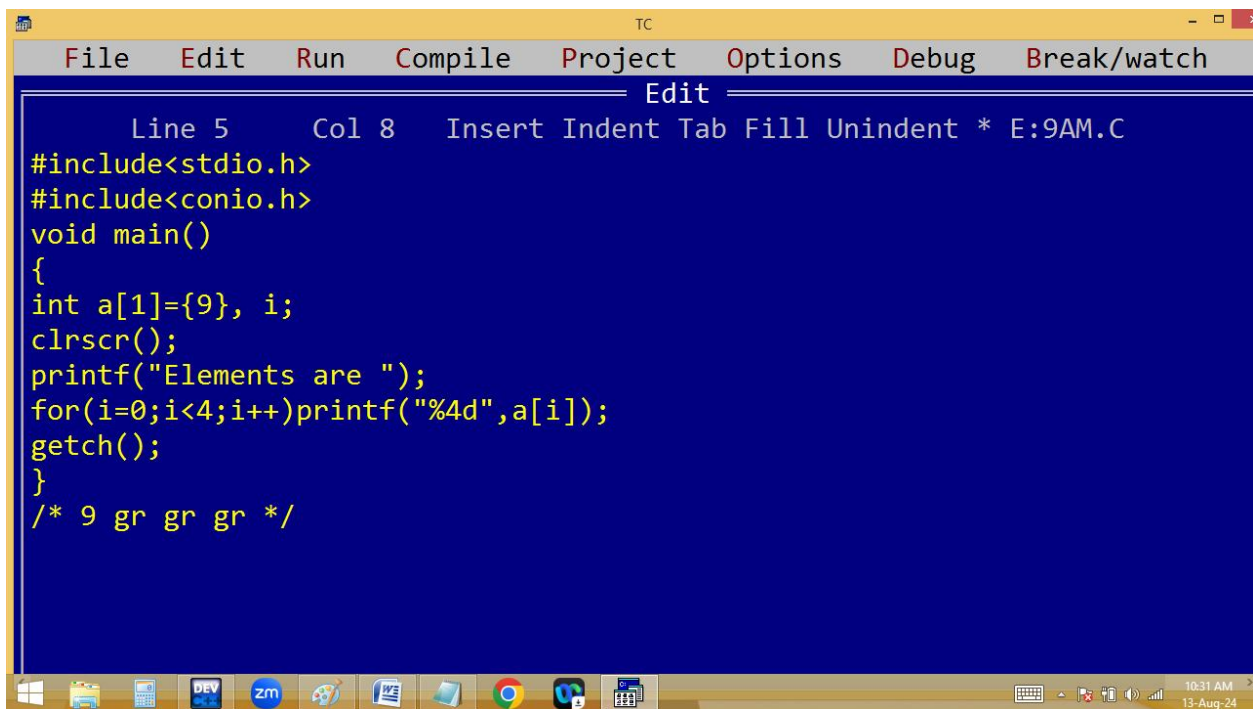
The Windows taskbar at the bottom is identical to the first screenshot, showing the same set of application icons and system clock.



The screenshot shows the Turbo C++ IDE with a menu bar (File, Edit, Run, Compile, Project, Options, Debug, Break/watch) and a toolbar. The main window displays a C program with the following code:

```
Line 11 Col 17 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[]={9}, i;
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",a[i]);
getch();
}
/* 9 gr gr gr */
```

