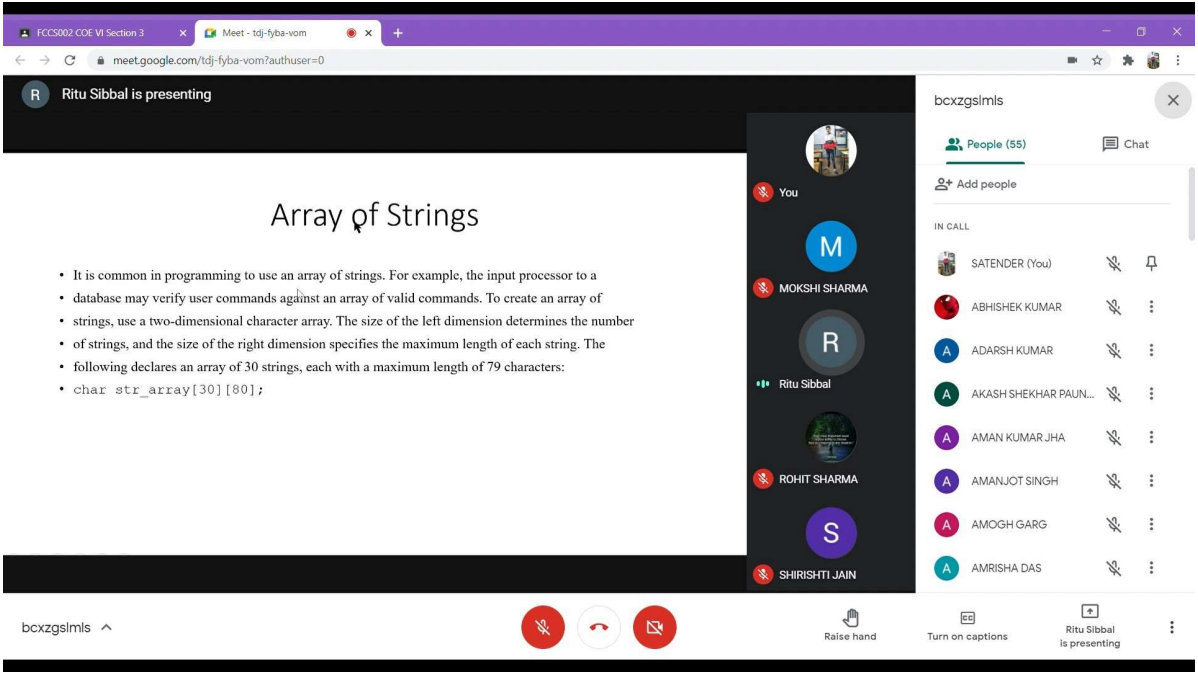
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Array of Strings
It is common in programming to use an array of strings. For example, the input processor to a
database may verify user commands against an array of valid commands. To create an array of
strings, use a two-dimensional character array. The size of the left dimension determines the number
of strings, and the size of the right dimension specifies the maximum length of each string. The
following declares an array of 30 strings, each with a maximum length of 79 characters:
char str_array[30][80];
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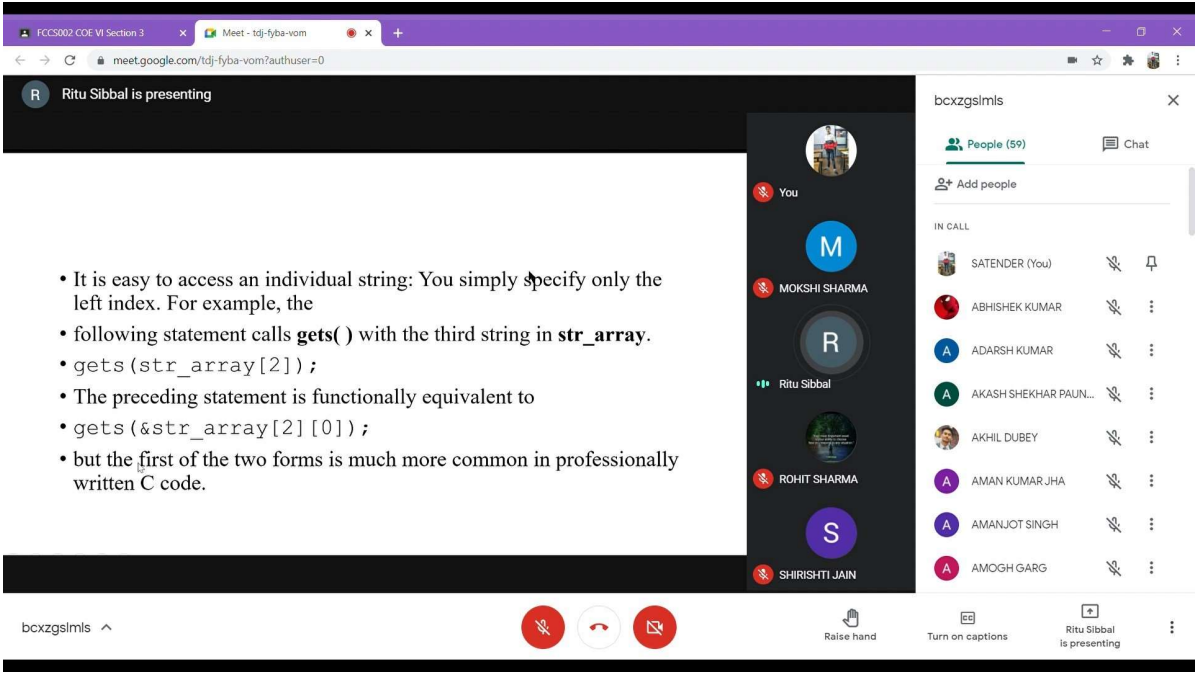
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• It is easy to access an individual string: You simply specify only the left index. For example, the
• following statement calls gets( ) with the third string in str_array.
