

# JavaScript Prototypal Inheritance — a Brief Intro

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# Objectives

We'll learn

- how to create objects that inherit from other objects;
- about the base prototype and how other objects inherit from it;
- and, how and when to use inheritance.

# Agenda

We'll see

- examples of the five **Object.prototype** methods that all objects inherit from,
- an example of prototypal inheritance in the real world.

# Definitions

- **Object:** a composite of data types, including other objects.
- **Method:** a function bound to an object.
- **Prototype:** a template, or model, consisting of methods used by other objects.
- **Inheritance:** properties inherited by a “child” instance of another object.

# Prototypal Inheritance

- Also known as prototype chaining.
- `Object.prototype` is the first in the prototype chain.
- `Object.prototype` is the base prototype from which all objects inherit.
- `Object.prototype` provides **five** methods to all descendants:

# Prototypal Inheritance

## hasOwnProperty

`hasOwnProperty()` returns `true` on non-inherited properties it owns, or `false` for inherited properties.

# Prototypical Inheritance

## hasOwnProperty

```
let dog = {  
  cute: true  
};
```

```
dog.hasOwnProperty('ugly');           // false  
dog.hasOwnProperty('cute');          // true  
dog.hasOwnProperty('toString');      // false  
Object.prototype.hasOwnProperty('toString'); // true
```

# Prototypal Inheritance

## `propertyIsEnumerable`

`propertyIsEnumerable()` returns `true` on non-inherited properties defined as `enumerable` (the default), which means it will appear in a `for...in` loop. It returns `false` otherwise.



# Prototypical Inheritance

## propertyIsEnumerable

```
let dog = {
  adoptable: true,
  vaccinated: true
};

Object.defineProperty(dog, 'name', {
  value: 'Spot',
  enumerable: false
});

dog.propertyIsEnumerable('adoptable'); // true
dog.propertyIsEnumerable('vaccinated'); // true
dog.propertyIsEnumerable('name');      // false

console.log('Please adopt ' + dog.name + '. He's...');

for (let property in dog) {
  console.log('— ' + property);
}
```

# Prototypal Inheritance

## `valueOf`

`valueOf()` returns the primitive value associated with an object, or the object itself. Only in the most unique and isolated situations would you modify this method.

# Prototypal Inheritance

## valueOf

```
// Construct the Dog object
function Dog(name, breed) {
  this.name = name;
  this.breed = breed;
}

// Create a new Dog instance named dog
let dog = new Dog('Spot', 'mutt');

// Retrieve the object itself
dog.valueOf(); // Dog {name: "Spot", breed: "mutt"}

// Using prototypal inheritance, over-ride how valueOf behaves, returning the name of the dog
Dog.prototype.valueOf = function () {
  return this.name;
}

dog.valueOf(); // Spot
```

# Prototypal Inheritance

## `toString`

`toString()` converts an object to a string whenever the object is used in a string context. The result, however, may not be useful, so over-riding it using prototypal inheritance can be advantageous.

# Prototypical Inheritance

## toString

```
let dog = {
  adoptable: true,
  vaccinated: false
};

dog.toString(); // [object Object]

// Over-ride the inherited toString method in the prototype
dog.toString = function () {
  let output = 'This dog is ';

  output += ((this.adoptable) ? 'adoptable ' : 'not adoptable ');
  output += ((this.vaccinated)? 'and vaccinated.' : 'and not vaccinated.');
```

```
  return output;
}

dog.toString(); // This dog is adoptable and not vaccinated.
dog.hasOwnProperty('toString'); // true, because toString shadows the inherited prototype method for toString
```

# Prototypal Inheritance

## `isPrototypeOf`

`isPrototypeOf()` returns `true` if one object is the prototype of another, or `false` if otherwise. (`isPrototypeOf` is a more appropriate name. You'll see why in a moment.)

# Prototypal Inheritance

## isPrototypeOf

```
let dog = {  
  adoptable: true,  
  vaccinated: false  
};  
  
let puppy = Object.create(dog);  
  
// Is Object.prototype a prototype of dog?  
Object.prototype.isPrototypeOf(dog); // true  
  
// Is dog a prototype of puppy?  
dog.isPrototypeOf(puppy);           // true  
  
// The prototype chain, or prototypal inheritance, looks like...  
'Object.prototype ← dog ← puppy'
```

# Inheritance in the Real World



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