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This slide deck consists of slides used in 2 lecture videos in Week 3. Below is a list of shortcut hyperlinks for you to jump into specific sections.

Object Oriented Programming in JavaScript

- Dr. Charles Severance
- www.dj4e.com

http://www.dj4e.com/code/javascript-objects
http://www.dj4e.com/code/javascript-objects.zip

Definitions

- Class - a template - Dog
- Method or Message - A defined capability of a class - bark()
- Attribute - A defined data item in a class - color
- Object or Instance - A particular instance of a class - Lassie

Terminology: Class

Defines the abstract characteristics of a thing (object), including the thing's characteristics (its attributes, fields, or properties) and the thing's behaviors (the things it can do, or methods, operations, or features). One might say that a class is a blueprint or factory that describes the nature of something. For example, the class Dog would consist of traits shared by all dogs, such as breed and fur color (characteristics), and the ability to bark and sit (behaviors).

http://en.wikipedia.org/wiki/Object-oriented_programming

Terminology: Class

A pattern (exemplar) of a class. The class of Dog defines all possible dogs by listing the characteristics and behaviors they can have; the object Lassie is one particular dog, with particular versions of the characteristics. A Dog has fur; Lassie has brown-and-white fur.

http://en.wikipedia.org/wiki/Object-oriented_programming

Terminology: Instance

One can have an instance of a class or a particular object. The instance is the actual object created at runtime. In programmer jargon, the Lassie object is an instance of the Dog class. The set of values of the attributes of a particular object is called its state. The object consists of state and the behavior that's defined in the object's class.

Object and Instance are often used interchangeably.

http://en.wikipedia.org/wiki/Object-oriented_programming

Terminology: Method

An object's abilities. In language, methods are verbs. Lassie, being a Dog, has the ability to bark. So bark() is one of Lassie's methods. She may have other methods as well, for example sit() or eat() or walk() or save_timmy(). Within the program, using a method usually affects only one particular object; all Dogs can bark, but you need only one particular dog to do the barking

Method and Message are often used interchangeably.

http://en.wikipedia.org/wiki/Object-oriented_programming

Objects in JavaScript

- The OO pattern in JavaScript is a little different.
- The function is indeed a store and reuse pattern.
- The function keyword returns a value which is the function itself - it makes a function!

First-Class Functions

In computer science, a programming language is said to have first-class functions if it treats functions as first-class citizens. Specifically, this means the language supports passing functions as arguments to other functions, returning them as the values from other functions, and assigning them to variables or storing them in data structures.

http://en.wikipedia.org/wiki/First-class_function

A Sample Class

```
function PartyAnimal() {
    this.x = 0;
    this.party = function () {
        this.x = this.x + 1;
        console.log("So far "+this.x);
    }
}

an = new PartyAnimal();

an.party();
an.party();
an.party();
```

This is the template for making PartyAnimal objects.

Each PartyAnimal object has a bit of data.

Each PartyAnimal object has a bit of code.

Create a PartyAnimal object

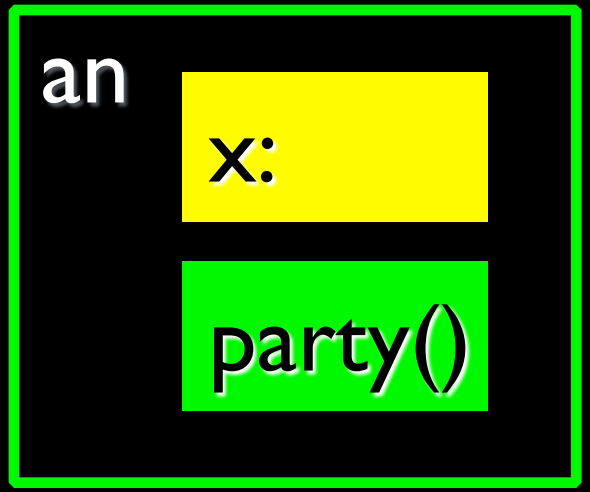
Tell the object to run the party() code.

js01.htm

```
function PartyAnimal() {
    this.x = 0;
    this.party = function () {
        this.x = this.x + 1;
        console.log("So far "+this.x);
    }
}

an = new PartyAnimal();

an.party();
an.party();
an.party();
```




```
So far 1
So far 2
So far 3
```

js-01.htm

Object Life Cycle

- http://en.wikipedia.org/wiki/Constructor_(computer_science)

