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.**

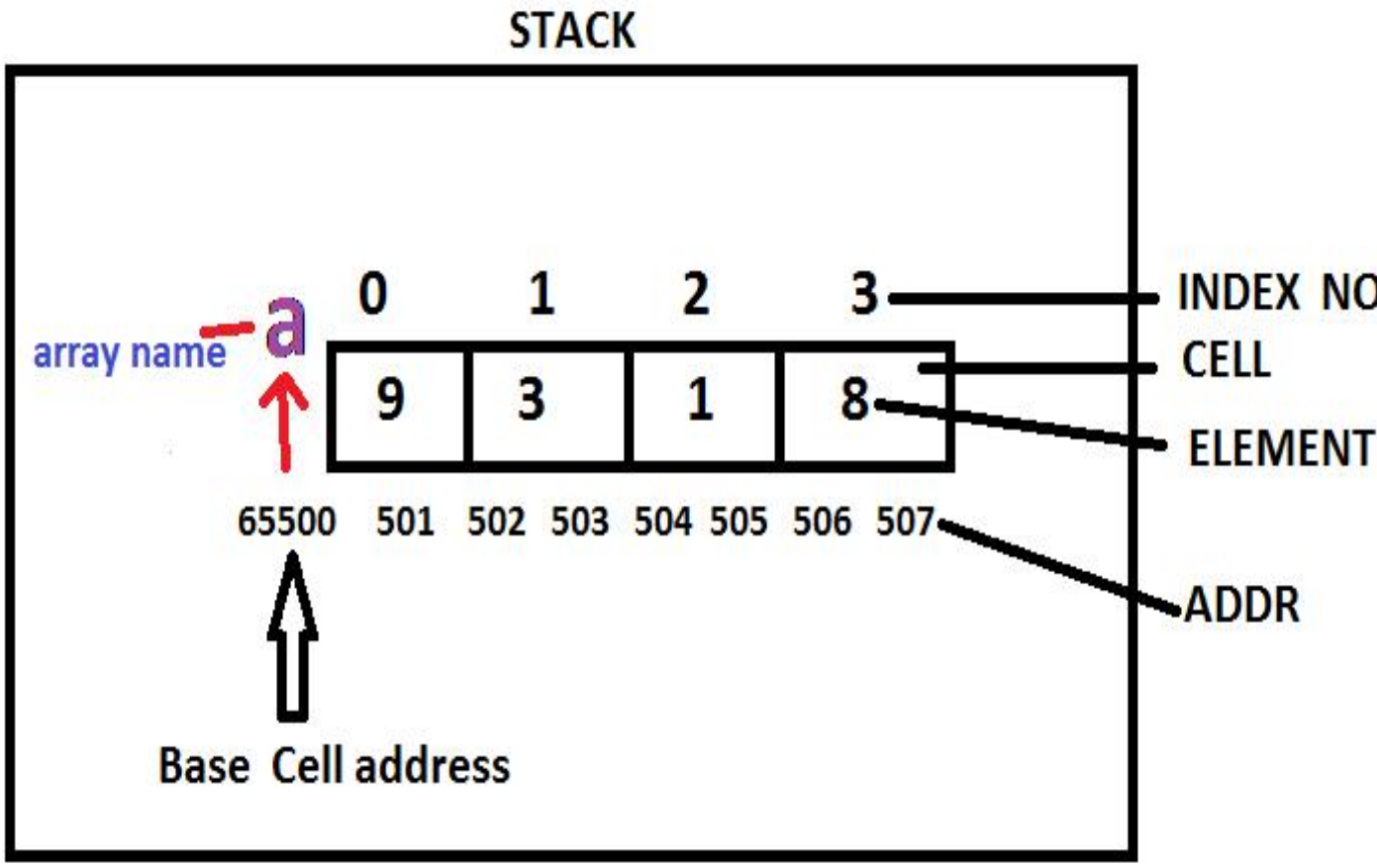
Syntax:

```
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

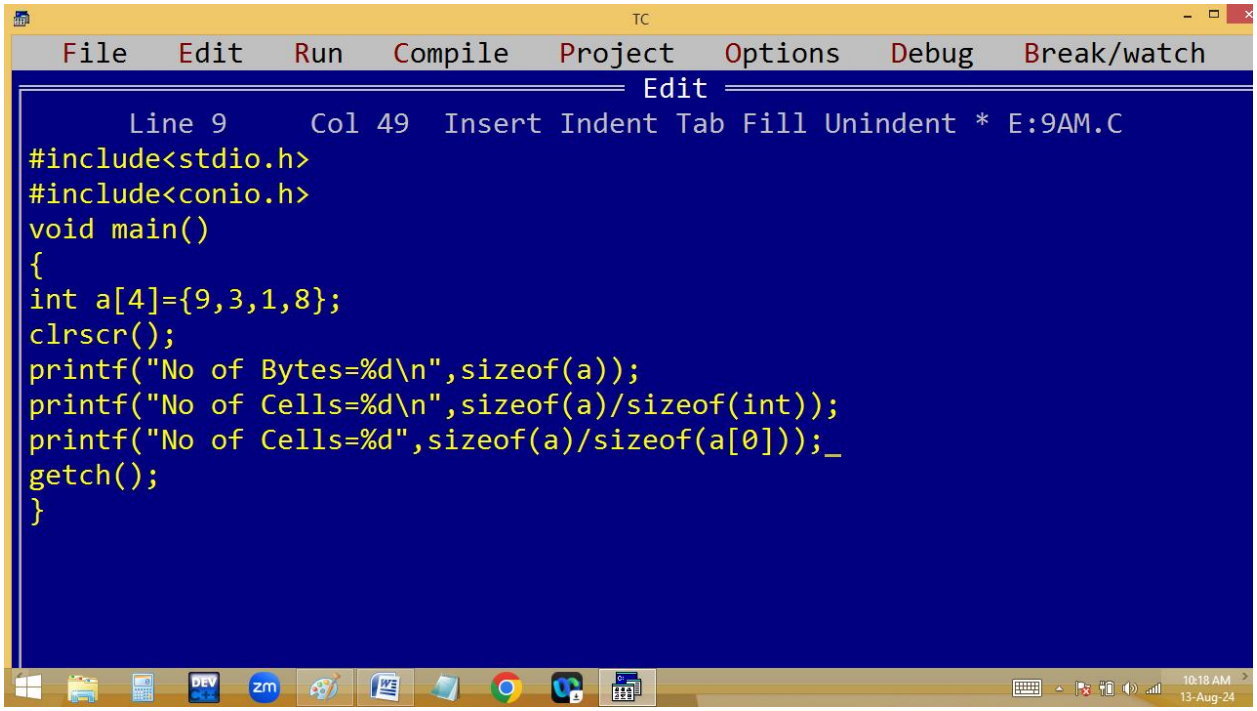
int a[40000]; ➔ 40000 * 2 = 80000 bytes ➔ No

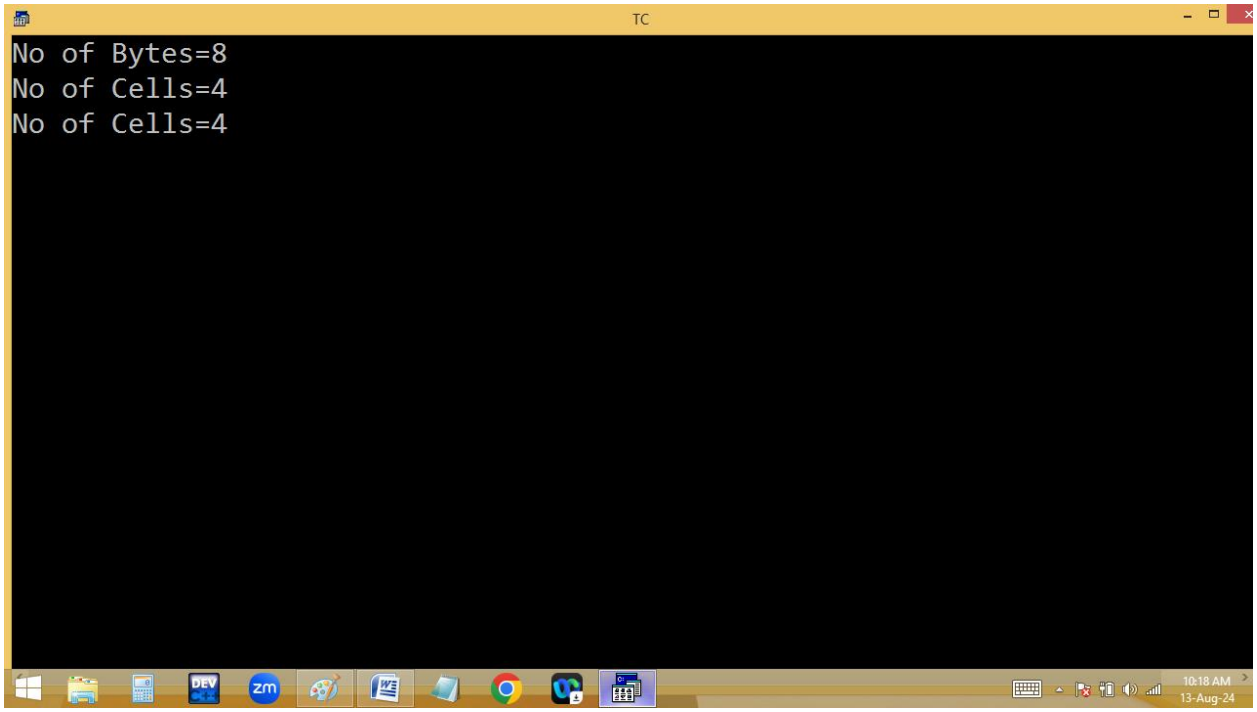
Note: Stack size is 65536 bytes(64kb) Only.

