

DATA TYPES

Data type determines the type of value we are going to store in our computer. To store anything in our computer, we should have to allocate the memory. This memory allocation is depended on the data type we are using.

Data type determines the properties such as

1. No of bytes
2. Range
3. Type of value

In C language we are having 3 **basic** data types

1. **Int – To store non-decimal numbers**
2. **Float – To store decimal numbers**
3. **Char – To stores alphabets, numbers and special char**

Total data types are divided into 3 types.

1. **Primitive data types**
2. **Derived data types**
3. **User defined data types**

PRIMITIVE DATA TYPES:

These are the regular data types we are using in our c programs.

Data type	Bytes	Conversion	Storage Range
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		Character / format specifier	
int / signed int / short int	2	%d	-32768 to +32767
unsigned int	2	%u	0 to 65535
long int	4	%ld	-2147483648 to 2147483647
unsigned long int	4	%lu	0 to 4294967295
float	4	%f	$3.4 * 10^{-38}$ to $3.4 * 10^{+38}$
double	8	%lf	$1.7 * 10^{-308}$ to $1.7 * 10^{+308}$
long double	10	%Lf	$3.4 * 10^{-4932}$ to $1.1 * 10^{+4932}$
char	1	%c	1 character Signed char [-128 to +127] Unsigned char [0 to 255]
char[10] (STRING)	10	%s	9 char + 1 null char
void [empty data type]			nothing

DERIVED DATA TYPES:

They are derived from primitive data types.

- 1. Array [non-primitive]**
- 2. Pointer**
- 3. Function**

USER DEFINED DATA TYPES:

These are the data types created by the user.

1. structure
2. union
3. enum

OPERATORS

Operator is a special symbol designed for a particular task [work]. C comes with 44 operators and 14 separators. Operator works on operands. Based on no of operands participating in operation, the operators divided into 3 types.

1. **Unary operator**: Require one operand.
Eg: a++, a--, sizeof(a), ~a, !a, +a, -a,....
2. **Binary operators**: Require two operands.
Eg: a+b, a-b, a>b, a<=b, a!=b, a<<b,
3. **Ternary / conditional operator [? :]**: Require 3 operands / expressions.

Conditional part ? true part : false part;

5==5 ? true : false;

5>9 ? true : false;

Based on operation, the operators divided into several types.

1. **Assignment operator [=]**: It copies the value on its right side into the variable on its left side. The left side operand should be a variable. i.e. expressions and constant values not allowed on left side.

Eg:

a=10;

b=1.2;

c='X';

d="abc"; ➔ Error because of abc is a string

e=f=g=100;

2+7=10; ➔ Error because of 2+7 is 9 which is a constant

30=50;

c = a+b;