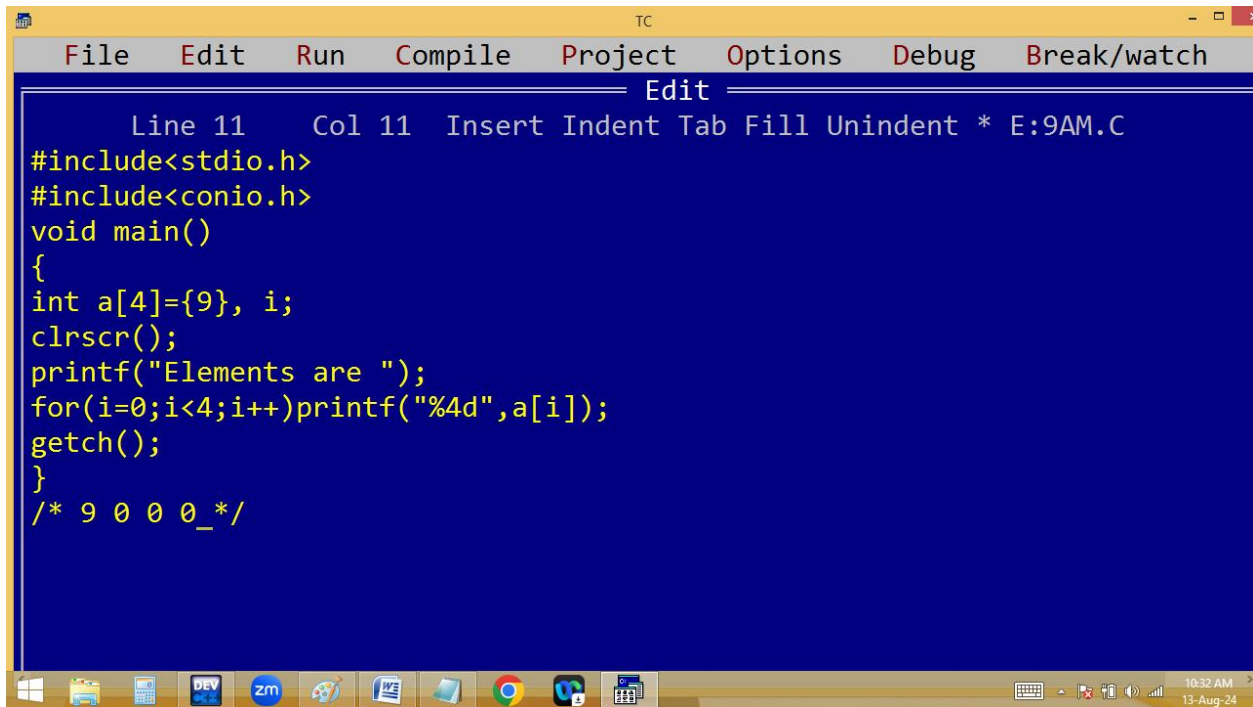
The status bar at the bottom shows the time as 10:31 AM on 13-Aug-24.



The screenshot shows the Turbo C++ IDE with a menu bar (File, Edit, Run, Compile, Project, Options, Debug, Break/watch) and a toolbar. The main window displays a C program with the following code:

```
Line 5 Col 8 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[1]={9}, i;
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",a[i]);
getch();
}
/* 9 gr gr gr */
```

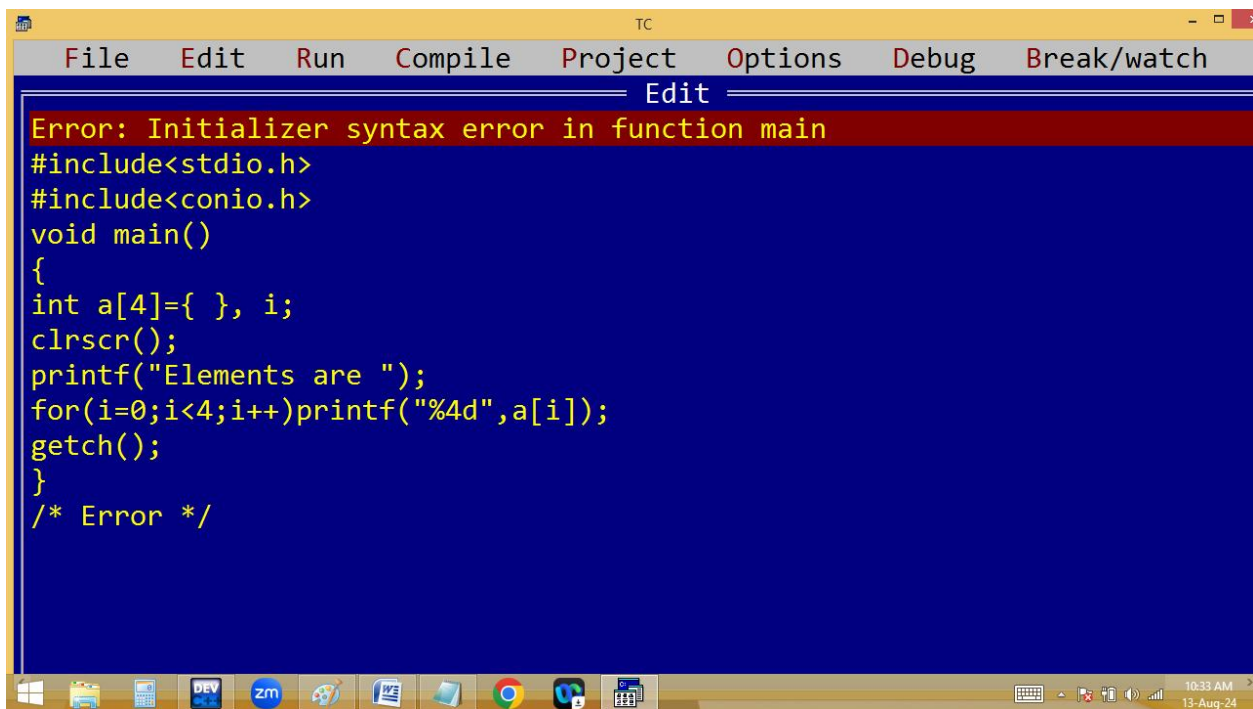
The status bar at the bottom shows the time as 10:31 AM on 13-Aug-24.