• gets(str_array[2]);
• The preceding statement is functionally equivalent to
• gets(&str_array[2][0]);
• but the first of the two forms is much more common in professionally written C code.
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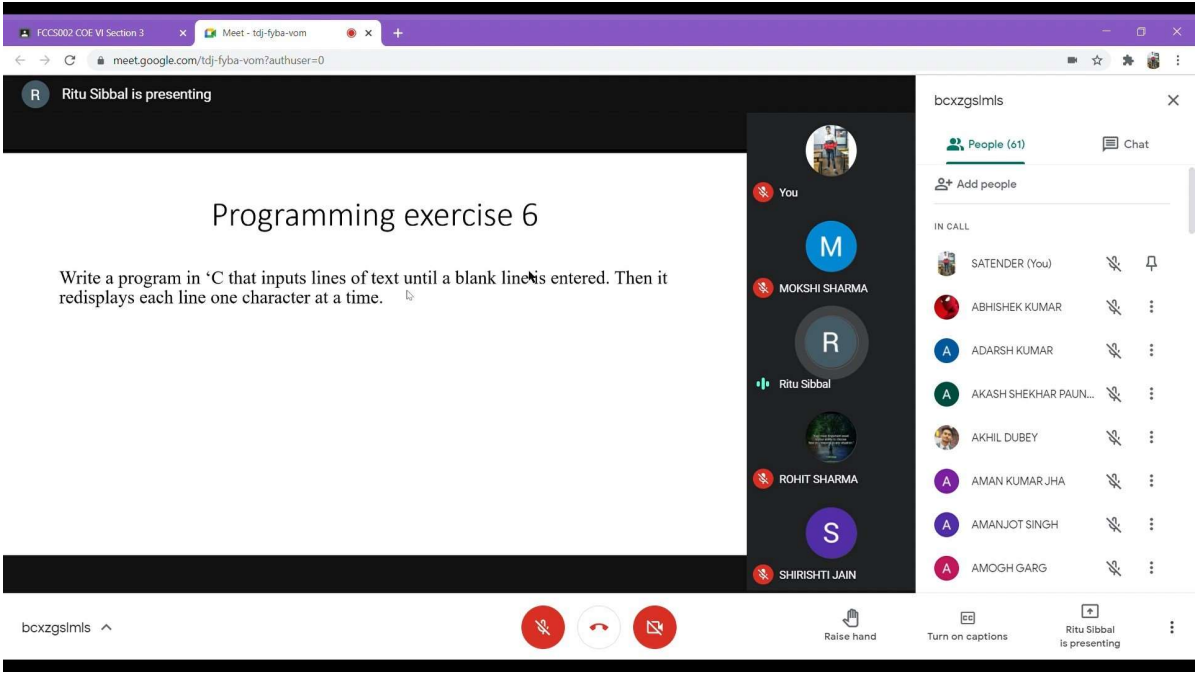
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Programming exercise 6
Write a program in 'C that inputs lines of text until a blank line is entered. Then it redisplays each line one character at a time.