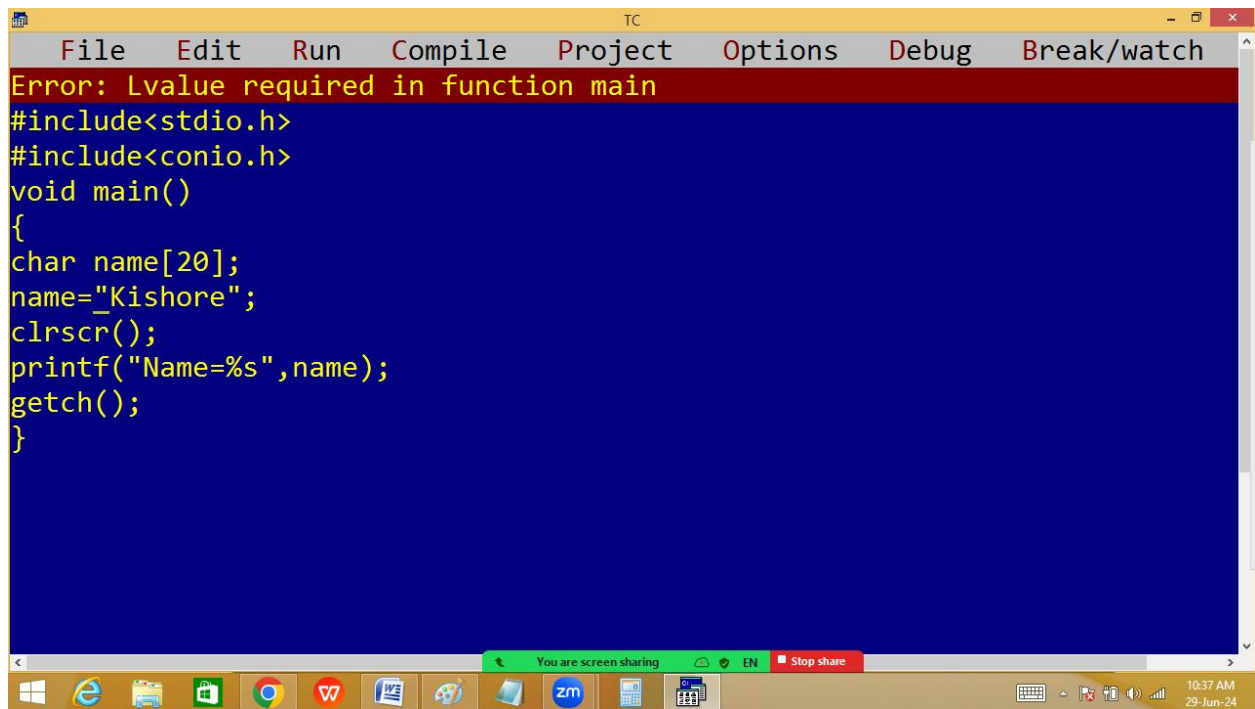
The image shows a screenshot of the Turbo C++ (TC) IDE. The top window displays a C program with the following code:

```
File Edit Run Compile Project Options Debug Break/watch
Line 12 Col 34 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a;
float b;
char c;
clrscr();
a=10;
b=1.2;
c='X';
printf("a=%d, b=%f, c=%c",a,b,c);_
getch();
}
```

The bottom window shows the output of the program:

```
a=10, b=1.200000, c=X_
```

The Windows taskbar at the bottom includes icons for various applications and the system clock, which shows 10:37 AM on 29-Jun-24. A green status bar at the bottom of the IDE windows indicates "You are screen sharing" and provides a "Stop share" button.

