Object

Day05_02

OBJECTS

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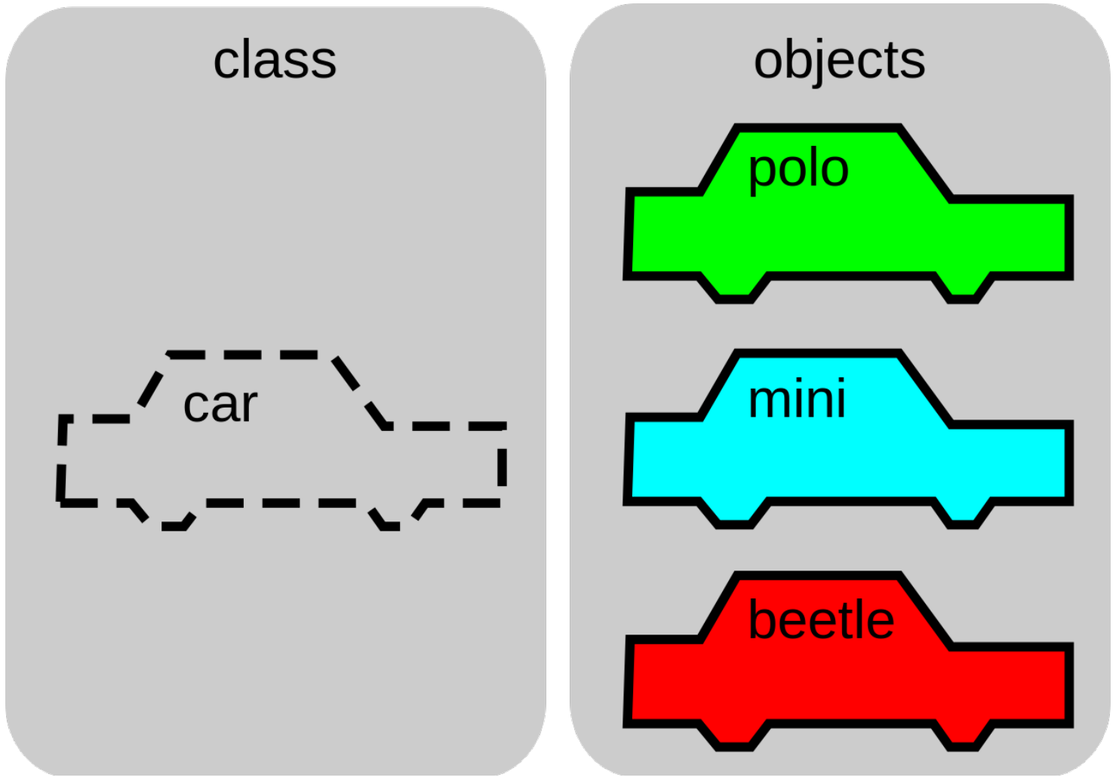
Objects are complex customizable data structures within a program.

Like functions, they are aimed at creating modular, reusable code.

However, objects can contain multiple values and even multiple functions within a single structure.

