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.

Prototypal 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.

Prototypal 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, many not be useful, so over-riding it using prototypal inheritance can be advantageous.

Prototypal 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. (**`isPrototypeFor`** 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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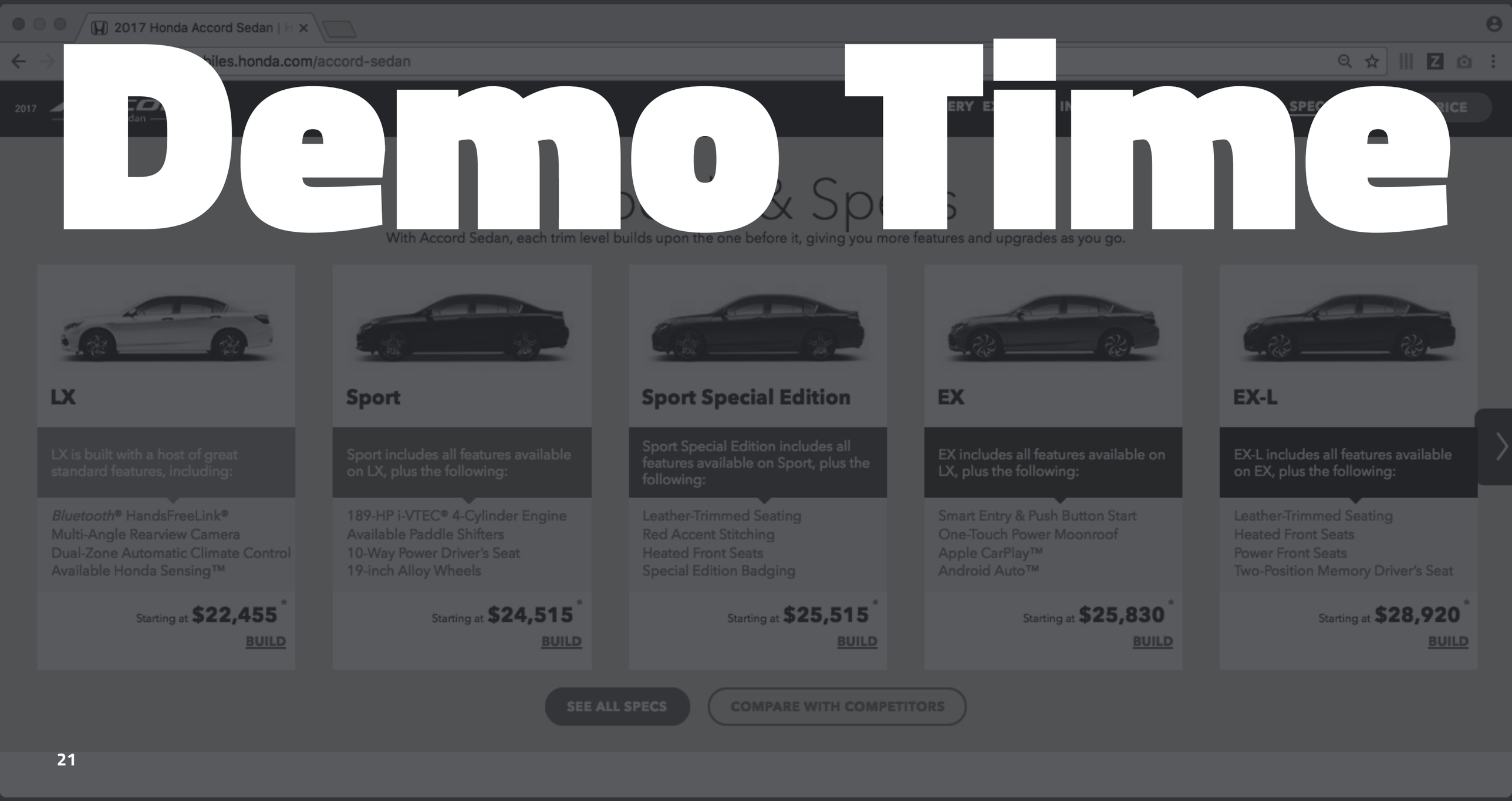
Demo Time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