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# POINTER IN C

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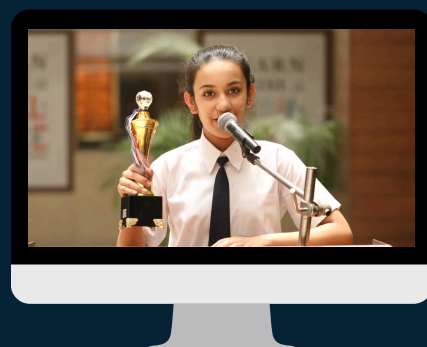
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In C programming, a pointer is a variable that stores the memory address of another variable. Pointers are a powerful feature of C and allow for efficient manipulation of data and memory.



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## Declaration of a Pointer

A pointer is declared using the

\* operator.:

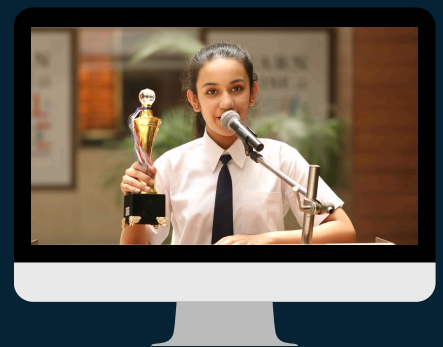
**Syntax:**

```
data_type *pointer_name;
```

**Example:**

```
int *p; // Pointer to an integer  
char *c; // Pointer to a character
```

“जिस दिन एक सिग्नेचर ऑटोग्राफ में बदल जाए तब मान लीजिएगा कि आप कामयाब हो गए।”



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# Initialization of a Pointer:

A pointer must be initialized with the address of a variable using the address-of operator (&)

## Example:

```
int x = 10;  
int *p = &x; // p stores the address of x
```

## Dereferencing a Pointer

Dereferencing a pointer means accessing the value stored at the memory address it points to, using the \* operator.

```
int x = 10;  
int *p = &x;  
printf("Value of x: %d\n", *p); // Output: 10
```

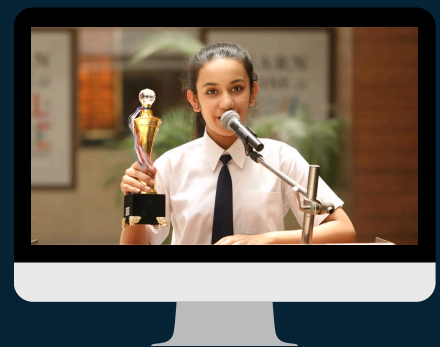


# Pointer Arithmetic

You can perform arithmetic operations on pointers (e.g., increment, decrement) to traverse memory locations.

## Example:

```
int arr[] = {10, 20, 30};  
int *p = arr;  
printf("%d\n", *p); // Output: 10  
p++;  
printf("%d\n", *p); // Output: 20
```



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# Common Uses of Pointers

1. Dynamic Memory Allocation
2. Passing by Reference
3. Arrays and Strings:

## Advantages of Pointers

1. Efficient manipulation of arrays and strings.
2. Allows dynamic memory allocation.
3. Enables passing large structures to functions without copying.
4. Provides the foundation for advanced data structures.

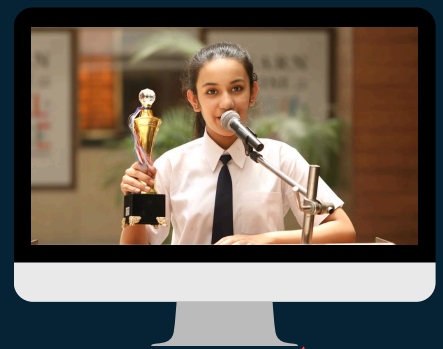
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# Disadvantages of Pointers

- Misuse can lead to errors like segmentation faults and memory leaks.
- Dangling pointers and uninitialized pointers can cause undefined behavior.
- Debugging pointer-related bugs can be challenging.

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