

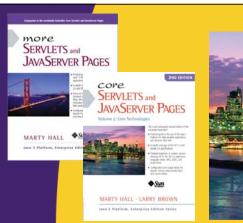
# The Prototype Framework Part III: Better OOP

(Prototype 1.6 Version)

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## **Topics in This Section**

- Constructor and prototype in one place
- Single inheritance
  - (Sort of)
- Merging objects
- Multiple inheritance
  - (Sort of)

4

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### **Overview**

- Compared to Java, JavaScript has
  - Fabulous function support
  - Lousy OOP support (not even real OOP at all)
- Prototype adds better OOP support
  - Still not real OOP, but a definite improvement
- Main methods
  - Class.create
    - Creates a constructor that calls "initialize"
    - You can define everything in prototype instead of half (fields) in constructor and half (methods) in prototype
  - Object.extend
    - Adds new capabilities to existing class
    - Lets you define object hierarchies (almost real inheritance)
    - Object.extend called automatically if first arg of Class.create is a class name

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### Class.create: Base Classes

- Makes constructor that calls "initialize"
  - You supply a *single* object that is automatically attached to MyClass.prototype

```
var MyClass = Class.create({
  initialize: function(args) {
    this.field1 = blah;
    this.field2 = blah;
},

method1: function(...) { ...},
method2: function(...) { ...}
});
```

initialize called automatically

```
var someObject = new MyClass(args);
```

# Class.create & Base Classes: Circle Class

```
var Circle = Class.create({
  initialize: function(radius) {
    this.radius = radius;
  },

getArea: function() {
    return(Math.PI * this.radius * this.radius);
  }
});
```

# Class.create & Base Classes: Rectangle Class

```
var Rectangle = Class.create({
  initialize: function(width, height) {
    this.width = width;
    this.height = height;
  },

getArea: function() {
    return(this.width * this.height);
  }
});
```

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# Class.create & Base Classes: Helper (Static) Method

```
var ShapeUtils = {};

ShapeUtils.sumArea = function(shapeArray) {
  var sum = 0;
  for(var i=0; i<shapeArray.length; i++) {
    sum = sum + shapeArray[i].getArea();
  }
  return(sum);
}</pre>
```

9

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# Class.create & Base Classes: Test Case

#### Code

```
var shapes =
  [ new Circle(10), new Circle(20),
   new Rectangle(5,10), new Rectangle(10,20)];
ShapeUtils.sumArea(shapes);
```

#### Result

1820.7963267948967

10

### Class.Create: Single Inheritance

#### Idea

- First argument to Class.create can be a class name
- Second argument is the class definition

```
var Superclass = Object.create({
  initialize: function(...) {...},
  method1: function(...) {...}
});

var Subclass = Class.create(Superclass, {
  initialize: function(...) {...},
  method2: function(...) {...}
})
```

## Class.create: Accessing Overridden Methods

#### Problem

– JavaScript has no builtin approach to accessing overridden methods. So what if subclass wants to call superclass's initialize method?

#### Solution

- In subclass, for any overridden method, add \$super as first argument
- \$super is now the name of the overridden method
  - Not \$super.methodName as in Java

#### Example

```
var Subclass = Class.create(Superclass, {
  initialize: function($super, args...) {
    $super(someOfTheArgs);
    somethingElse(restOfTheArgs);
  },
  ...
}
```

12

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# Class.create & Single Inheritance: Parallelogram

```
// Superclass (Base class)

var Parallelogram = Class.create({
  initialize: function(length, width) {
    this.length = length;
    this.width = width;
  }
});
```

# Class.create & Single Inheritance: Rectangle

```
// Subclass (extended class) of Parallelogram

var Rectangle = Class.create(Parallelogram, {
   initialize: function($super, length, width) {
    $super(length, width);
   },

getArea: function() {
    return(this.length * this.width);
   }
});
```

14

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# Class.create & Single Inheritance: Test Cases

# Object.extend and Multiple Inheritance

#### Problem

- Although Class.create lets you define a class, a sub-class, a sub-sub-class, a sub-sub-class, etc., it only lets you specify a single immediate parent
- So Class.create alone does not support mixin style of programming
  - Main (instantiable) base class provides core functionality
  - Mixin class (usually not instantiable; static methods only in JavaScript) provides additional functionality

#### Solution

- Specify base class in Class.create
- Use Object.extend(this, MixinClass) in constructor

#### Note

- Java does not support multiple inheritance at all
- Interfaces are not the same as mixin classes, since interfaces have no real (implemented) methods

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16

## **Object.extend**

#### Idea

- Merges two objects: first now has all properties of second

### Simple usage (object merge)

- Add properties to a single object
  - var obj1 = {a: 1, b: 2}
  - var obj2 = {c: 3, d: 4};
  - Object.extend(obj1, obj2); // obj1 has a, b, c, d

### Advanced usage (multiple inheritance)

- In initialize, extend "this" with new class
  - Object.extend(this, MixinClass);

#### Note for testing

 Prototype provides Object.keys that returns array of all of the property names of an object

### Object.extend: Simple Object Merging

18

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### **Multiple Inheritance: Mixin Class**

19

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# **Multiple Inheritance: Subclass with Mixin**

20

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### **Multiple Inheritance: Test Cases**

### **Summary**

- Base classes
  - Class.create({initialize: ..., otherMethod: ...});
- Single inheritance
  - Class.create(Superclass, {initialize: ..., otherMethod: ...});
  - Use \$super to get at overridden methods (esp. initalize)
- Merging simple objects
  - Object.extend(obj1, obj2);
    - · Adds to obj1; leaves obj2 unchanged
- Multiple inheritance
  - Call Object.extend(this, MixinClass) from constructor

22

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