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**Assignment 1**

**Problem Statement**: Develop an object oriented program in C++ to create a database of student information system containing the following information: Name, Roll number, Class, division, Date of Birth, Blood group, Contact address, telephone number, driving license no. etc Construct the database with suitable member functions viz, static member functions, friend class/ friend function, this pointer, inline code and dynamic memory allocation operators-new and delete. Implement all the keywords as mentioned in the problem statement.

# **Aim of Assignment:** To understand the concepts of static member functions and data members, friend class/function, ‘this’ pointer, inline code, and the new and delete operators.

# **Description:**  In this program, we have a class called ‘Student\_Database’. First we create a constructor to give initial values to all the variables. The format in which the data is expected to be inputted is displayed by the inline function ‘format’. Function ‘accept’ is next, which accepts the data, while simultaneously checking for errors. Function ‘display’ is used to actually print the given data.

# In the main() method, we first accept the number of students whose data is to be entered, and using an array of objects, the same functions are invoked over and over.

**Algorithm**:

Step 1: Start

Step2: Create class person, and define variables and create a default and parameterized constructor

Step3: Define the functions like display.

Step4: Create a switch case

Step5: Accept choice

Step6: Perform functions as per choice

Step7: Repeat until while(true)

Step8: End

**Concepts Used**: In order to solve the problem statement the concepts used were

1. Static member :
2. **Static variables in a Function**: When a variable is declared as static, space for it gets allocated for the lifetime of theprogram. Even if the function is called multiple times, space for the static variable is allocated only once and the value of the variable in the previous call gets carried through the next function call.
3. **Static variables in a class**: As the variables declared as static are initialized only once as they are allocated space in separate static storage so, the static variables in a class are shared by the objects**.** There can not be multiple copies of the same static variables for different objects. Also because of this reason static variables can not be initialized using constructors
4. Friend Function: Like friend class, a friend function can be given special grant to access private and protected members. A friend function can be:  
   a) A method of another class  
   b) A global function
5. This pointer: In C++, this pointer is used to represent the address of an object inside a member function. For example, consider an object obj calling one of its member functions say method() as obj.method(). Then, this pointer will hold the address of object obj inside the member function method(). The this pointer acts as an [implicit argument](http://stackoverflow.com/questions/3057859/whats-the-difference-between-explicit-and-implicit-assignment-in-c) to all the member functions.
6. Inline code: C++ provides an inline functions to reduce the function call overhead. Inline function is a function that is expanded in line when it is called. When an inline function is called whole code of the inline function gets inserted or substituted at the point of inline function call.
7. New and Delete operator: The new operator denotes a request for memory allocation on the Heap. If sufficient memory is available, new operator initializes the memory and returns the address of the newly allocated and initialized memory to the pointer variable. Since it is a programmer's responsibility to deallocate dynamically allocated memory, programmers are provided delete operator by C++ language.
8. Inheritance: The capability of a class to derive properties and characteristics from another class is called **Inheritance**. Inheritance is one of the most important features of Object Oriented Programming.  
   **Sub Class:** The class that inherits properties from another class is called Subclass or Derived Class.  
   **Super Class:**The class whose properties are inherited by the subclass is called Base Class or Super class.
9. Access Modifiers: Access modifiers are used to implement an important feature of Object-Oriented Programming known as [Data Hiding](https://practice.geeksforgeeks.org/problems/what-is-data-hiding). Consider a real-life example:  
   The Indian secret informatic system having 10 senior members have some top secret regarding national security. So we can think that 10 people as class data members or member functions who can directly access secret information from each other but anyone can’t access this information other than these 10 members i.e. outside people can’t access information directly without having any privileges. This is what data hiding is.  
   Access Modifiers or Access Specifiers in a [class](https://www.geeksforgeeks.org/c-classes-and-objects/) are used to set the accessibility of the class members. That is, it sets some restrictions on the class members not to get directly accessed by the outside functions.

There are 3 types of access modifiers available in C++:

Public

Private

Protected

**Conclusion:**  Hence, we have successfully created a basic student database management system which uses OOP concepts like friend functions for efficient working.