The screenshot shows the Turbo C++ IDE with a menu bar (File, Edit, Run, Compile, Project, Options, Debug, Break/watch) and a toolbar. The code editor displays a C program with the following code:

```
Line 11 Col 11 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={9}, i;
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",a[i]);
getch();
}
/* 9 0 0 0_*/
```

The taskbar at the bottom shows various application icons and the system clock indicating 10:32 AM on 13-Aug-24.



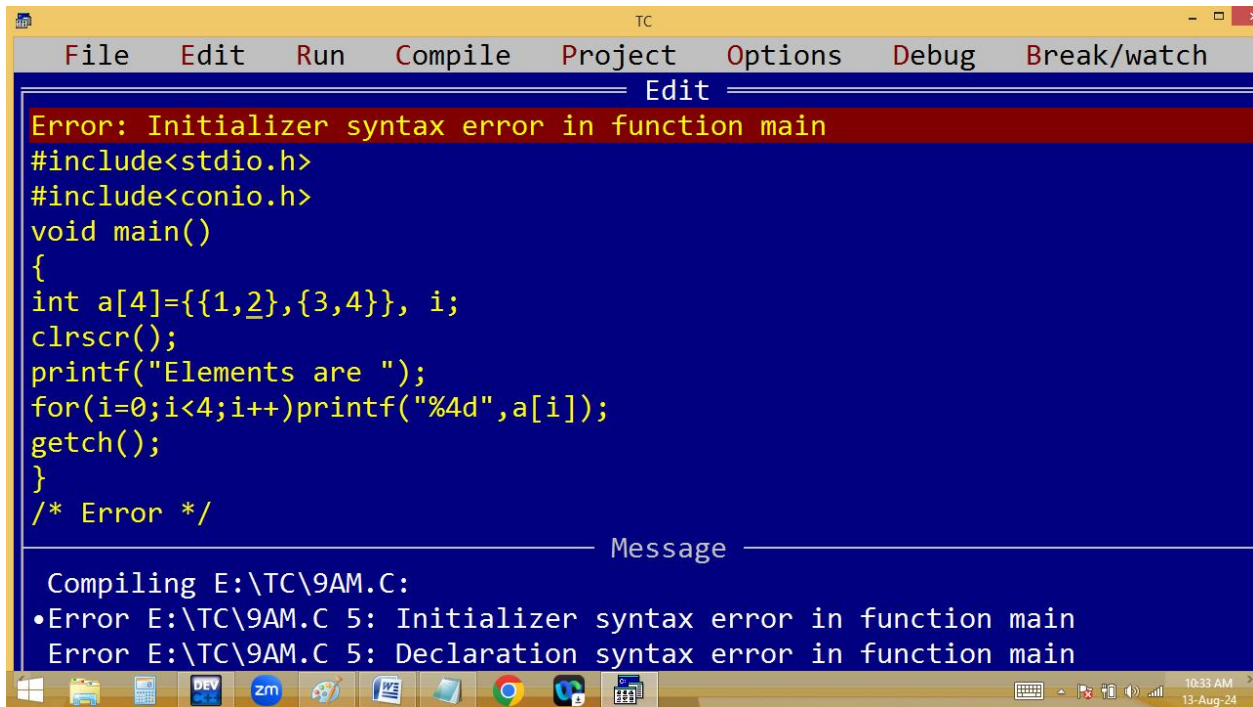
The screenshot shows the Turbo C++ IDE with the same code as the first image. A red error message is displayed at the top of the code editor:

```
Error: Initializer syntax error in function main
```