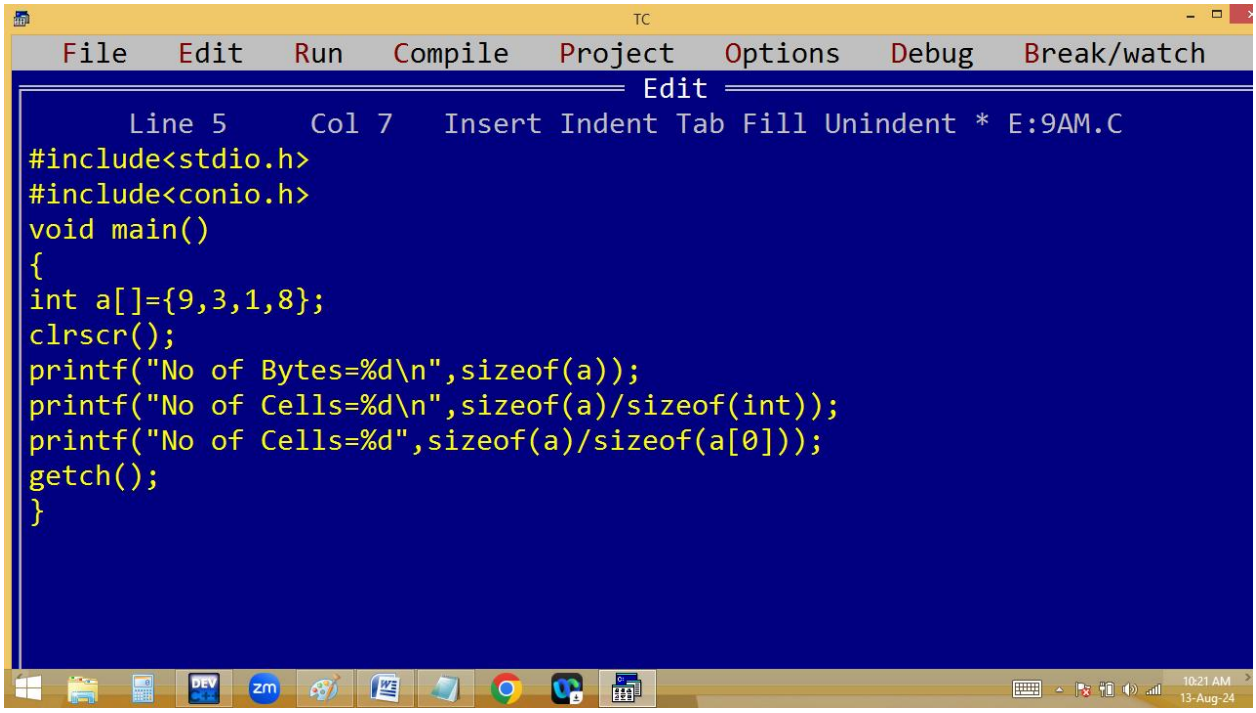
float a[10000]; Ok ➔ 10000 * 4 = 40000 bytes

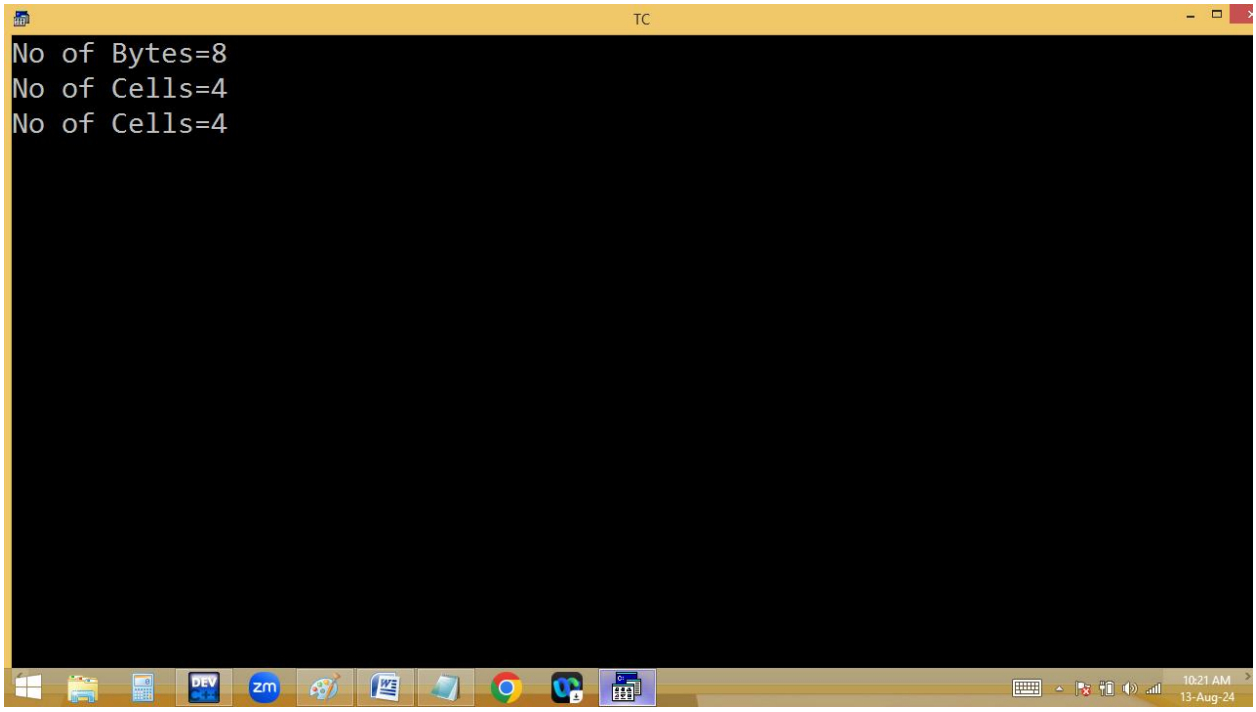
float a[20000]; No ➔ 20000 * 4 = 80000 bytes

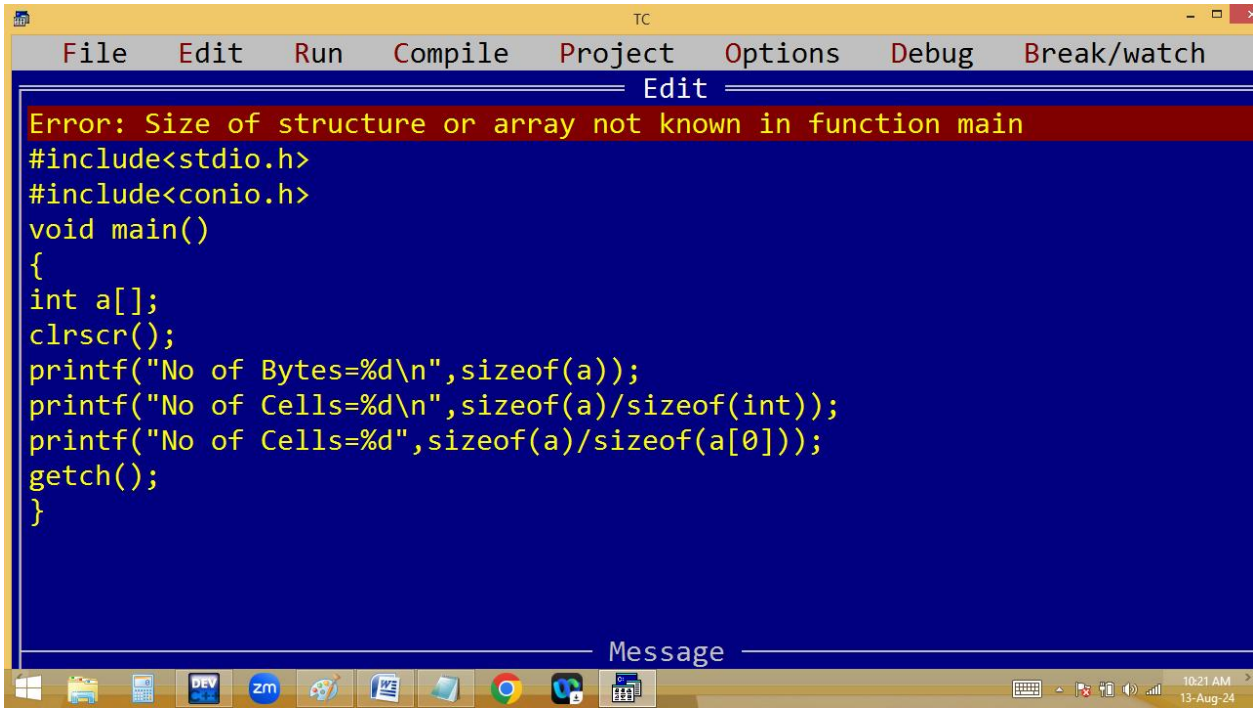
Finding array size:



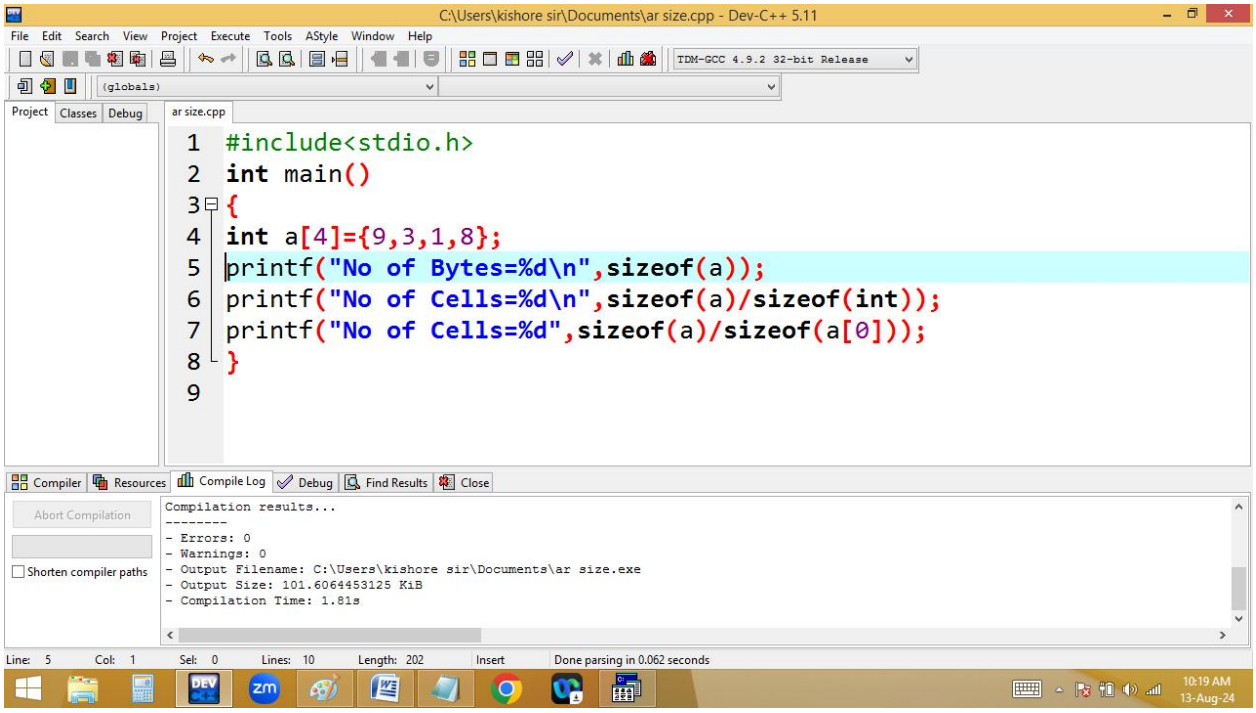


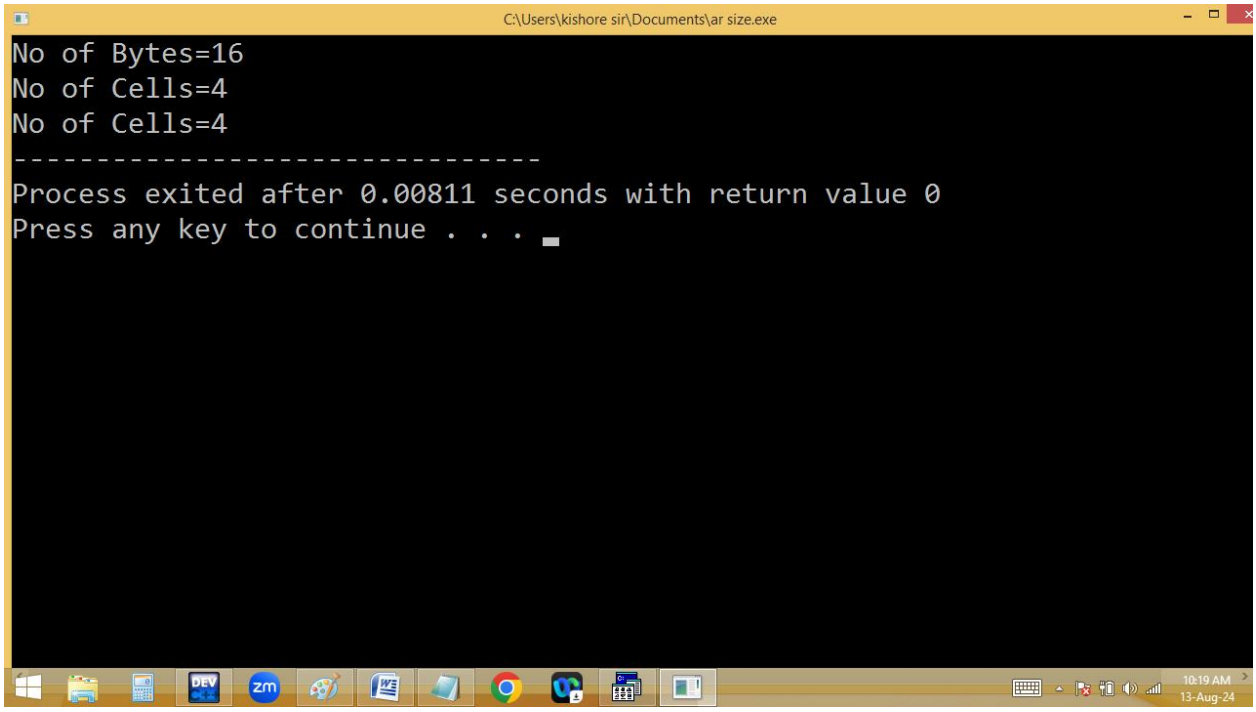

TC
File Edit Run Compile Project Options Debug Break/watch
Edit
Line 5 Col 7 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[]={9,3,1,8};
clrscr();
printf("No of Bytes=%d\n",sizeof(a));
printf("No of Cells=%d\n",sizeof(a)/sizeof(int));
