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Inheritance (Object.create())

Why Inheritance?

Understand concept of Inheritance

- How nature implements inheritance

Imagine you have to create different species. Will you keep on creating a new copy from scratch every single time?

We inherit the properties of our parents/grandparents. Fundamentally, we are not a completely new product but rather some stuff of our own and some of our parents. The same is also found in extending a particular species like different types of Cats, different species of the same plant (Rose).

- How Murtis/status/toys are made (moulds)



- reuse > re-invent - In programming, no need to always start from scratch
- Inheritance is efficient

Inheritance is efficient because you can borrow existing properties and save memory/space from adding the same properties from scratch.

Imagine just for a one-day photoshoot, you borrowing a friend's DSLR vs buying a new DSLR.

Where have you seen Inheritance?

- Think where did you need to borrow properties in a JS program

In Js, **it's better to borrow**, than own a property or method.

What is an Inheritance?

One object gets access to properties and methods of other object.

Js has Prototypal Inheritance.

We can use Js Prototypal inheritance in two ways:

1. Function Constructors

```
Person.prototype.showName=function () {  
  console.log( this.name )  
}
```

2. Object.create() method

```
var a = Object.create(b)
```

Inheritance using Object.create()

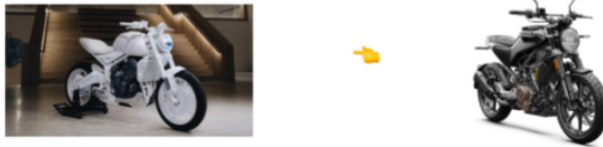
Create a family hierarchy using Object.create

```
JavaScript ES6  
→ 1 const parents = {  
2   father: 'krishna',  
3   mother: 'priya'  
4 }  
5  
6 const son = Object.create(parents)  
7  
8 son.name = 'raj'  
9  
10 const daughter = Object.create(parents)  
11  
12 daughter.name = 'rashmi'  
13  
14  
15 //practical applications - profiles  
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Important Note: In pre-class `[[Prototype]]` is mentioned as `__proto__`. Chrome replaced it with `[[prototype]]` recently.

`[[Prototype]]?`

Points to original model (prototype) from which it is built from.



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Prototype

What is a Prototype?

An original model on which something is patterned.



Explore prototype property

- Explore prototype property available on objects, arrays, strings etc. like toString(), concat(), slice() etc. where can we find them?

```

(3) [1, 2, 3]
  0: 1
  1: 2
  2: 3
  length: 3
  function entries() { [native code] }
  [[Prototype]]: Array(0)
    at: f at()
    concat: f concat()
    constructor: f Array()
    copyWithin: f copyWithin()
    entries: f entries()
    every: f every()
    fill: f fill()
    filter: f filter()
    find: f find()
    findIndex: f findIndex()
    flat: f flat()
    flatMap: f flatMap()
    forEach: f forEach()

```

Understand Prototype concepts

- Why its called prototypal inheritance (Because we use prototype property of Objects to implement Inheritance)

- Understand prototype chain

JavaScript ES6

```
1 var amar = { money: 1000 }
2
3 var akbar = Object.create(amar)
4
5 akbar.money = 100000
6
7 var anthony = Object.create(akbar)
8
```

Print output (drag lower right corner to resize)

Frames

Objects

Global frame

amar undefined

8

9 console.log(anthony)

→ line that just executed

→ next line to execute

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Step 1 of 5

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[Customize visualization](#)

akbar undefined

anthony undefined

Getting and setting the prototype of Objects

How to set and get the prototype of an object

JavaScript ES6

→ 1 var amar = { money: 1000 }

2

3 var akbar = Object.setPrototypeOf({ money: 1000 }, amar)

4

5 console.log(Object.getPrototypeOf(akbar))

←

→ line that just executed

→ next line to execute

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Step 1 of 3

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Print output (drag lower right corner to resize)

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Global frame

amar undefined

akbar undefined

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Inheritance (Constructor Function)

.Prototype property of Constructor Functions

Introduction to .prototype

- CF is a blueprint. If we add any property to the blueprint it will be applicable to all objects. we can do that using .prototype

The screenshot shows a JavaScript ES6 editor with the following code:

```
1 function Newspaper(h){
2   this.date=new Date()
3   this.id=Math.random()*10
4   this.name='TOI'
5   this.headline=h
6 }
7
8 var n1=new Newspaper("India wins world cup")
```

The right side of the editor shows the Frames and Objects panels. The Frames panel shows the Global frame and a Newspaper frame with n1 as the variable name and undefined as the value. The Objects panel shows the function Newspaper(h) with properties: this.date=new Date(), this.id=Math.random()*10, this.name='TOI', and this.headline=h. A blue arrow points from the Newspaper frame to the function object.

Where and Why to use .prototype property?

Create a ORDER SYSTEM using CF.

The screenshot shows a JavaScript ES6 editor with the following code:

```
1 function order() {
2   this.id = Math.floor(Math.random()*1000);
3   this.seller = "Flipkart";
4   this.buyer = b;
5   this.product = p;
6 }
7
8 order.prototype.invoice = function() {
9   console.log(`${this.buyer} bought ${this.product} for ₹${this.id}`);
10 }
11
12 var o1 = new Order("Raj", "Football", "Flipkart")
```

The right side of the editor shows the Frames and Objects panels. The Frames panel shows the Global frame and an order frame with o1 as the variable name and undefined as the value. The Objects panel shows the function order() with properties: this.id = Math.floor(Math.random()*1000), this.seller = "Flipkart", this.buyer = b, and this.product = p. A blue arrow points from the order frame to the function object.

Create a Flipkart shoes product catalogue and add coupon as prototype method.

JavaScript ES6

```
1 function Shoes() {
2   this.price = Math.floor(Math.random() * 10000);
3   this.category = "Sports";
4 }
5
6 shoes.prototype.coupon = function () {
7   if (this.category == "Sports") {
8     console.log("20% DISCOUNT IS AVAILABLE");
9   } else {
10    return false;
11  }
12 };
13
14 var shoe = new Shoes();
```

◀ ▶

→ line that just executed

→ next line to execute

< Prev

Next >

Step 1 of 1

Frames

Objects

Global frame

Shoes

shoe

undefined

function Shoes() {
 this.price = Math.floor(Math.random() * 10000);
 this.category = "Sports";
}

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Everything in Js is an Object

What that means is, Js has an object as its base prototype. From that, it creates other data types and methods that we can use on them.

It's just how Js was decided to be built.

Uncover Prototype

See the prototype of String, Array, Function on console tab using chrome inspect element.

Objects

```
var o = {a: 1};
```

1. The newly created object o has Object.prototype as its Prototype
2. So o inherits hasOwnProperty from Object.prototype
3. Object.prototype has null as its prototype.
4. **o ----> Object.prototype ----> null**

functions

```
function f() {  
  return 2;  
}
```

1. Functions inherit from Function.prototype
2. (which has methods call, bind, etc.)
3. **f ----> Function.prototype ----> Object.prototype ----> null**

Array

```
var cities = ['Pune', 'Mumbai', 'Delhi'];
```

1. Arrays inherit from Array.prototype
2. (which has methods indexOf, length, push etc.)
3. The prototype chain looks like:
4. **b ----> Array.prototype ----> Object.prototype ----> null**