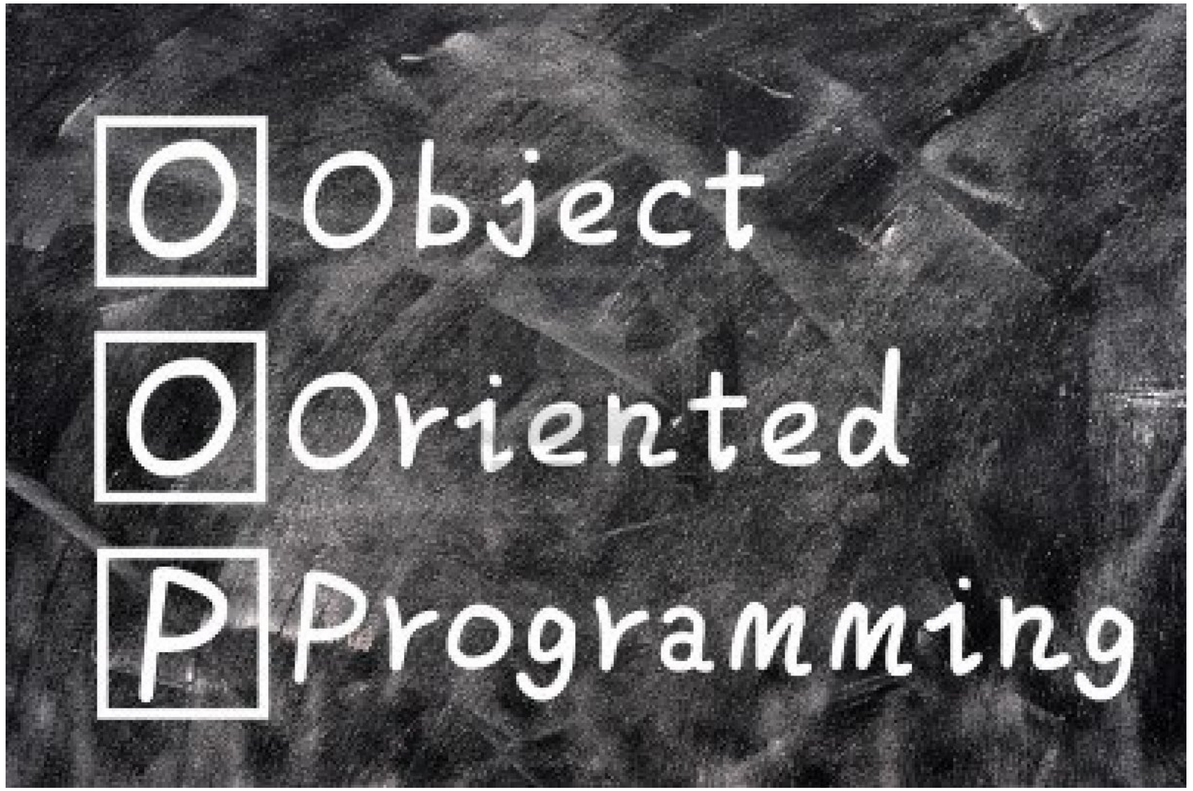
Object和function的目标一样，目标是将代码模块儿化，重复使用，而object可以包含多个变量和多个function.



OBJECT ORIENTED PROGRAMMING丨面向对象编程

Over time, several approaches or methodologies have developed around the problems of programming, and using objects is one such approach.
Programming with objects is called Object Oriented Programming (OOP).

使用object的编程被称作：面向对象编程



CLASSES

In Processing and many other languages objects are instances of classes.

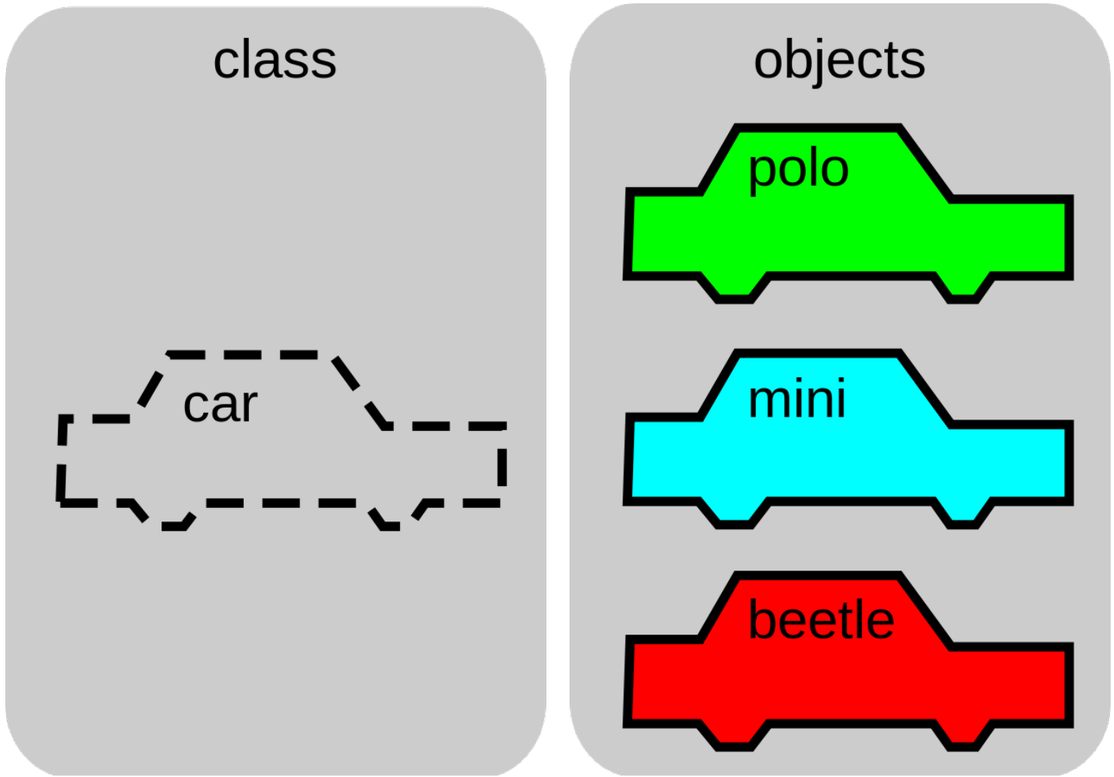
A class is a grouping of related data and subroutines.