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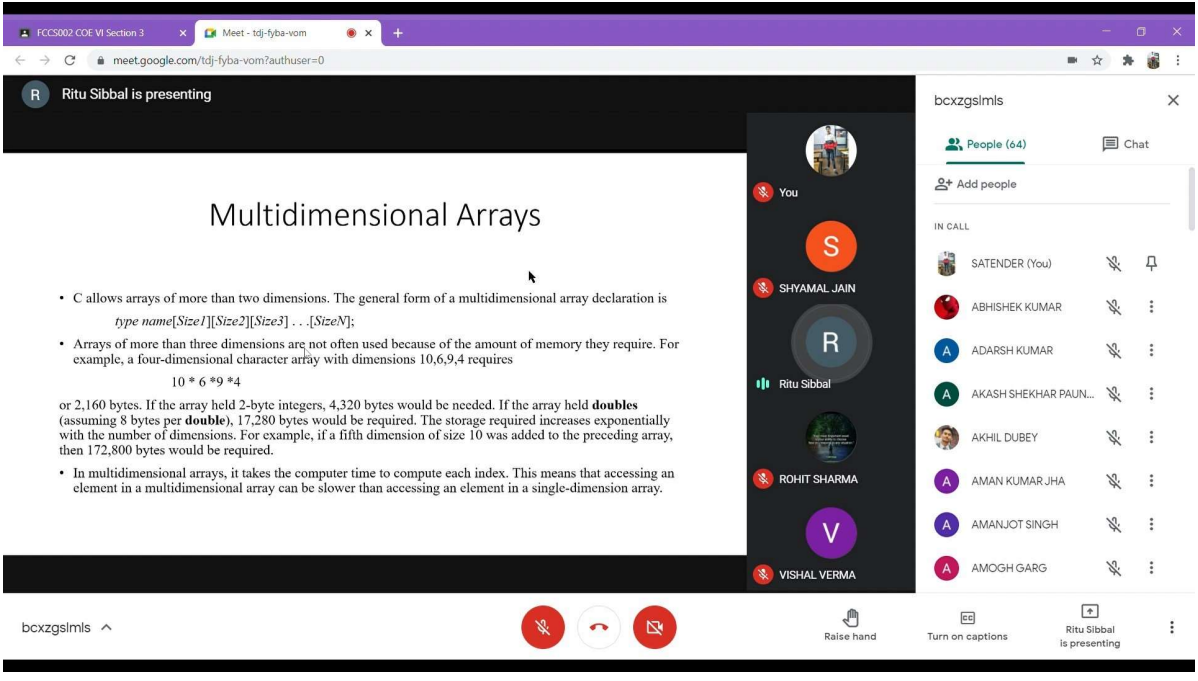
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Multidimensional Arrays
• C allows arrays of more than two dimensions. The general form of a multidimensional array declaration is
type name[Size1][Size2][Size3] . . .[SizeN];
• Arrays of more than three dimensions are not often used because of the amount of memory they require. For example, a four-dimensional character array with dimensions 10,6,9,4 requires
10 * 6 *9 *4
or 2,160 bytes. If the array held 2-byte integers, 4,320 bytes would be needed. If the array held doubles (assuming 8 bytes per double), 17,280 bytes would be required. The storage required increases exponentially with the number of dimensions. For example, if a fifth dimension of size 10 was added to the preceding array, then 172,800 bytes would be required.
• In multidimensional arrays, it takes the computer time to compute each index. This means that accessing an element in a multidimensional array can be slower than accessing an element in a single-dimension array.