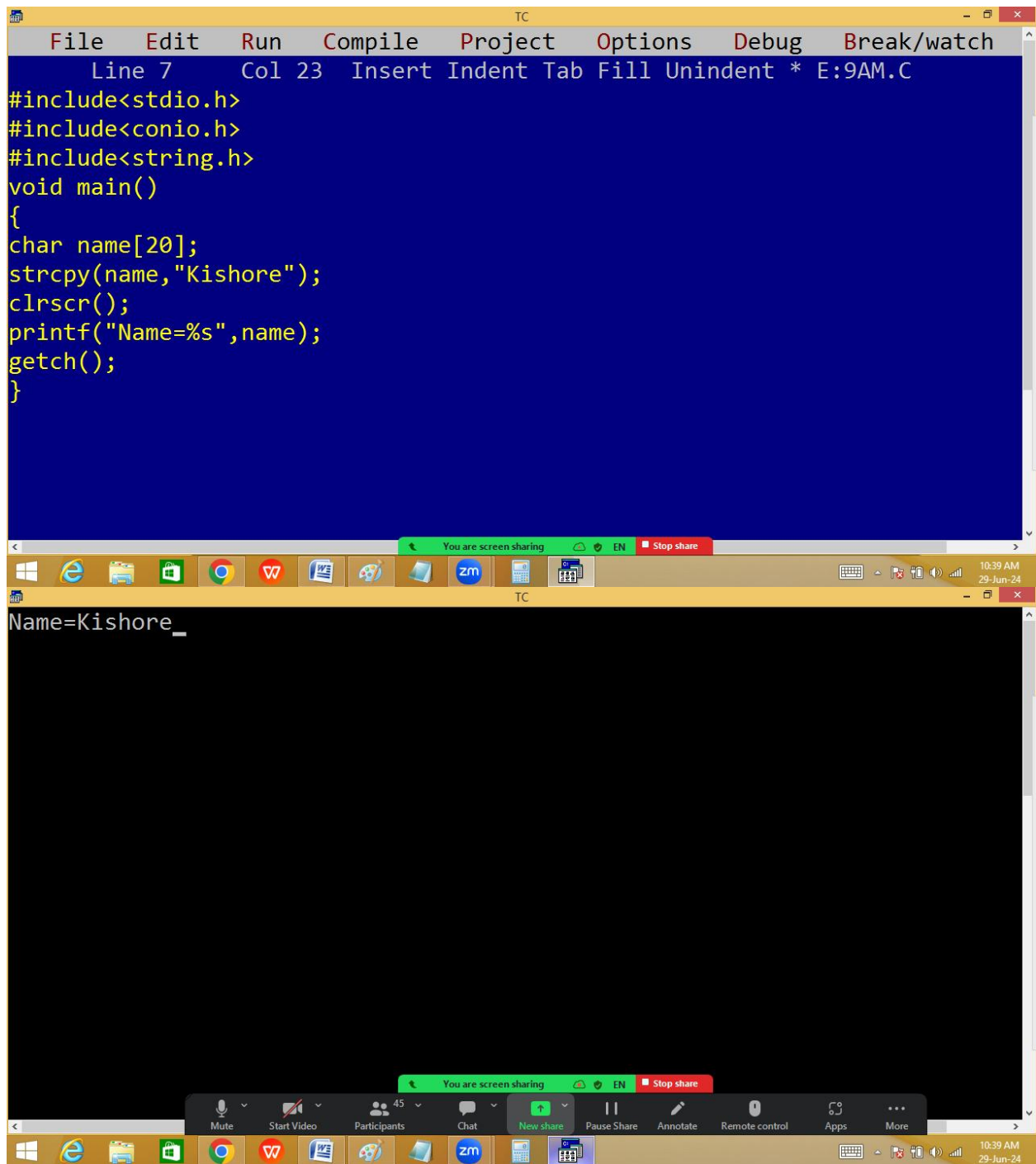


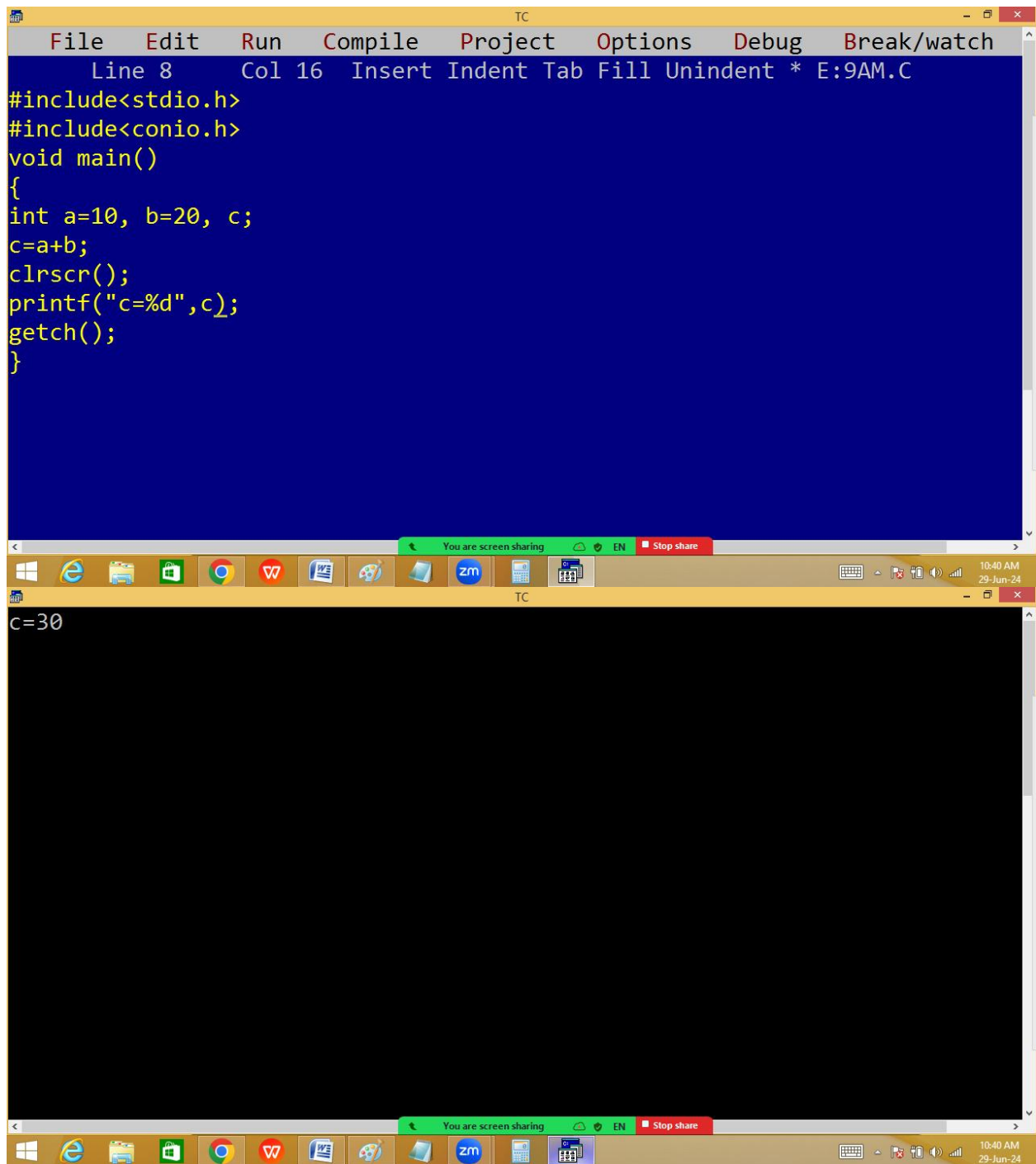
The screenshot shows the Turbo C++ (TC) IDE interface. The menu bar includes File, Edit, Run, Compile, Project, Options, Debug, and Break/watch. A red error message banner at the top reads "Error: Lvalue required in function main". The code editor has a blue