Classes

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The 3 Pillars of Object-Oriented Paradigm

1. Encapsulation
2. Inheritance
3. Polymorphism
Inheritance

- One of the most important aspect of object oriented systems.

- A new class can inherit **reuse the behavior and structure** of previously defined classes.

- The Sub-Classes (Derived Classes) can **extend or add more functionality** (i.e. methods and instance variables) to the base class.

- Inheritance is a **natural tool to express relationships** such as classification, specialization, generalization, evolution and approximation.
Example of Encapsulation:

class Car
{
  private: // Private Data
    string color;
    int year;
    string make;
    string model;

  public: // Public Methods
    void PrintColor(void);
    void SetColor(string clr);
};
Functions of a class

void Car::PrintColor(void)
{
    cout << "The Color = " << color;
}

//------------------------------

void Car::SetColor(string clr)
{
    color = clr;
}
Inheritance

- Important aspect of object oriented systems.
- A new class can inherit **reuse the behavior and structure of previously defined classes**.
- The Sub-Classes (Derived Classes) can **extend or add more functionality** to the base class.
- Promotes code reuse
Example of Inheritance:

// The SUPER_CAR class Inherits from the CAR class
// and add extends the class by adding a new attribute
// and two new methods.

class Super_Car : public Car // Inherits
from the CAR class
{
private:
    string SuperAttribute;
public:
    string GetSuperAttribute() {
        return SuperAttribute;
    }

    void SetSuperAttribute(string SuperAttr)
    {
        SuperAttribute = SuperAttr;
    }
};
Example of Inheritance:

```cpp
#include <iostream>
#include <string>
#include "Car.h"
#include "Super_Car.h"
using namespace std;

void main()
{
    Car MyCar;    // MyCar is an object of type Car
    MyCar.SetColor("GREEN");
    MyCar.PrintColor();

    Super_Car BatMobil; // BatMobile is an object of type SuperCar
    BatMobil.SetColor("BLACK");
    BatMobil.SetSuperAttribute("Goes Real Fast!!");
    BatMobil.PrintColor();
}
```
What are some example of real-life inheritance

- Person -- employee
- Person -- student
- Shape -- circle
- Shape -- rectangle
- Mammal -- human
- Mammal -- dog
- Employee -- Employee-hourly
- Employee -- Employee-salary
- ?
Example of Inheritance

https://www.python-course.eu/python3_inheritance.php
INHERITANCE:
improve code readability and enable the reuse of functionality

heart
blood
breath() 
birth()

ANIMAL

MAMMAL

heart
blood
4 chambered heart
warm
birth(child)

REPTILE

heart
blood
3 chambered heart
cold
brith(egg)

WHALE

DOG

CROCODILE

SNAKE

http://magizbox.com/training/platform/site/oop/
http://javarevisited.blogspot.com/2013/06/why-favor-composition-over-inheritance-java-oops-design.html