Think of a class as a design or blueprint for something and the object as the instance or execution of that class.

A class is like a cookie cutter. Objects are the cookies made by a class.

在Processing和很多其他语言中，object是Class的instance

Instance：示例，个例，特例



FIELDS (VARIABLES & CONSTANTS)

A variable or constant that is defined within a class is called a field in processing and Java.
Some other languages refer to fields as properties.
Fields should be closely related to the class and its purpose within your program.

在class内部定义的Variable被称作field （processing / java中的名词），其他语言中也称之为properties，field只能和相应的class一起出现使用

VARIABLE SCOPE|作用域

Where you declare your variable in your program has an effect on where within the program that variable is available, this is referred to as scope.

变量的有效区间位置和变量声明的位置相关，这个区间 / 位置称之为作用域。

METHODS (FUNCTIONS)

A function that is defined within an object is called a method.

Methods should also be closely related to the object and its purpose within your program.

Class内定义的function称之为method，
method只能和相应的class一起使用

CLASS DECLARATION EXAMPLE|示例

```
class Dog {
   String breed;
   color black;
   Dog (String b, color c) {
      breed = b;
      black = c;
   }
   void bark()
      { println("Woof!");
   }
}
```

OBJECT INSTANTIATION & CONSTRUCTORS

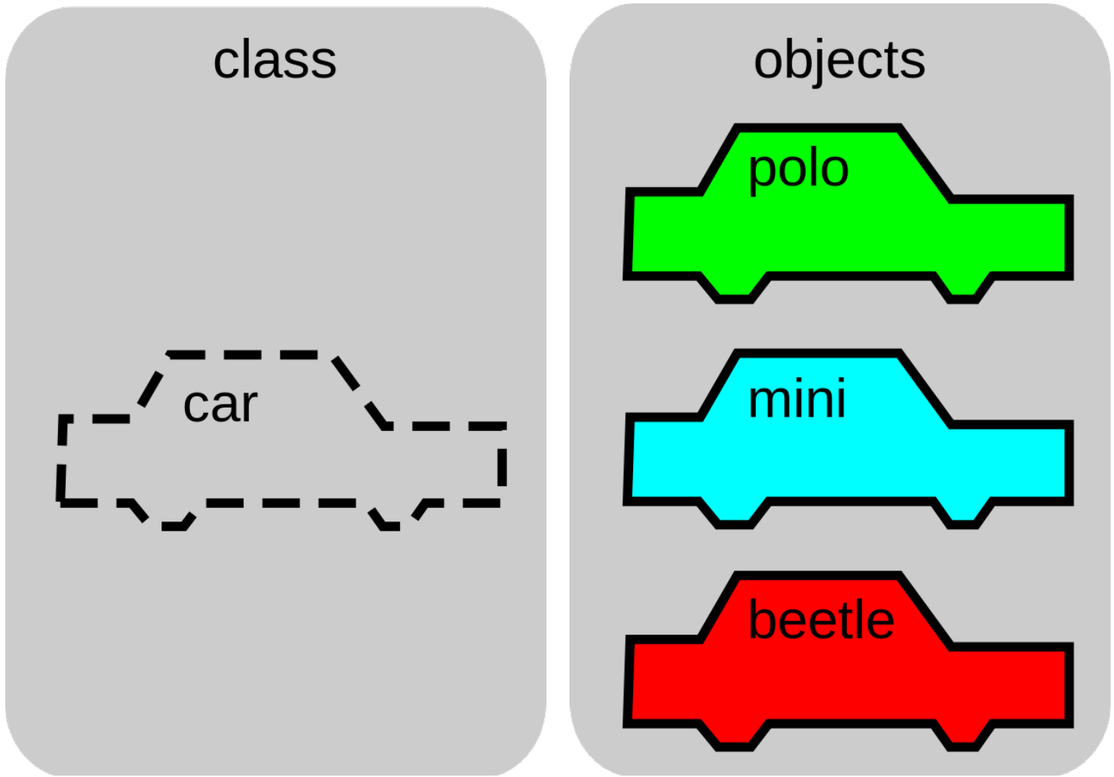
To instantiate an object means to make a new copy of the object.