The code in the editor is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={ }, i;
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",a[i]);
getch();
}
/* Error */
```

The taskbar at the bottom shows various application icons and the system clock indicating 10:33 AM on 13-Aug-24.



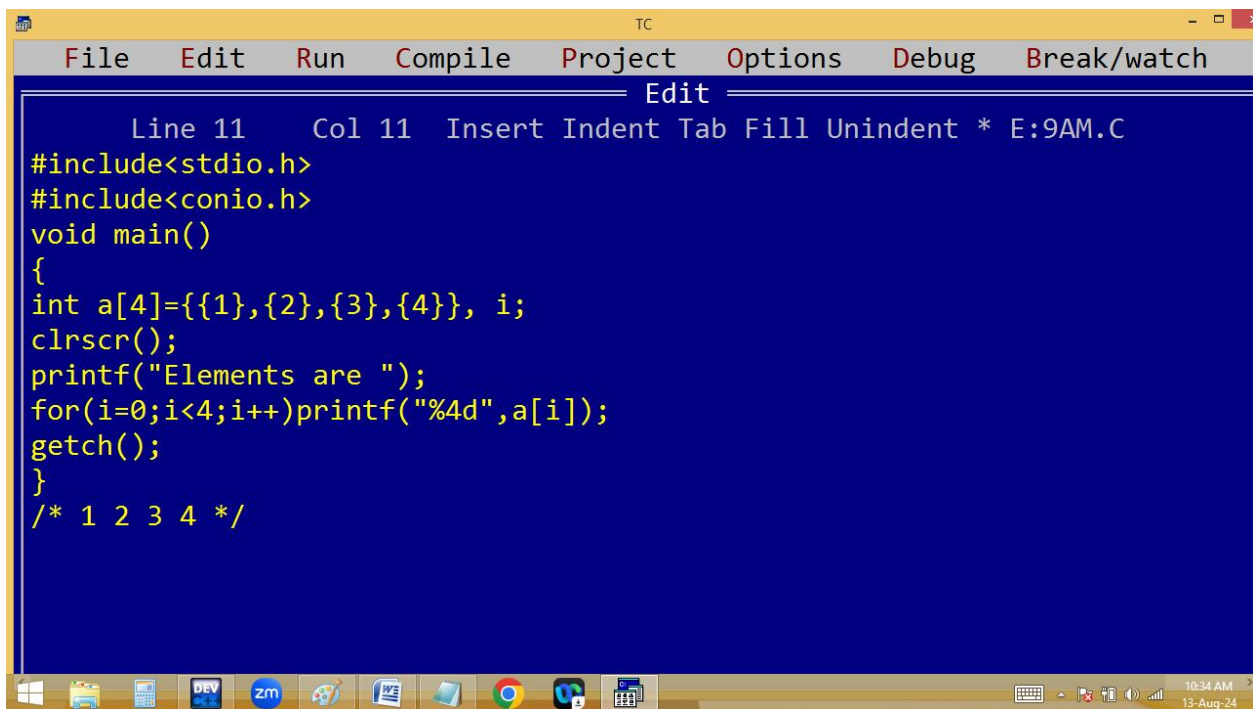
The screenshot shows the Turbo C++ IDE with a menu bar (File, Edit, Run, Compile, Project, Options, Debug, Break/watch) and a toolbar. The main window displays a C program with a syntax error. A red error message banner at the top reads "Error: Initializer syntax error in function main". The code in the editor is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={1,2},{3,4}}, i;
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",a[i]);
getch();
}
/* Error */
```