background and contains the following C code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
char name[20];
name="Kishore";
clrscr();
printf("Name=%s",name);
getch();
}
```

The Windows taskbar at the bottom shows various application icons, including Internet Explorer, Google Chrome, and Zoom. A green status bar above the taskbar indicates "You are screen sharing". The system clock in the bottom right corner shows "10:37 AM 29-Jun-24".

Note:Lvalue error means left side value not changeable.

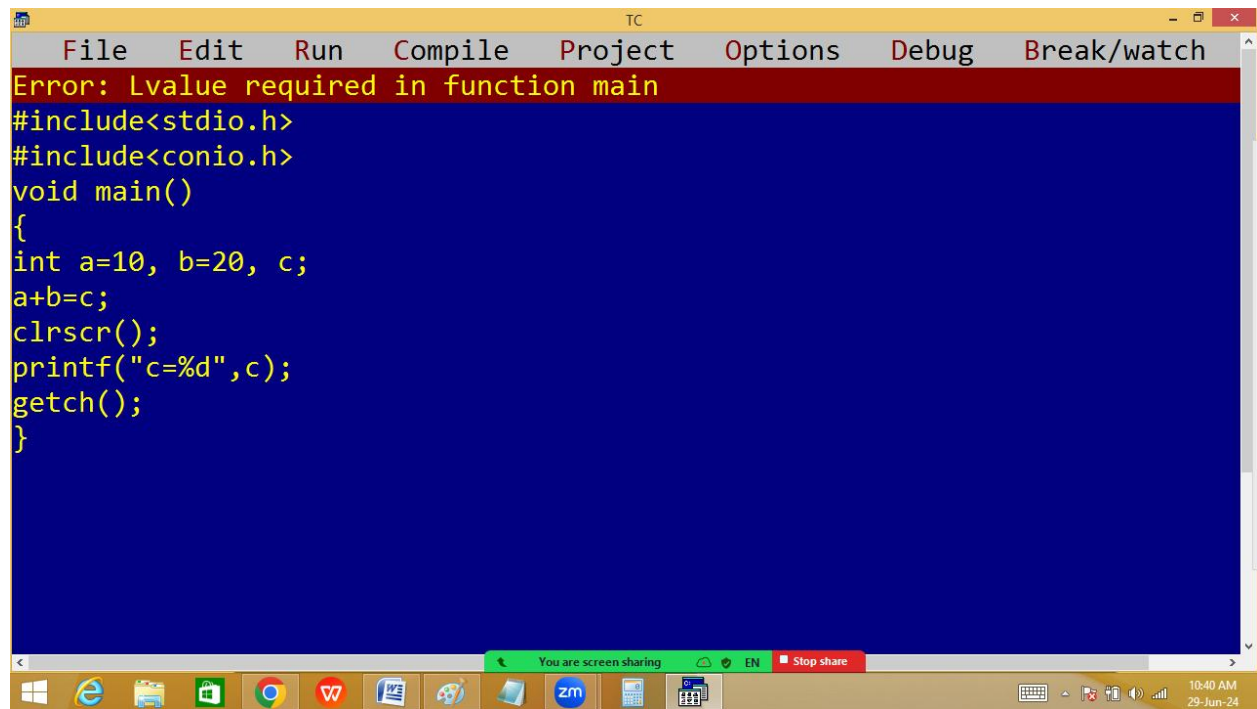




The image shows a screenshot of the Turbo C++ (TC) IDE. The top window, titled 'TC', displays a C program with the following code:

```
File Edit Run Compile Project Options Debug Break/watch
Line 8 Col 16 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a=10, b=20, c;
c=a+b;
clrscr();
printf("c=%d",c);
getch();
}
```

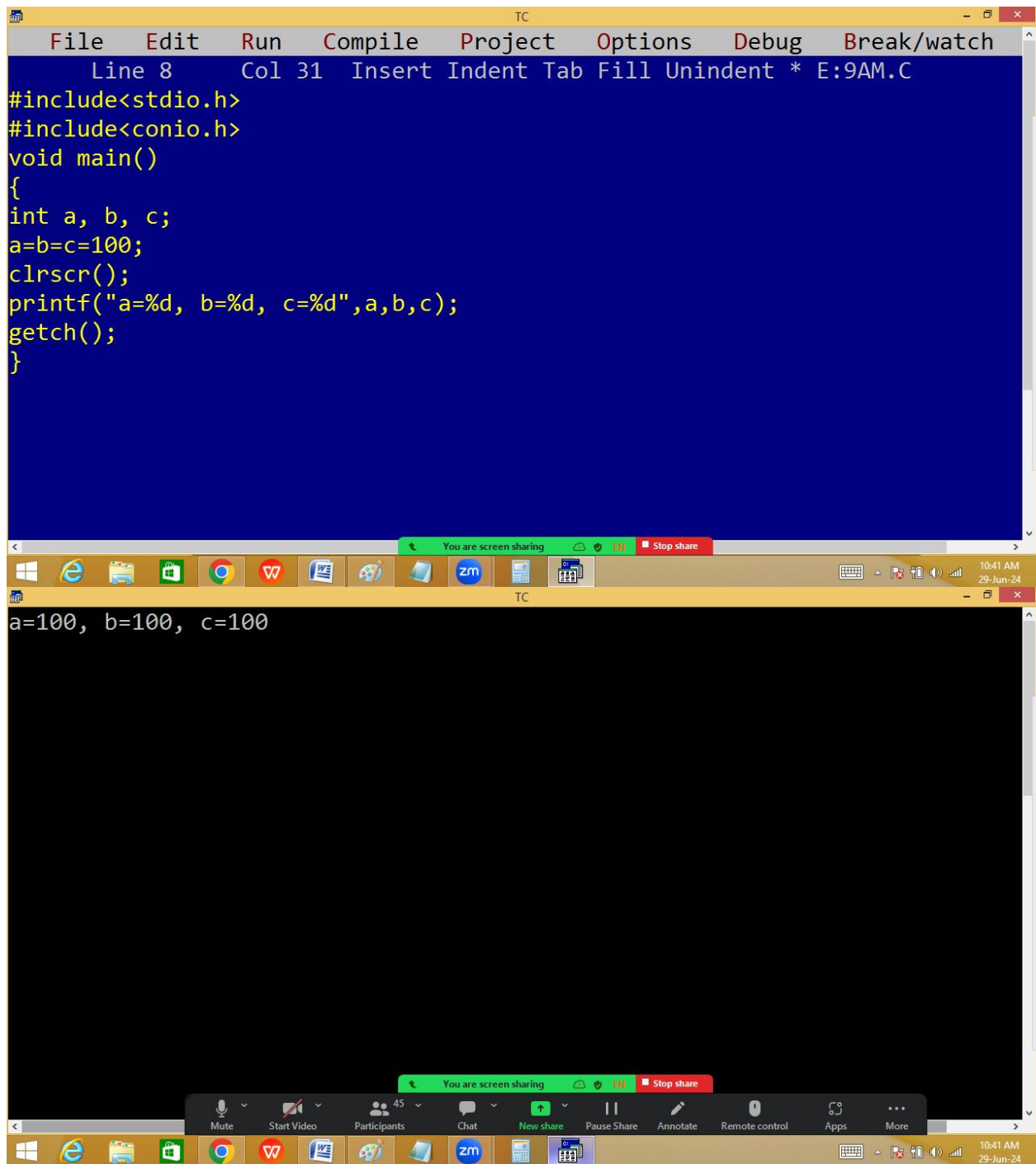
The bottom window, also titled 'TC', shows the output of the program: 'c=30'. A green status bar at the bottom of both windows indicates 'You are screen sharing' and 'EN'. The Windows taskbar at the bottom shows the time as 10:40 AM on 29-Jun-24.



The image shows a screenshot of a Turbo C++ (TC) IDE window. The title bar reads "TC". The menu bar includes "File", "Edit", "Run", "Compile", "Project", "Options", "Debug", and "Break/watch". A red error message banner at the top states "Error: Lvalue required in function main". The main editing area has a dark blue background with yellow text showing the following C code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a=10, b=20, c;
a+b=c;
clrscr();
printf("c=%d",c);
getch();
}
```

At the bottom of the window, there is a Windows taskbar with various application icons. A green status bar above the taskbar indicates "You are screen sharing" with a "Stop share" button. The system clock in the bottom right corner shows "10:40 AM" and "29-Jun-24".



The image shows a screenshot of a Turbo C++ (TC) IDE window. The top menu bar includes File, Edit, Run, Compile, Project, Options, Debug, and Break/watch. Below the menu bar, the status bar shows 'Line 8 Col 1 Insert Indent Tab Fill Unindent * E:9AM.C'. The main editing area has a blue background and contains the following C code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int main=100;
clrscr();
printf("main=%d",main);
getch();
}
```

Below the code editor, there is a green status bar that says 'You are screen sharing' and a red button that says 'Stop share'. The bottom of the window shows a Windows taskbar with various icons (Windows, Edge, File Explorer, Word, PowerPoint, Paint, Zoho, etc.) and a system tray with the date and time '10:42 AM 29-Jun-24'.

Below the TC window, there is another window titled 'TC' with a black background. It displays the output of the program: 'main=100'.