printf("No of Cells=%d",sizeof(a)/sizeof(a[0]));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


TC
No of Bytes=8
No of Cells=4
No of Cells=4

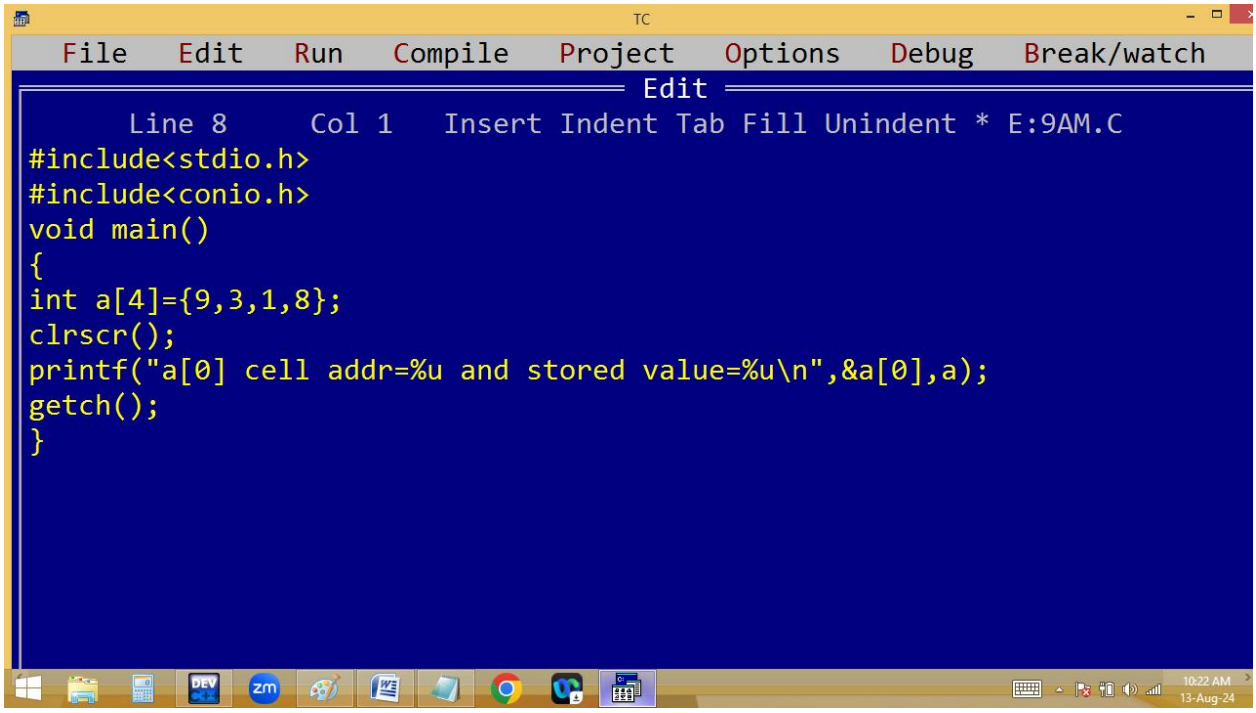


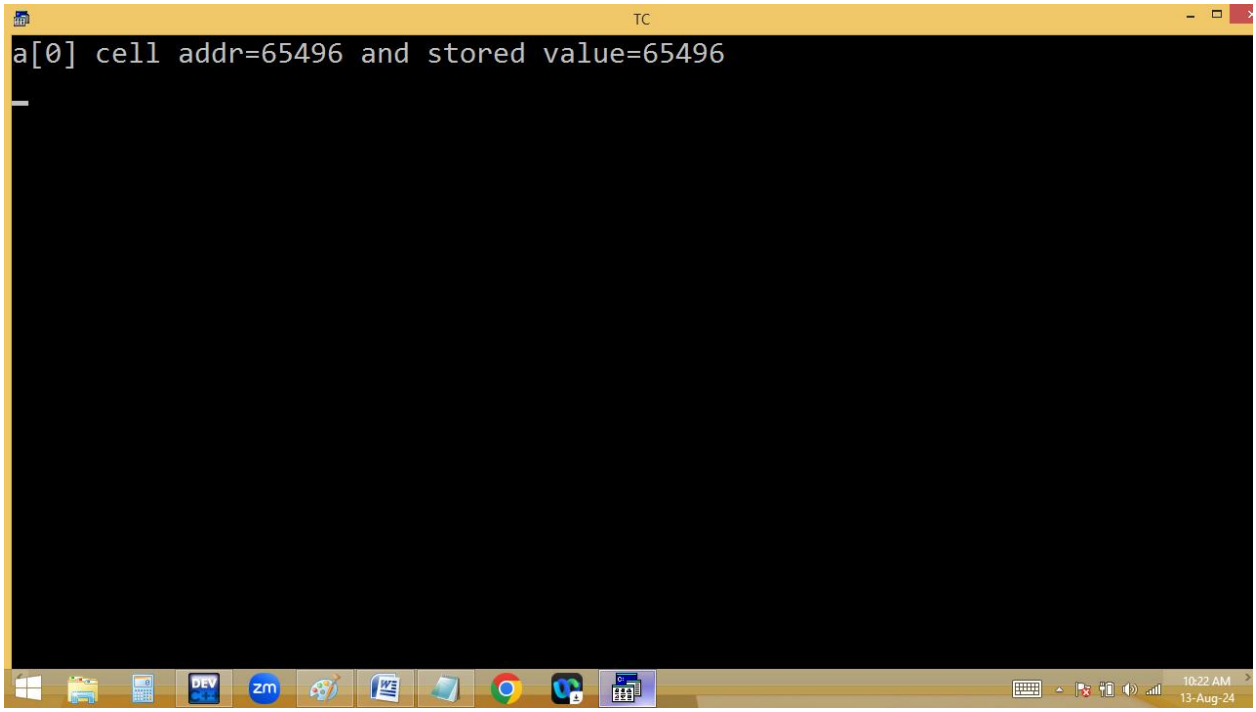
In online / devc++ / vscode etc:

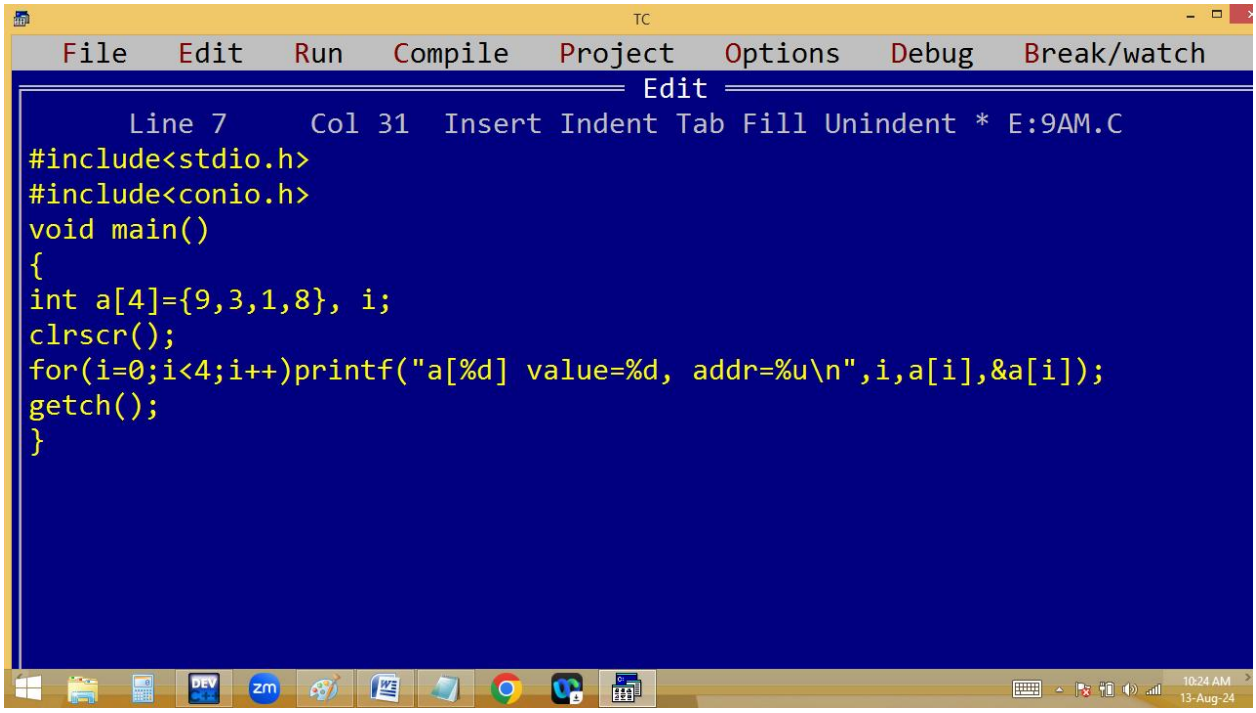




Finding array address:


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();
}


TC
a[0] cell addr=65496 and stored value=65496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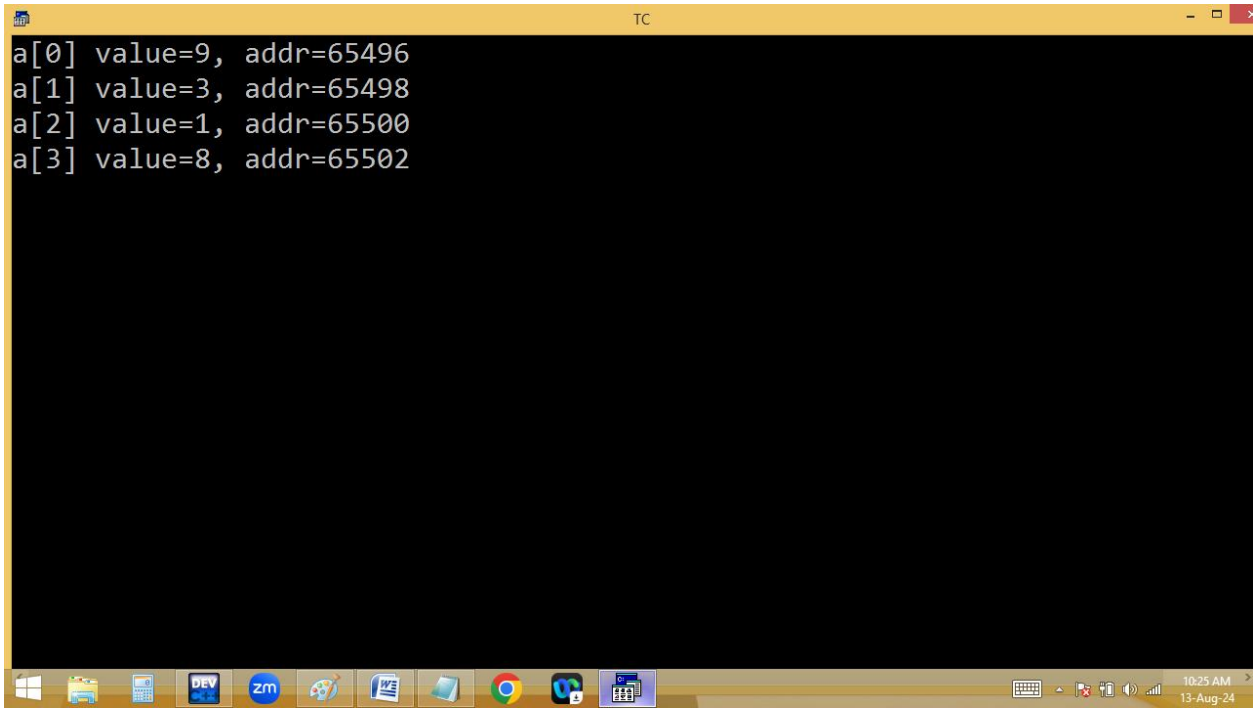
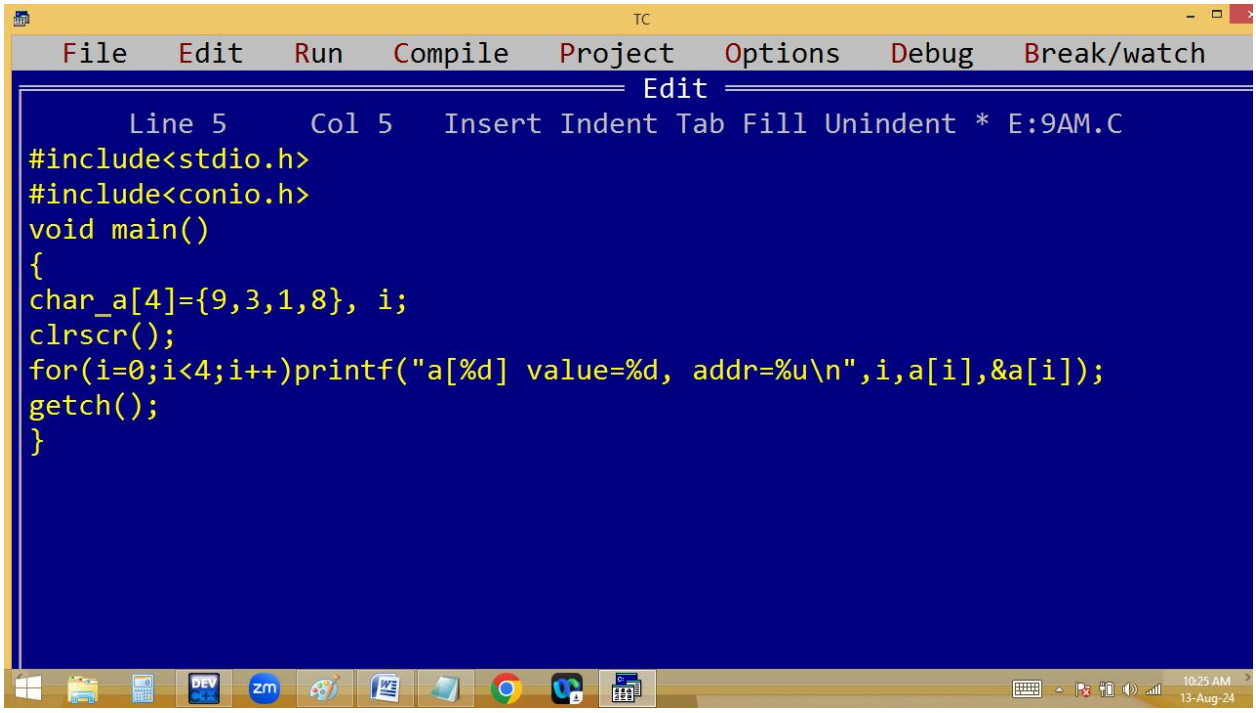
