C++ OOP Concepts: const, static, virtual, friend

1. const Keyword

const Variable:

- Immutable after initialization

- Must be initialized immediately

const Function:

- Declared like: void show() const;

- Does not modify any class member

- Can be used with const objects

2. static Keyword

static Variable:

- Shared among all instances of a class

- Stored in static memory

static Function:

- Belongs to class, not instance

- Cannot access instance variables or this pointer

3. virtual Function

- Supports runtime polymorphism

- Allows overriding in derived classes

- Uses virtual table (vtable) under the hood

4. friend Function & Class

friend Function:

- Defined outside class but has access to private/protected members

friend Class:

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- One class grants another full access to its private/protected members

Feature Comparison Table

Feature	Characteristics	Advantages	Disadvantages
const	Immutable	Safe, clear	Inflexible
static var	Class-level shared	Memory efficient	Thread issues
static func	No this pointer	Utility, class access	No instance data
virtual	Runtime dispatch	Polymorphism	Slow, complex
friend func	External access	Operator overloads	Breaks encapsulation
friend class	Full internal access	Cooperation between classes	Tight coupling