Classes contain a special method, called a constructor, which initializes the object when it is instantiated.

To create an instance of a class you use the new keyword as you call the constructor function.

新建一个instance即是创造class的一个新示例

Class内含一个封装的method－constructor， 用以新建instance，关键词为new



‘NEW’ KEYWORD

Constructors, like other functions, can accept parameters.

These parameters can be used to define unique qualities among a group of objects created using the same class.

To create an instance of a class you use the ‘new’ keyword as you call the constructor function

Dog spot = new Dog;

Constructor作为一个function，也需要parameter输入

OBJECT INSTANTIATION EXAMPLE｜示例

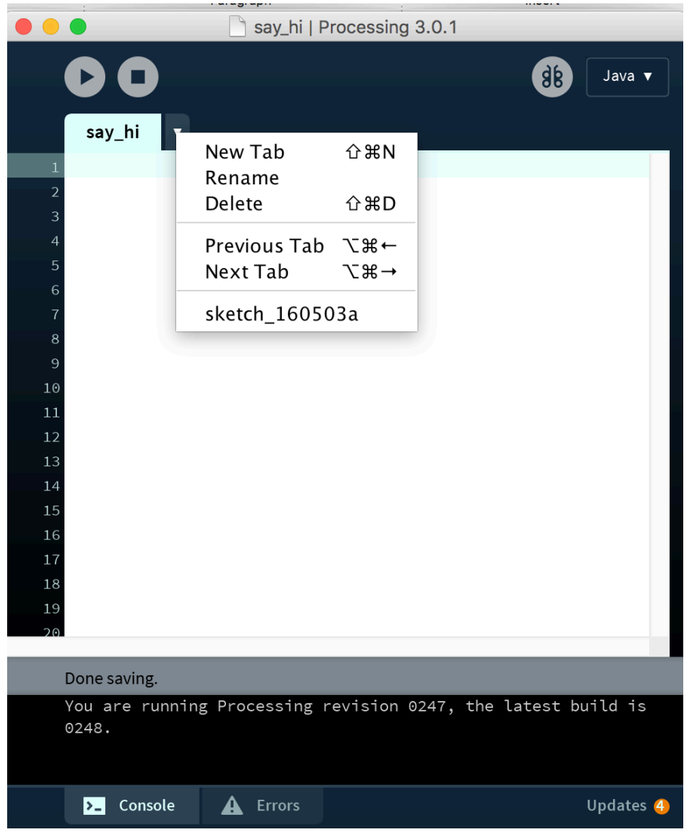
```
Dog spot = new Dog("Terrier", color(0));

spot.bark();
```

USING TABS

Your Processing sketch starts with a single primary tab, but you can easily create new tabs to help organize your code as your sketch grows in complexity.

It is pretty typical to put classes into their own tab.