Below the code, a "Message" window shows the compilation output:

```
Compiling E:\TC\9AM.C:
•Error E:\TC\9AM.C 5: Initializer syntax error in function main
Error E:\TC\9AM.C 5: Declaration syntax error in function main
```

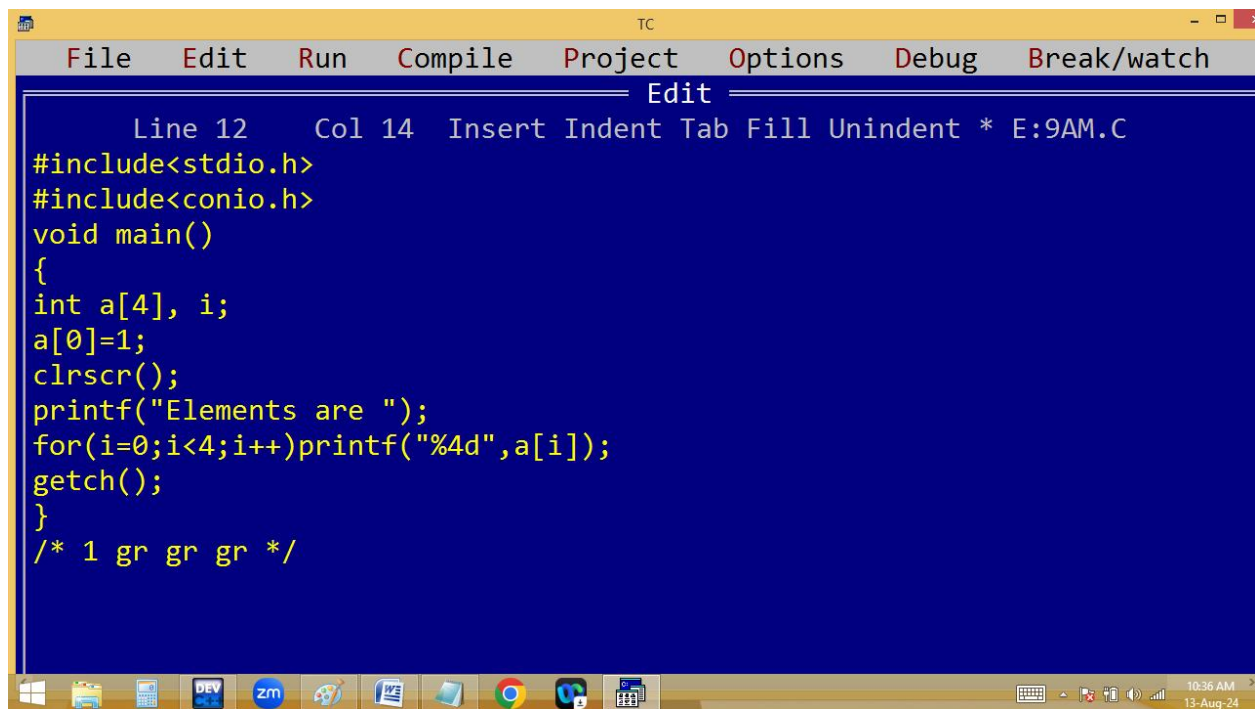
The Windows taskbar at the bottom shows the time as 10:33 AM on 13-Aug-24.



The screenshot shows the Turbo C++ IDE with the same menu bar and toolbar. The main window displays the corrected C program. At the top, a status bar indicates "Line 11 Col 11 Insert Indent Tab Fill Unindent * E:9AM.C". The code in the editor is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={1},{2},{3},{4}}, i;
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",a[i]);
getch();
}
/* 1 2 3 4 */
```

The Windows taskbar at the bottom shows the time as 10:34 AM on 13-Aug-24.



```
TC
File Edit Run Compile Project Options Debug Break/watch
Edit
Line 12 Col 14 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4], i;
a[0]=1;
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",a[i]);
getch();
}
/* 1 gr gr gr */

10:36 AM
13-Aug-24
```