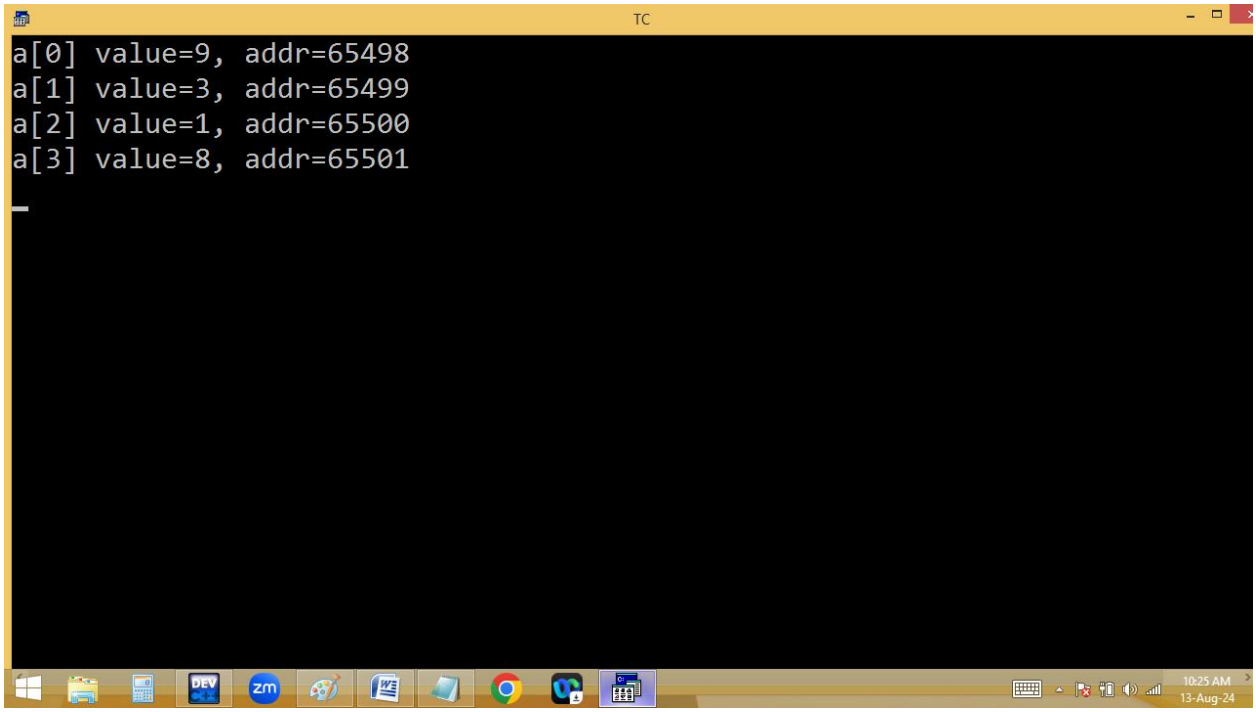
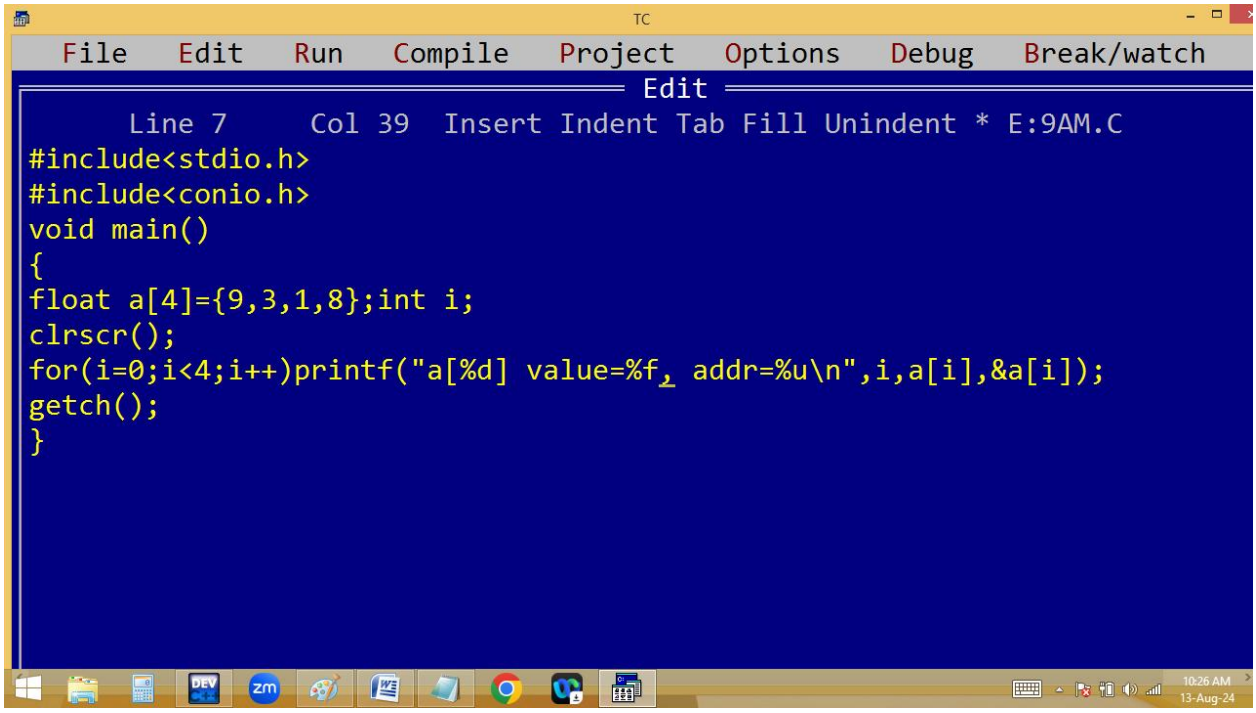
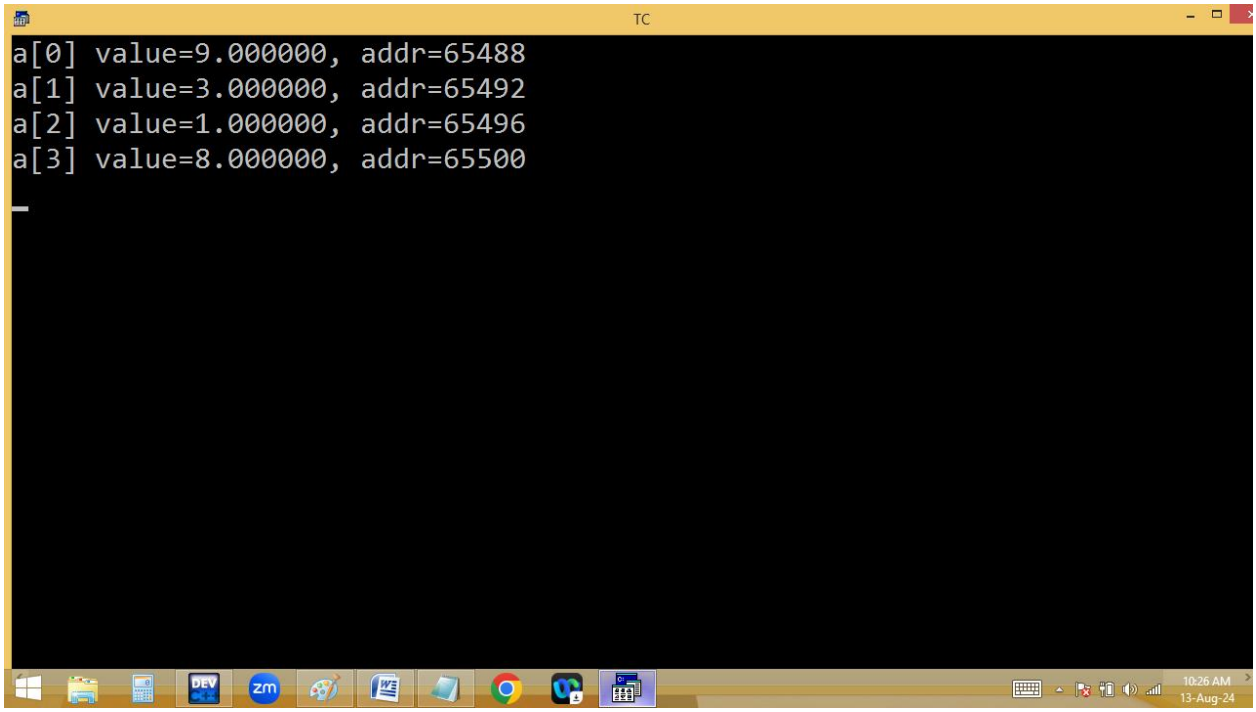
Edit
Line 7 Col 31 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={9,3,1,8}, i;
clrscr();
for(i=0;i<4;i++)printf("a[%d] value=%d, addr=%u\n",i,a[i],&a[i]);
getch();
}


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

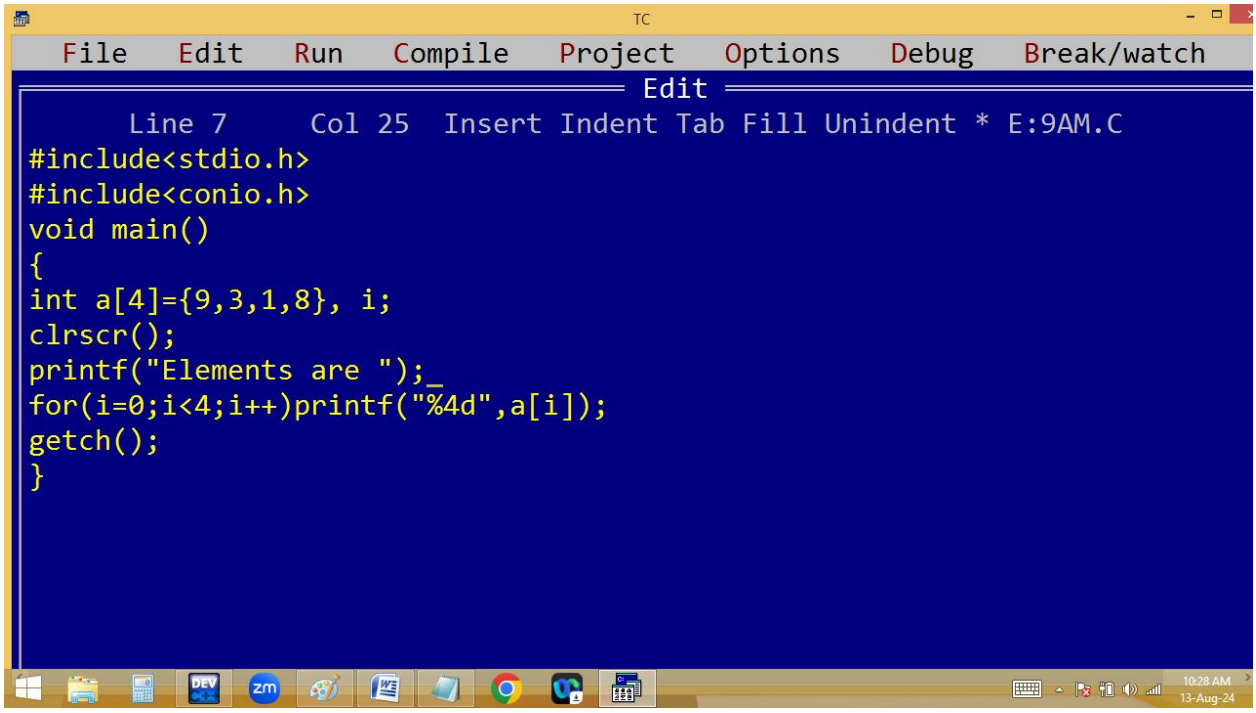

TC
File Edit Run Compile Project Options Debug Break/watch
Edit
Line 5 Col 5 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
char_a[4]={9,3,1,8}, i;
clrscr();