Object Life Cycle

- Objects are created, used, and discarded
- Constructors are implicit in JavaScript - natural
  - A constructor in a class is a special block of statements called when an object is created
- Destructors are not provided by JavaScript

http://en.wikipedia.org/wiki/Constructor_(computer_science)

js03.htm

js03.htm

```
function PartyAnimal() {
    this.x = 0;
    console.log("In the 'constructor'");
    this.party = function () {
        this.x = this.x + 1;
        console.log("So far "+this.x);
    }
}

an = new PartyAnimal();

an.party();
an.party();
an.party();
```

```
In the 'constructor'
So far 1
So far 2
So far 3
```

Many Instances

- We can create lots of objects - the class is the template for the object.
- We can store each distinct object in its own variable.
- We call this having multiple instances of the same class.
- Each instance has its own copy of the instance variables.

```
function PartyAnimal(nam) {
    this.x = 0;
    this.name = nam;
    console.log("Built "+nam);
    this.party = function () {
        this.x = this.x + 1;
        console.log(nam+"="+this.x);
    }
}

s = new PartyAnimal("Sally");
s.party();

j = new PartyAnimal("Jim");
j.party();
s.party();
```

Constructors can have additional parameters. These can be used to set up instance variables for the particular instance of the class (i.e., for the particular object).

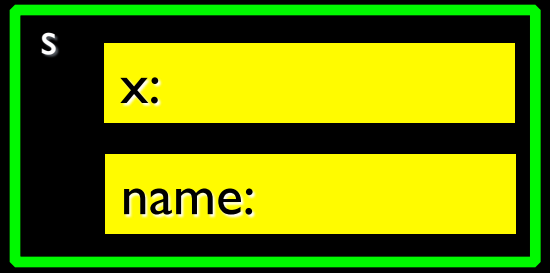
```
Built Sally
Sally=1
Built Jim
Jim=1
Sally=2
```

js04.htm

```
function PartyAnimal(nam) {
    this.x = 0;
    this.name = nam;
    console.log("Built "+nam);
    this.party = function () {
        this.x = this.x + 1;
        console.log(nam+"="+this.x);
    }
}

s = new PartyAnimal("Sally");
s.party();

j = new PartyAnimal("Jim");
j.party();
s.party();
```




```
Built Sally
Sally=1
```

js04.htm

```
function PartyAnimal(nam) {
    this.x = 0;
    this.name = nam;
    console.log("Built "+nam);
    this.party = function () {
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s = new PartyAnimal("Sally");
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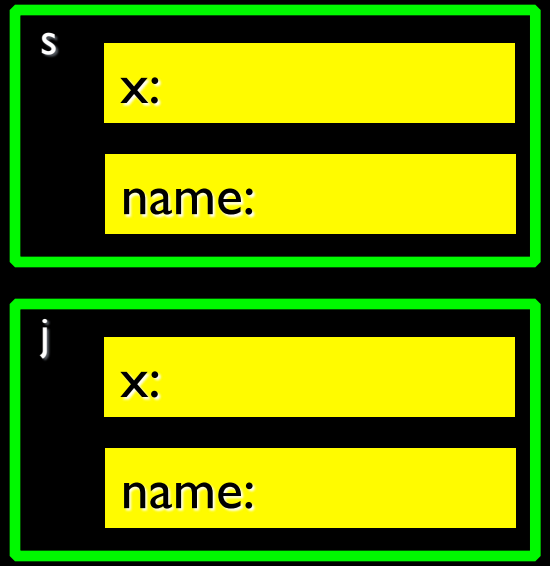
js04.htm




```
Built Sally
Sally=1
Built Jim
Jim=1
Sally=2
```

Definitions

- Class - a template - Dog
- Method or Message - A defined capability of a class - bark()
- Object or Instance - A particular instance of a class - Lassie
- Constructor - A method which is called when the instance / object is created

Summary

- The key for this lecture is to understand how to read OO documentation for JavaScript and how to use objects.
- Building brand new complex objects is more advanced.
- It is important to remember that JavaScript uses objects as its “Associative Array”.

Acknowledgements / Contributions

Initial Development: Charles Severance, University of Michigan School of Information

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Continue new Contributors and Translators here

Additional Source Information

- “Snowman Cookie Cutter” by Didriks is licensed under CC BY https://www.flickr.com/photos/dinnerseries/23570475099

- Photo from the television program *Lassie*. Lassie watches as Jeff (Tommy Rettig) works on his bike is Public Domain https://en.wikipedia.org/wiki/Lassie - /media/File:Lassie_and_Tommy_Rettig_1956.JPG