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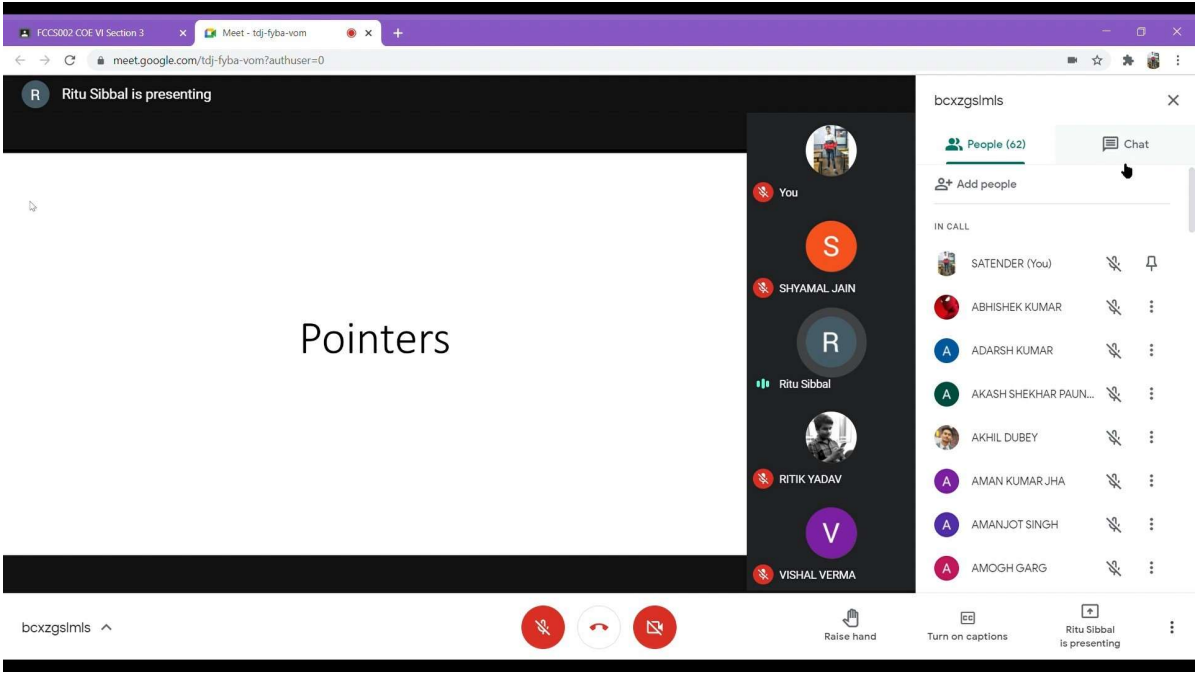
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Pointers
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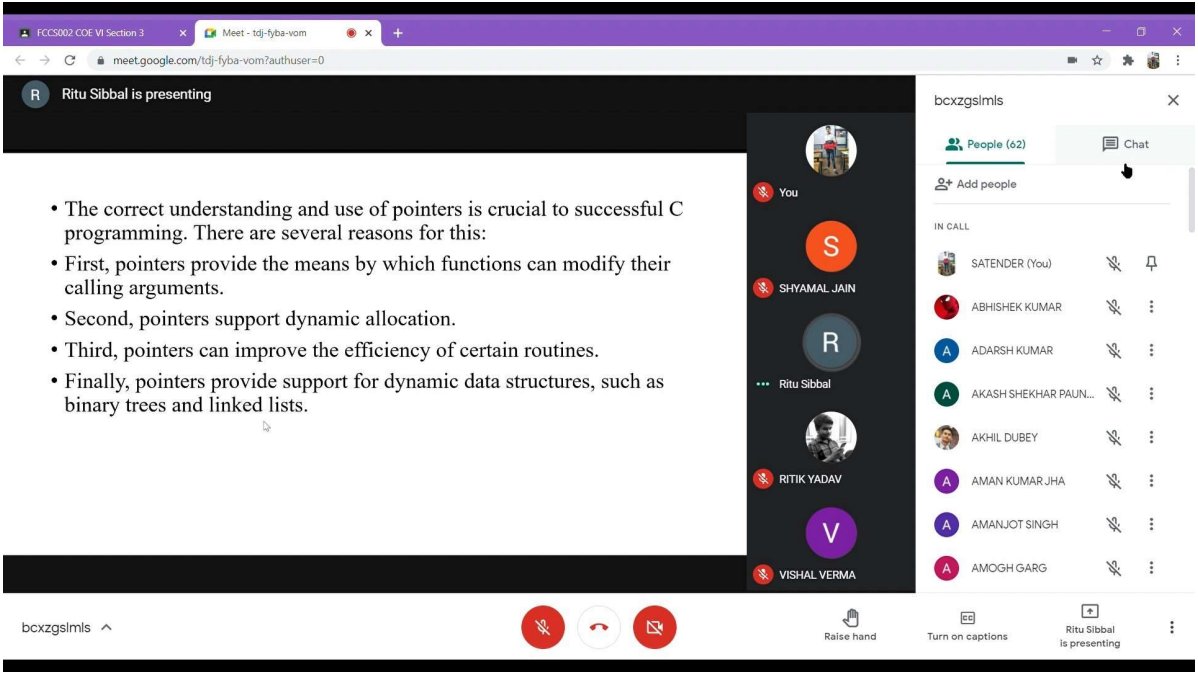
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Ritu Sibbal is presenting
• The correct understanding and use of pointers is crucial to successful C programming. There are several reasons for this:
• First, pointers provide the means by which functions can modify their calling arguments.
• Second, pointers support dynamic allocation.
• Third, pointers can improve the efficiency of certain routines.
• Finally, pointers provide support for dynamic data structures, such as binary trees and linked lists.
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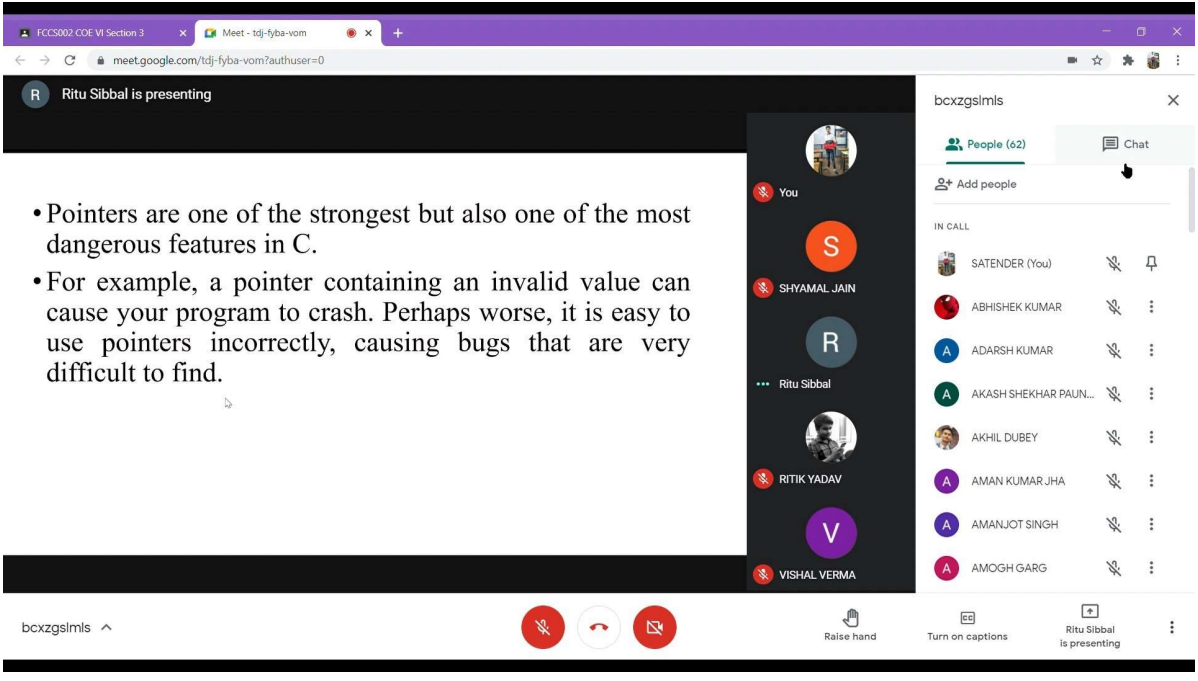
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• Pointers are one of the strongest but also one of the most dangerous features in C.
