OOP

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Assignment no. 2 SEA

Title :- Database of student's information system.

Problem statement :

Develop a program in C++ to create a database of student's information system containing the following info- Name, Rollno, class, Div, DOB. Blood grp, mobile no, adress, Driving license no. & other. make use of Constructor, default constructor, copy constructor, destructor, static member functions, friend class, this pointer, inline code & dynamic memory allocation operators- new & delete as well as exception handling.

Aim :- To learn about oop, friend function, Constructors & destructors, static member functions etc & implement them in program.

Prerequisites :- Basics of oop, classes, objects & member functions, C++ ide & compiler.

Theory :-

1) class :-

It is the one of the most used feature of oop. class is nothing but encapsulation of data & coding. classes are an expanded version structures. structure can contain multiple variables.

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Classes can contain multiple variables, also contains functions as class member.
A class definition starts with keyword class followed by class name & the class body, enclosed by a pair of curly braces.

e.g.
```
class student
{ public:
  data members;
  member functions;
};
```

2) Objects:
When class is defined, only the specification for the object is defined; no memory is allocated.
To use the data & access functions defined in the class, we need to create objects.
Syntax: to define object:
```
class name objectVariableName;
```

3) Constructor:
A class constructor is a special member function of class that is executed whenever we create new objects of that class. Every time an instance of a class is created the constructor method is called.
The constructor has the same name as the class & doesn't return any type (not even void)

Constructors are very useful for setting initial values for certain member variables.
Constructors can be defined either inside class definition or outside class definition using class name & scope resolution :: operator.
→ A constructor can never be private.

Constructor declaration & definition:

```
class student
{ int s;
  public:
  student();  <- // constructor declared
};

student :: student()   // Constructor definition
  ↑          ↑
 class name  constructor
{
  s = 0;
}
```

Types of constructors :-

1. Default
2. Parameterized
3. Copy

1. Default :- is the constructor which doesn't take any arguement. It has no parameter.

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② Parameterised :- There are the constructors with parameter. Using these constructors we can provide diff. values to data members of diff. objects, by passing appropriate values as argument.

③ Copy constructor :-
These are special type of constructors which takes an object as argument, & is used to copy values of data members of one object into other object.

e.g.
```
int main()
{ student S1;
  S1.name = "MAHESH"
  student S2(S1); ← copy constructor.
  Cout << S2.name;
}
```

4) Destructor:
A destructor is a special member function of a class that is executed whenever an object of its class goes out of scope or whenever the delete expression is applied to a pointer to the object of that class. A destructor will have exact same name as the class, prefixed with a tilde (~)

e.g.
```
~ student ()
{
}
```

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5) friend class & function:

A friend function is a function that has access to the private & protected data of the class. We declare a friend function using friend keyword inside body of the class.

syntax:

```
class classname
{ - - - -
  friend returntype functionname(arg);
} - - - -
```

we can also use a friend class in c++ using friend keyword.

when a class is declared a friend class, all the members functions of the friend class become friend functions.

e.g.

```
class classB;
class classA
{ friend class classB;
} - - -
class classB
{ - - - -
}
```

(6)

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6) This pointer

In c++, this pointer is used to represent the address of an object inside a member function.

e.g. Consider an object obj calling one of its member function say method() as obj.method().

Then, this pointer will hold the adress of object obj inside the member function method().

The this pointer acts as implicit argument to all the member functions.

e.g. this -> datamember = a ;

7) Dynamic memory allocation operators.

Many times, we are not aware in advance how much memory we will need to store particular information in a defined variable & the size of required memory can be determined at runtime.

New :- we can allocate memory at runtime within the heap for the variable of a given type using special operator in c++ which returns the adress of space allocated. This operator is called new operator.

Delete : If we are in need of dynamically allocated memory anymore, we will use delete operator, which deallocates memory that was previously allocated by new operator.

Conclusion:-

- The theory & analysis of OOP concepts was done.
- Implemented the student database system using different elements of OPP in C++.