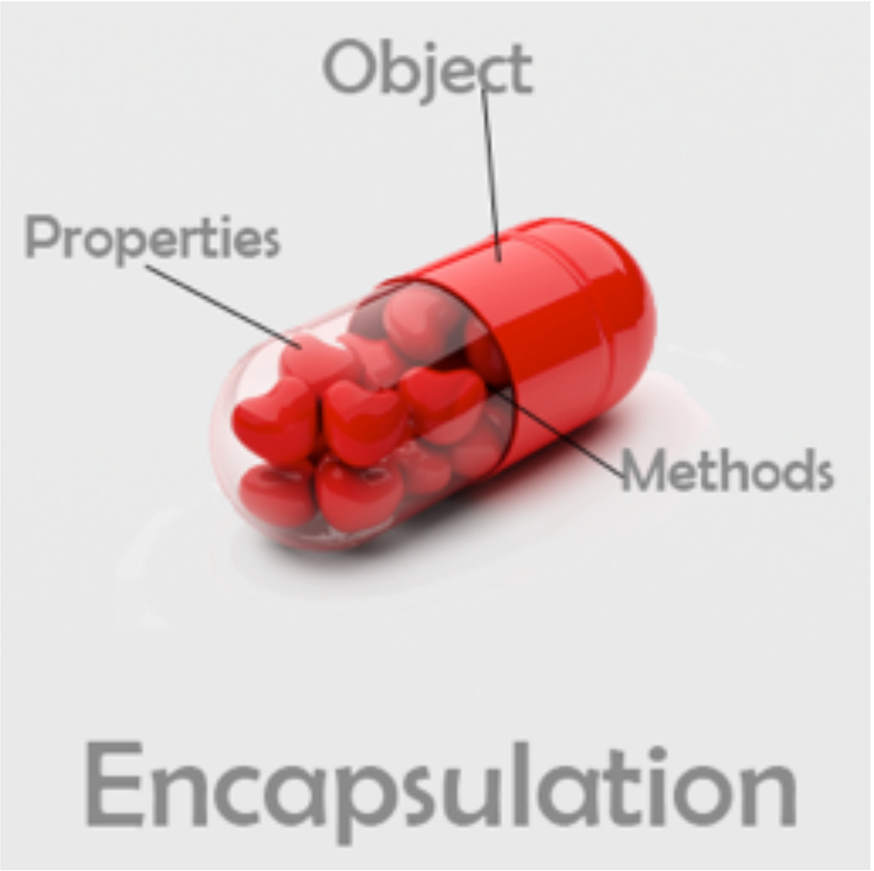
Processing可以tab管理代码，而将class文件放到一个新的tab中是很常见的做法



ENCAPSULATION｜封装

Object oriented programming provides encapsulation (bundling and protection) of data.
Encapsulation can be used to restrict access to and to keep fields and methods safe from the general program and from accidental misuse.
The public and private keywords can be used to allow and disallow access.

This keyword is used to disallow other classes access to the fields and methods within a class. The private keyword is used before a field or method that you want to be available only within the class. In Processing, all fields and methods are public unless otherwise specified by the private keyword.



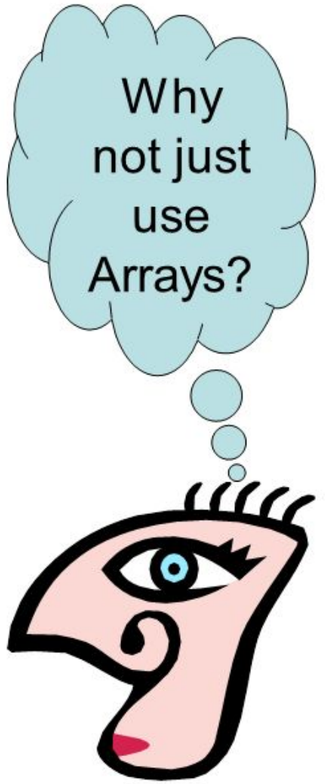
ARRAYLISTS

ARRAYLISTS

Arraylists are a dynamically resizable variable type designed to store multiple objects.
Arraylists are based on Java Lists, and are more convenient than arrays for storing objects, because of their dynamically resizable nature.
Arraylists have a size() method rather than a length field, but it serves the same purpose.

Arraylist是个动态可改变尺寸的变量类型，某些情况下比arraylist方便，因为它的动态尺寸。对应于array的length（），arraylist有size（）function

Java ArrayLists



ARRAYLIST USAGE EXAMPLE｜示例

```
ArrayList<Dog> puppies;

puppies = new ArrayList<Dog>();

puppies.add(new Dog(10, 10, 50));

for (int i = puppies.size()-1; i >= 0; i--) {
   Dog puppy = puppies.get(i);
   puppy.bark();
}

puppies.remove(0);
```