for(i=0;i<4;i++)printf("a[%d] value=%d, addr=%u\n",i,a[i],&a[i]);
getch();
}


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





Direct initialization of array elements: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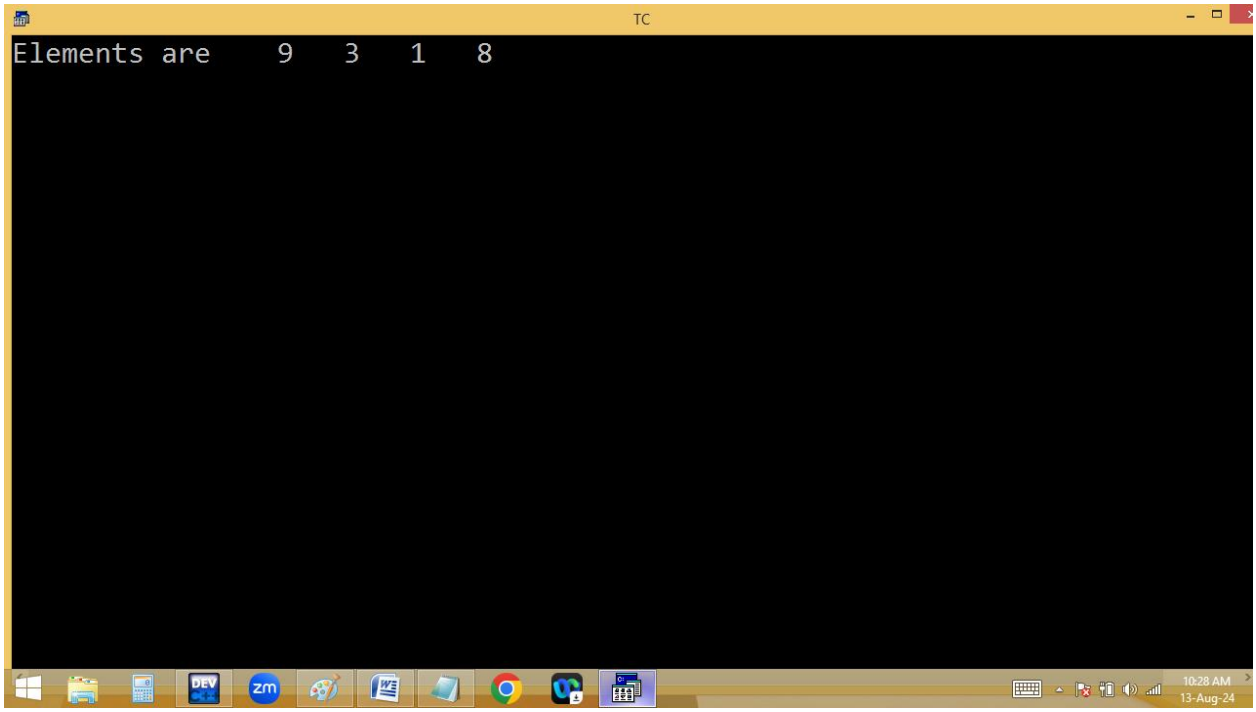
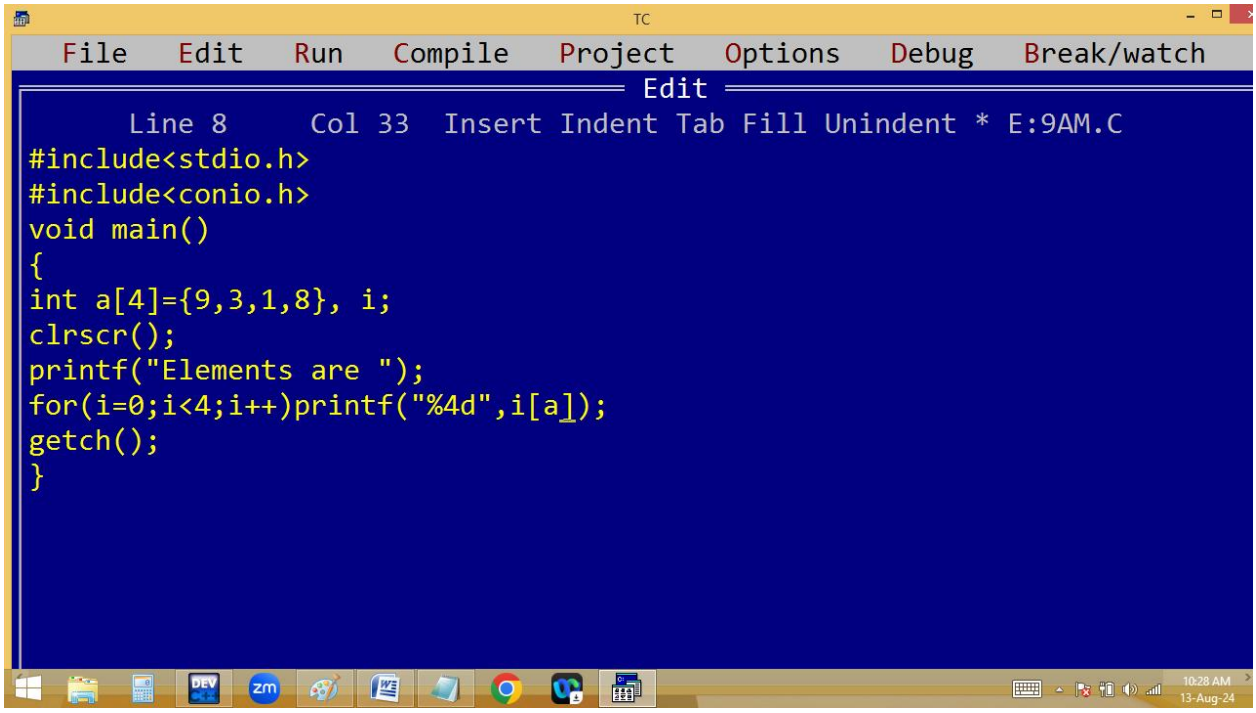
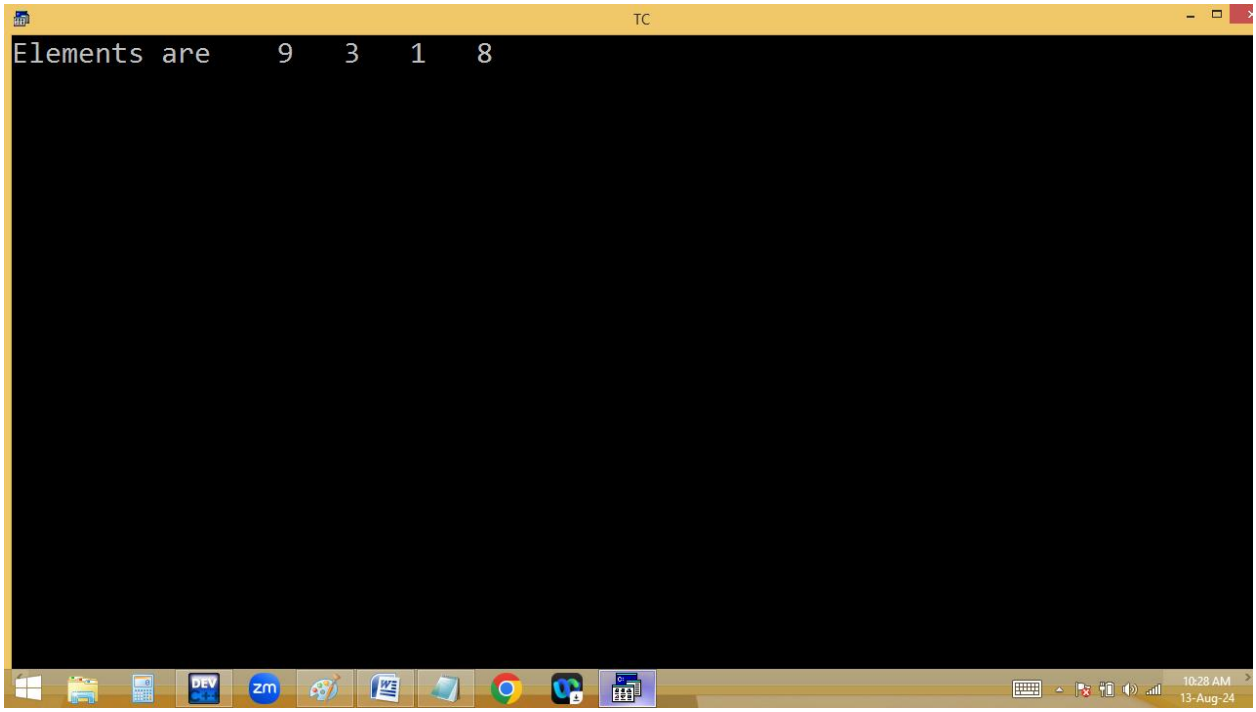
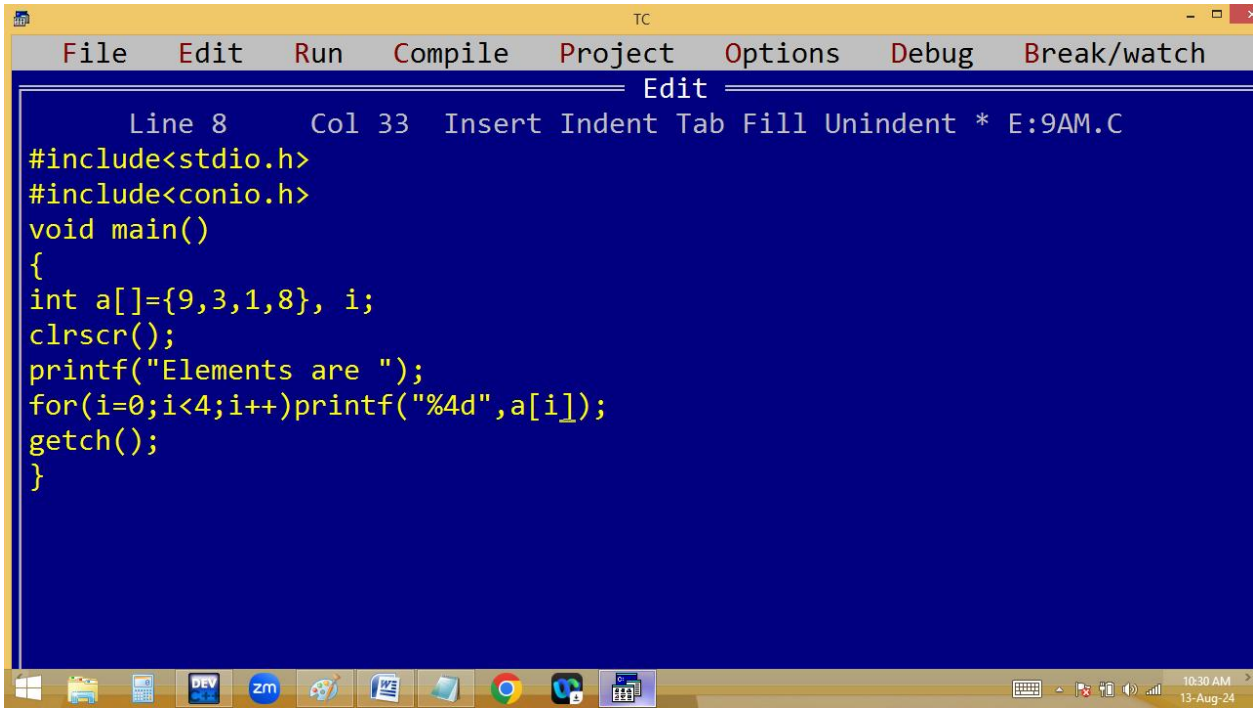
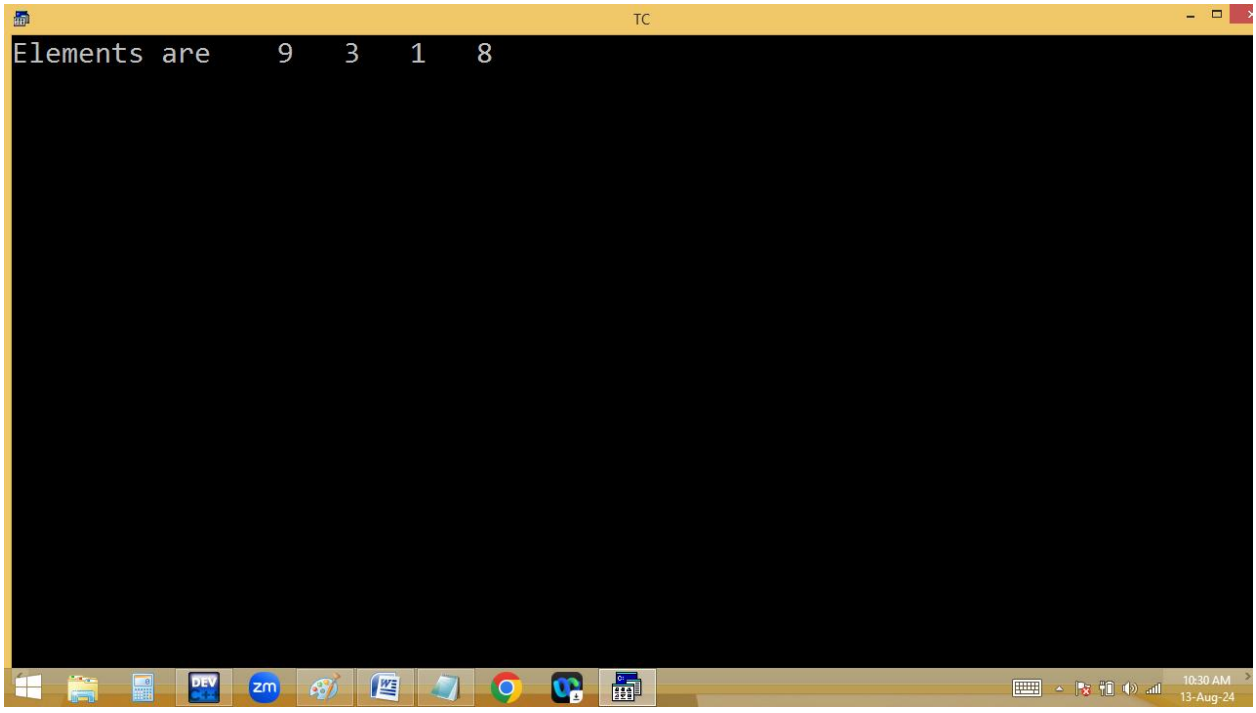
Edit
Line 7 Col 25 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={9,3,1,8}, i;
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",a[i]);