• For example, a pointer containing an invalid value can cause your program to crash. Perhaps worse, it is easy to use pointers incorrectly, causing bugs that are very difficult to find.
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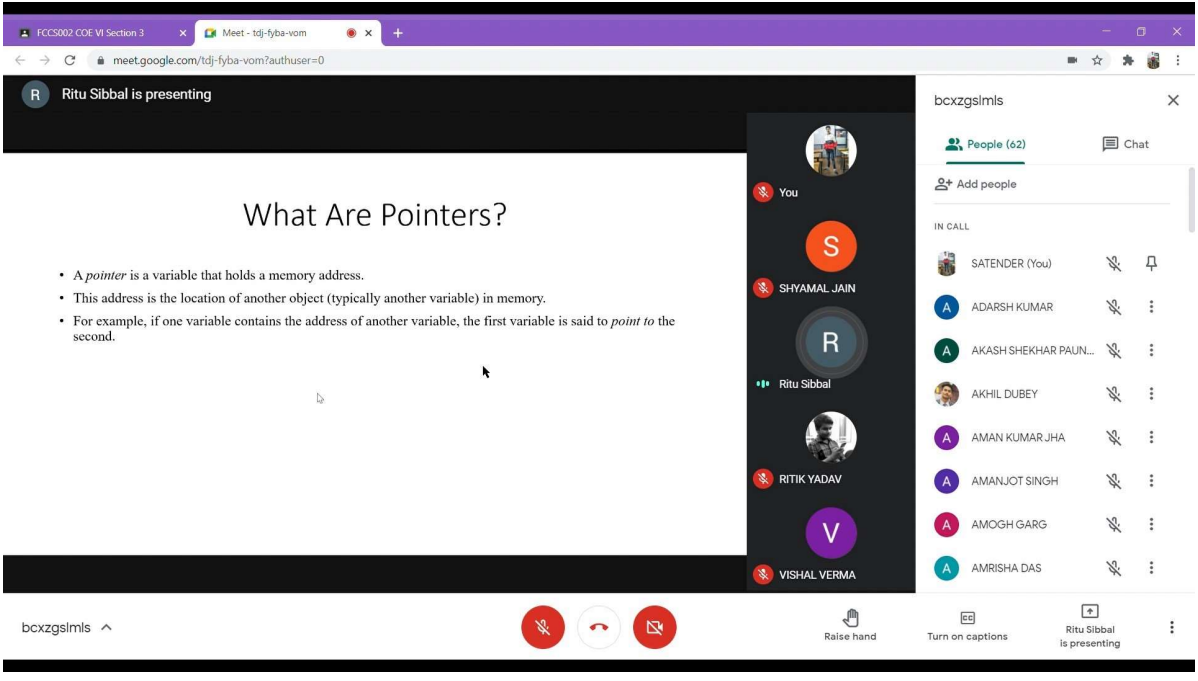
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What Are Pointers?
A pointer is a variable that holds a memory address.
This address is the location of another object (typically another variable) in memory.
For example, if one variable contains the address of another variable, the first variable is said to point to the second.
