Virtual Functions

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What is a virtual Function?

- A virtual function is a member function which is declared within base class and is re-defined (Overrriden) by derived class.

- When you refer to a derived class object using a pointer or a reference to the base class, you can call a virtual function for that object and execute the derived class's version of the function.
Run time polymorphism

- Virtual Functions provide late binding:

  Compile-time (early binding) (overloading of functions)
  VS
  run-time(late binding) (overriding of functions)
Rules for Virtual Functions

- They Must be declared in public section of class.
- Virtual functions cannot be static and also cannot be a friend function of another class.
- Virtual functions should be accessed using pointer or reference of base class type to achieve run time polymorphism.
- The prototype of virtual functions should be same in base as well as derived class.
- They are always defined in base class and overridden in derived class. It is not mandatory for derived class to override (or re-define the virtual function), in that case base class version of function is used.
- A class may have virtual destructor but it cannot have a virtual constructor.
Syntax:

class base
{
    public:
        virtual void print()
        { cout<<"print base class"<<endl; }
};

class derived: public base
{
    public:
        void print()
        { cout<<"print derived class"<<endl; }
};
Example

class base
{
public:
    virtual void print ()
    { cout<< "print base class" <<endl; }

    void show ()
    { cout<< "show base class" <<endl; }
};

class derived: public base
{
public:
    void print ()
    { cout<< "print derived class" <<endl; }

    void show ()
    { cout<< "show derived class" <<endl; }
};

int main()
{
    base *bp;
    derived d;
    bp = &d;

    //virtual function, bind-ed at runtime
    bp->print();

    // Non-virtual function, bind-ed at compile time
    bp->show();
}

Output:
print derived class
show base class