getch();
}

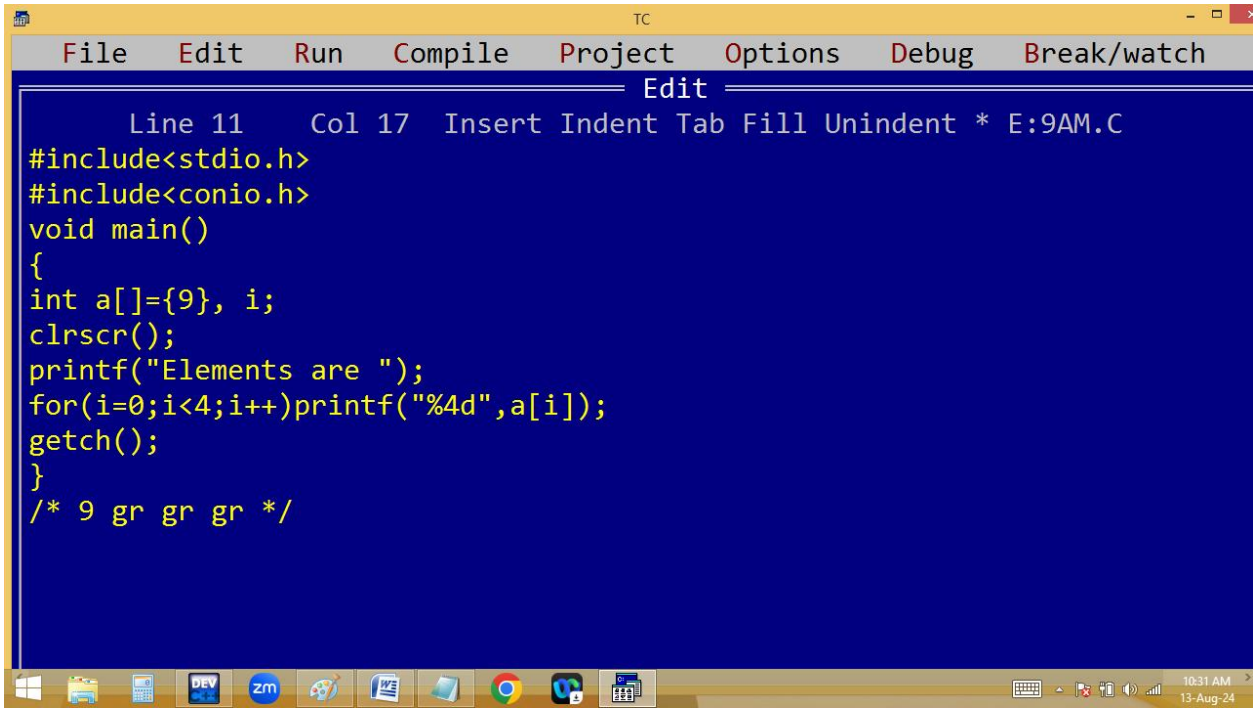

TC
Elements are 9 3 1 8


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


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[]={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
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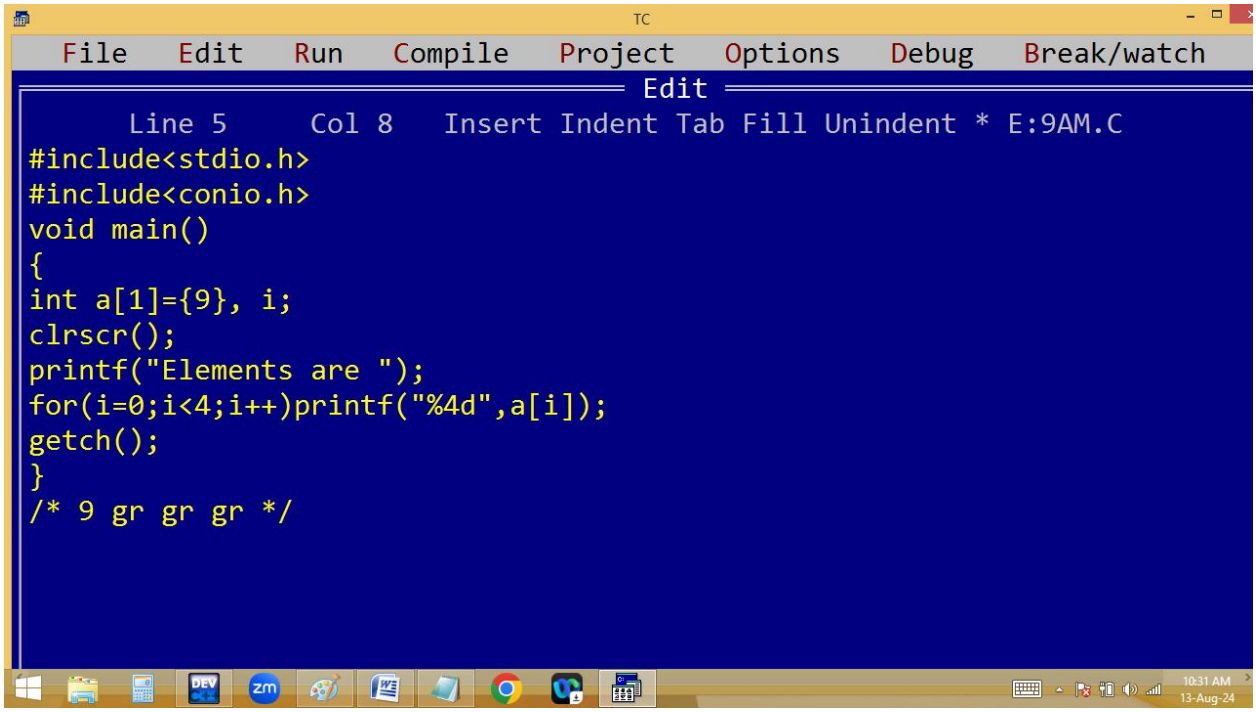
Edit
Line 11 Col 17 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[]={9}, i;
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",a[i]);
getch();
}
/* 9 gr gr gr */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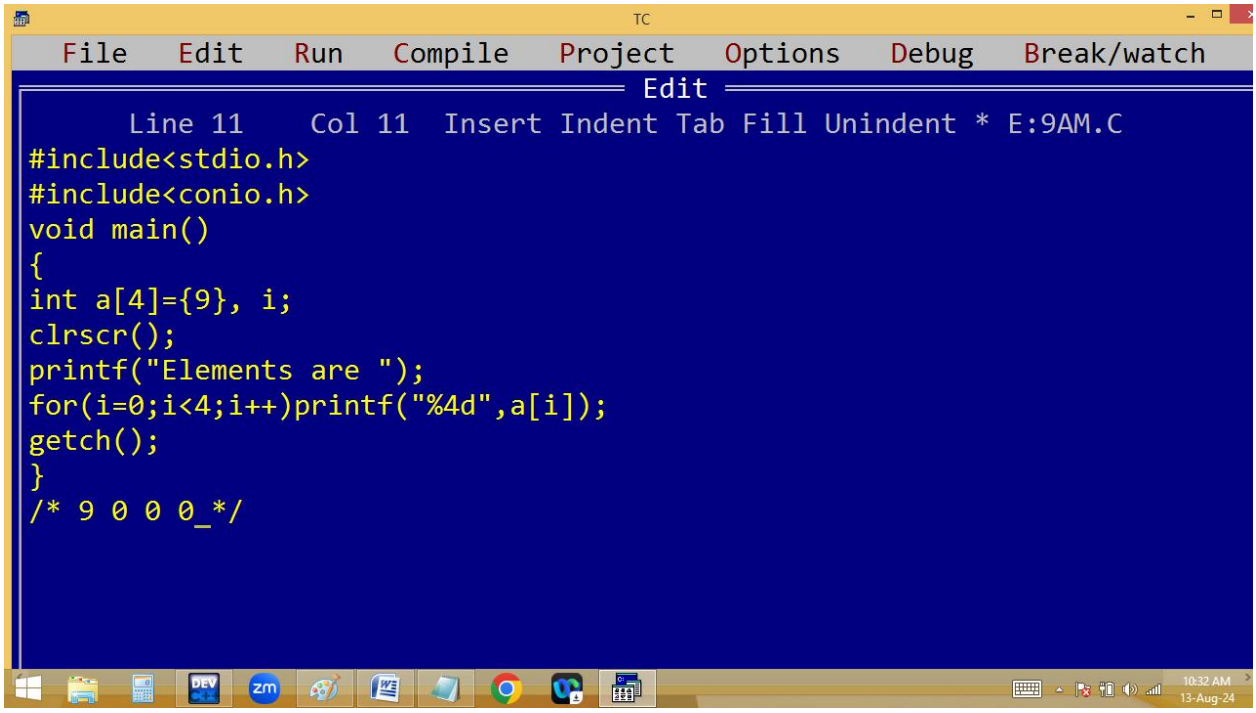