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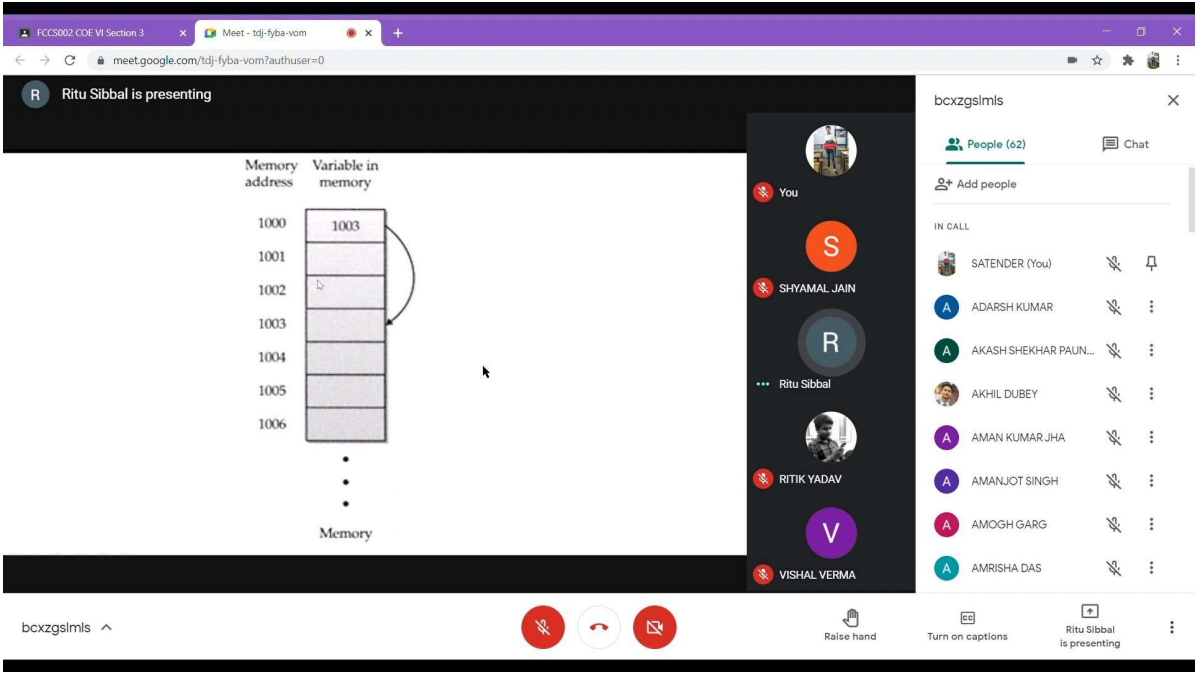
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Memory address
Variable in memory
1000
1001
1002
1003
1004
1005
1006
1003
Memory
You
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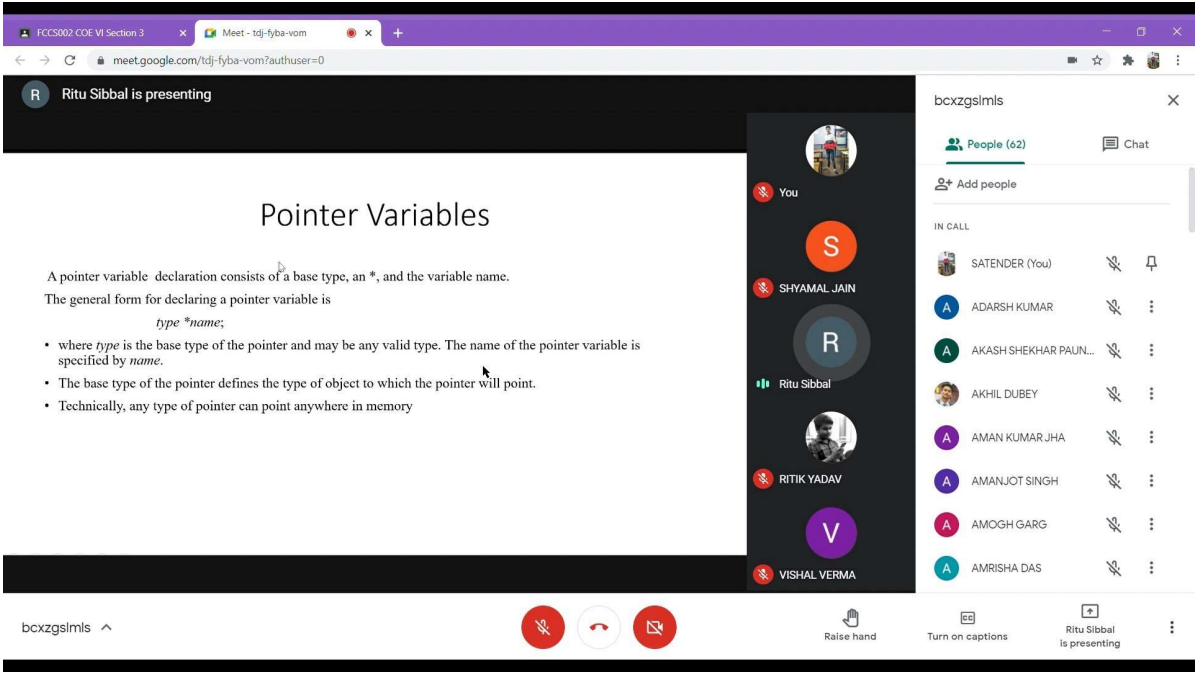
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Pointer Variables
A pointer variable declaration consists of a base type, an *, and the variable name.
The general form for declaring a pointer variable is
type *name;
where type is the base type of the pointer and may be any valid type. The name of the pointer variable is specified by name.
The base type of the pointer defines the type of object to which the pointer will point.
Technically, any type of pointer can point anywhere in memory
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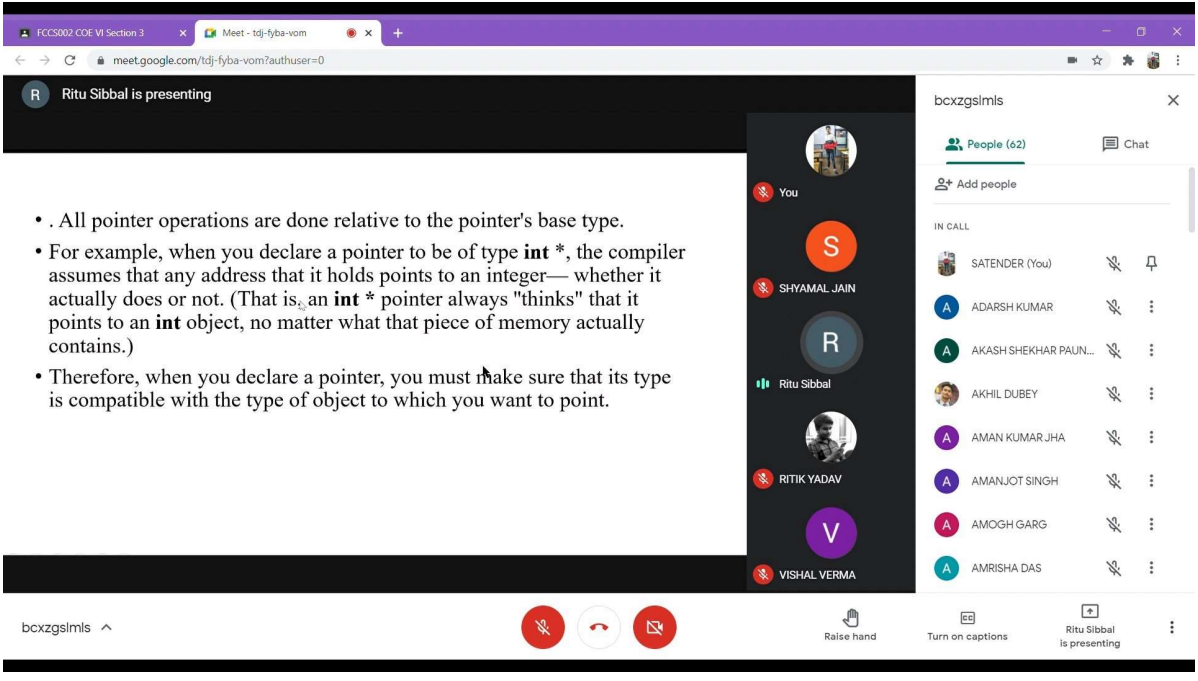
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• . All pointer operations are done relative to the pointer's base type.
• For example, when you declare a pointer to be of type int *, the compiler assumes that any address that it holds points to an integer— whether it actually does or not. (That is, an int * pointer always "thinks" that it points to an int object, no matter what that piece of memory actually contains.)
• Therefore, when you declare a pointer, you must make sure that its type is compatible with the type of object to which you want to point.