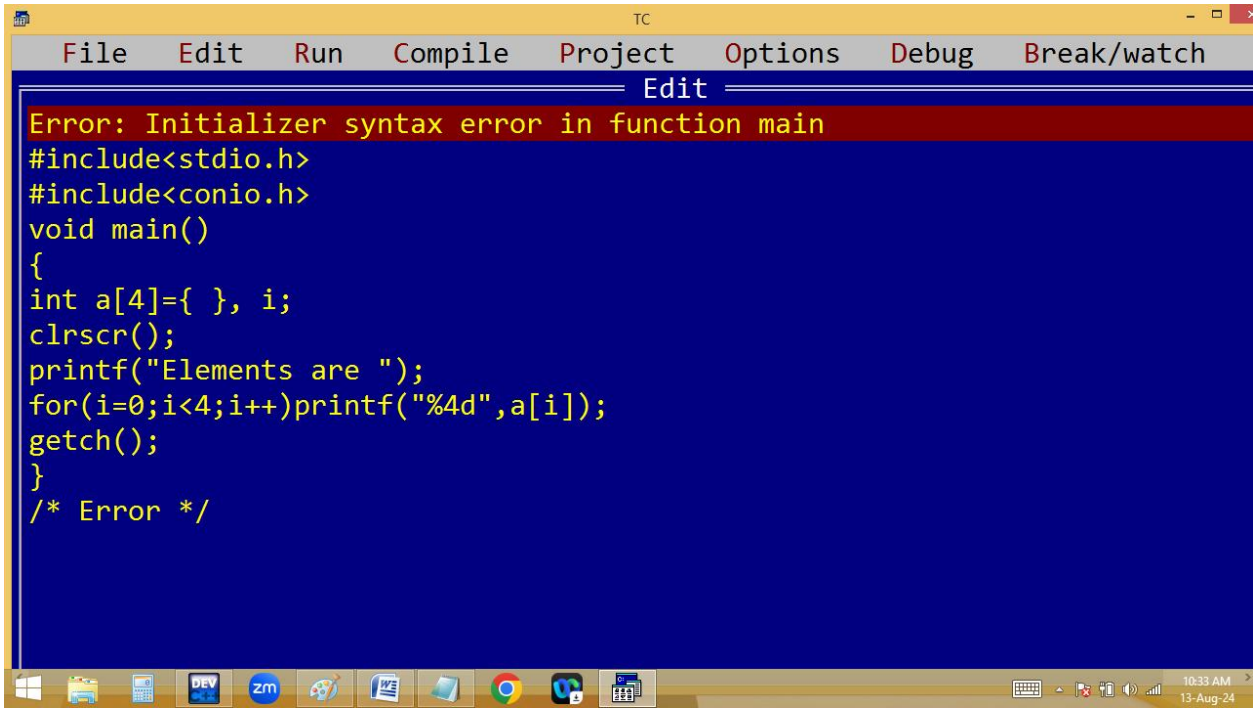
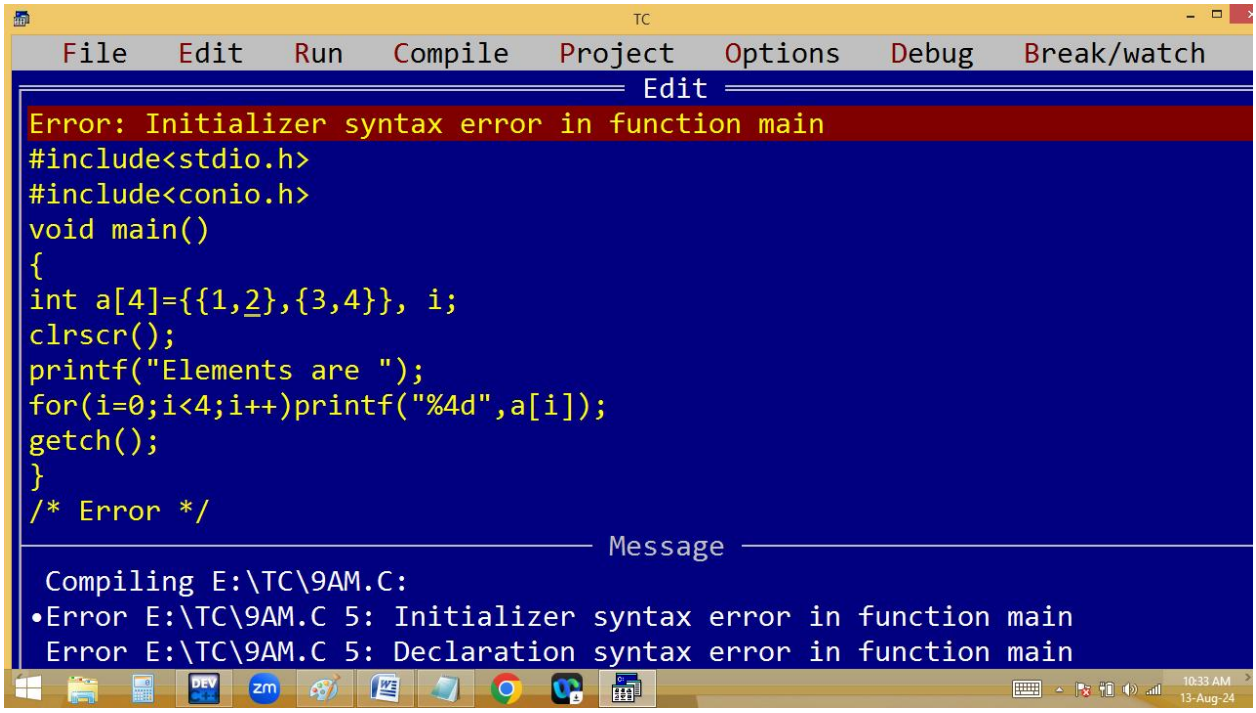
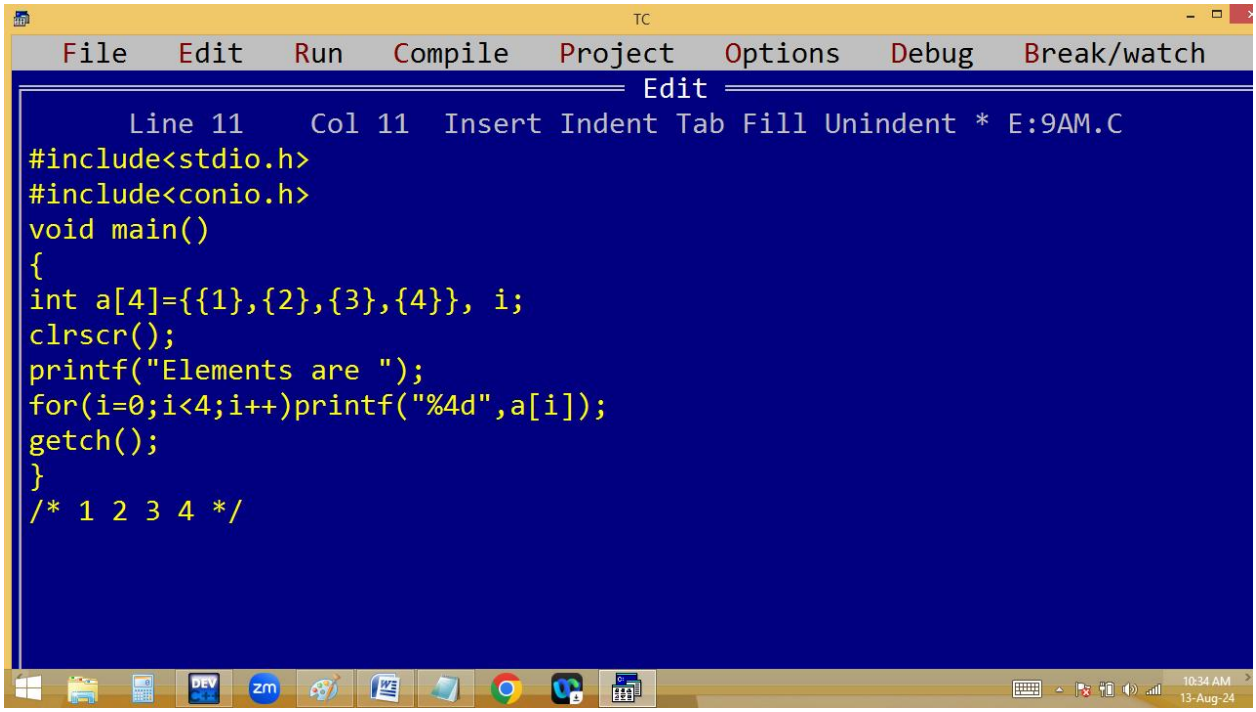
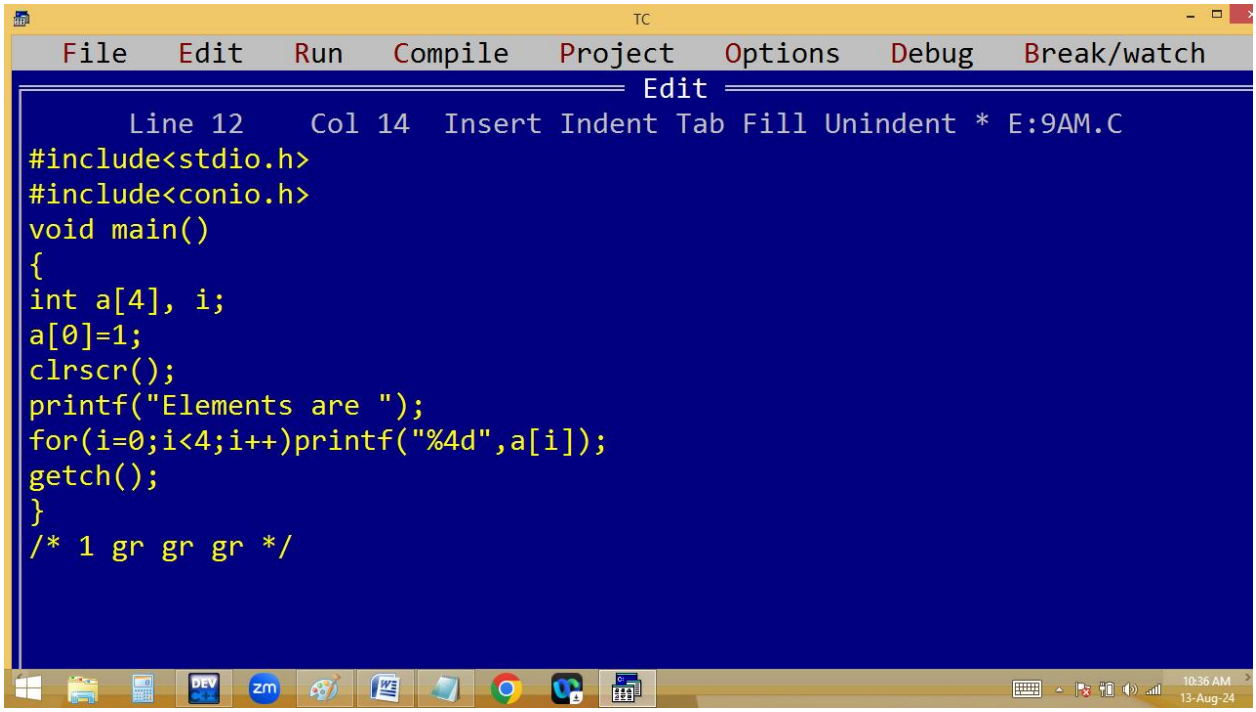
Line 5 Col 8 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[1]={9}, i;
clrscr();
printf("Elements are ");
for(i=0;i<4;i++)printf("%4d",a[i]);
getch();
}
/* 9 gr gr gr */


TC
File Edit Run Compile Project Options Debug Break/watch
Edit
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_*/


TC
File Edit Run Compile Project Options Debug Break/watch
Edit
Error: Initializer syntax error in function main
#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 */


TC
File Edit Run Compile Project Options Debug Break/watch
Edit
Error: Initializer syntax error in function main
#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 */
Message
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


TC
File Edit Run Compile Project Options Debug Break/watch
Edit
Line 11 Col 11 Insert Indent Tab Fill Unindent * E:9AM.C
#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 */


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 */