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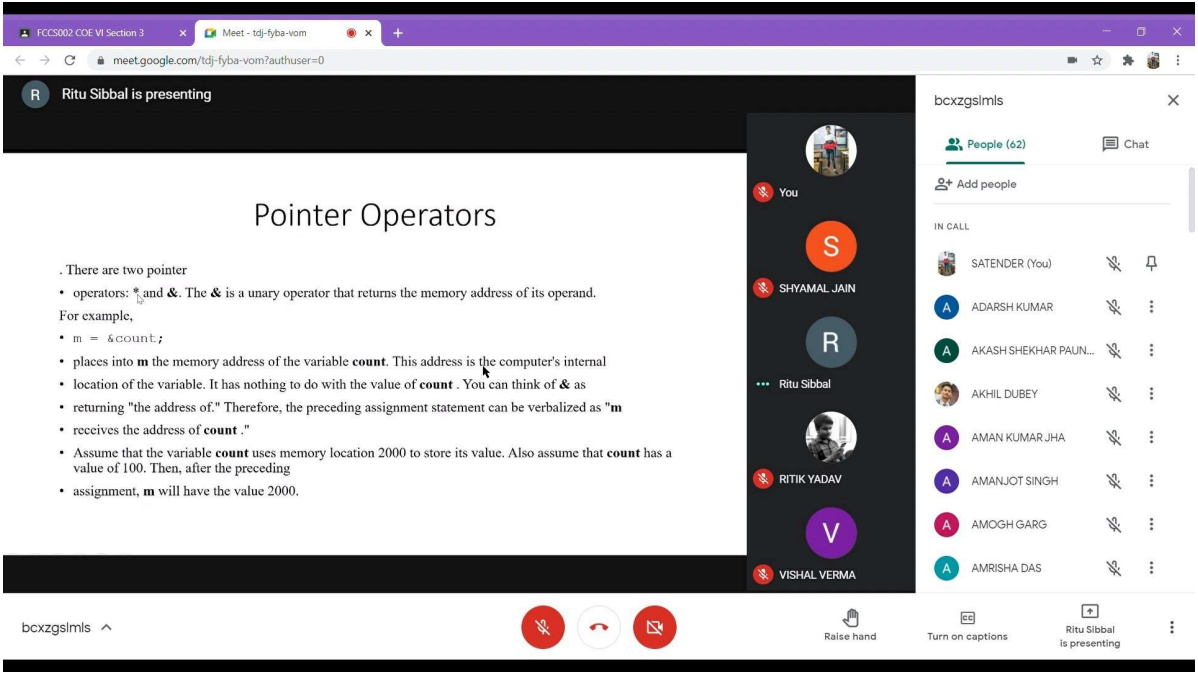
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Pointer Operators
. There are two pointer
• operators: * and &. The & is a unary operator that returns the memory address of its operand.
For example,
• m = &count;
• places into m the memory address of the variable count. This address is the computer's internal
• location of the variable. It has nothing to do with the value of count . You can think of & as
• returning "the address of." Therefore, the preceding assignment statement can be verbalized as "m
• receives the address of count ."
• Assume that the variable count uses memory location 2000 to store its value. Also assume that count has a value of 100. Then, after the preceding
• assignment, m will have the value 2000.
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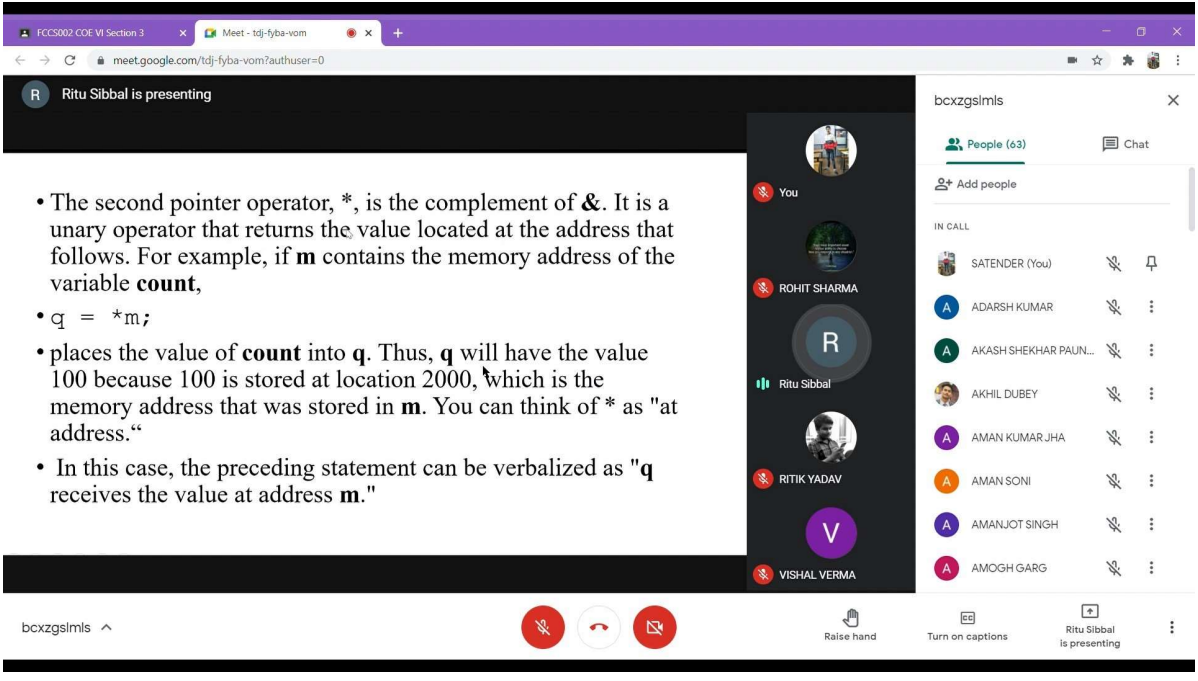
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• The second pointer operator, *, is the complement of &. It is a unary operator that returns the value located at the address that follows. For example, if m contains the memory address of the variable count,
• q = *m;
• places the value of count into q. Thus, q will have the value 100 because 100 is stored at location 2000, which is the memory address that was stored in m. You can think of * as "at address."
• In this case, the preceding statement can be verbalized as "q receives the value at address m."
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