JavaScript
Lecture 4a

Waterford Institute of Technology

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JavaScript Introduction

Topics discussed this presentation

- Arrays
- Prototypal inheritance

Arrays

Create

- Not necessary to declare size when constructing
  - Create easily using array literal
  - Grow automatically
  - Locate values by key
- Access using [ ] operator

```
// literal method
const cars = ['Ford', 'Honda', 'Nissan', '
      Peugot', 'Toyota'];
console.log(cars[0]);//Output: Ford
```

```
//using new
const sameCars = new Array('Ford', 'Honda',
      'Nissan', 'Peugot', 'Toyota'];
console.log(cars[0]);//Output: Ford
```

Arrays

Iterate

- **for** loop easy method of iterating
- Size array: use **length** property

```
const cars = ['Ford', 'Honda', 'Nissan', '
      Peugot', 'Toyota'];
for(let i = 0; i < cars.length; i += 1)
{
  console.log(cars[i]);
}
```

```
//Output
Ford
Honda
Nissan
Peugot
Toyota
```

Arrays

Iterate - forEach

```
function logArrayElements(element, index, array)
{
  console.log('a[' + index + '] = ' + element);
}

var cars = [ 'Ford', 'Honda', 'Nissan', 'Peugot'];

cars.forEach(logArrayElements);
```

```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="UTF-8">
    <title>JavaScript</title>
  </head>
  <body>
    <script src="array.js"></script>
  </body>
</html>
```

```
a[0] = Ford
a[1] = Honda
a[2] = Nissan
a[3] = Peugot
```

Arrays

Iterate - forEach

```
var cars = [ 'Ford', 'Honda', 'Nissan', 'Peugot'];

cars.forEach(function(element, index, array) {
    console.log('a[' + index + '] = ' + element);
});
```

```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="UTF-8">
    <title>JavaScript</title>
  </head>
  <body>
     <script src="array.js"></script>
  </body>
```

```
a[0] = Ford
a[1] = Honda
a[2] = Nissan
a[3] = Peugot
```

Arrays

Methods

Selection of array methods:

- **length** : provides number elements in array
- **join** :converts elements to string & concatenates
- **reverse**: reverses order of elements
- **push**: adds element(s) end array
- **pop** : removes element(s) end array
- **unshift**:adds element beginning array
- **shift**: removes element beginning array
- **sort**: sorts array

Arrays

Methods: *length, join*

```
const greet = ['hello', 'ictskills'];

const length = greet.length; // => 2
```

```
const str1 = greet.join(); // => hello,ictskills
const str2 = greet.join(separator=' '); // => hello ictskillls
```

Arrays

Methods: *reverse, push, pop*

```
const greet = ['hello', 'ictskills'];

console.log(greet.reverse()); // => ['ictskills', 'hello']
```

```
greet.push('2016');
console.log(greet); // => ['hello', 'ictskills', '2016']
```

```
greet.pop();
console.log(greet); // => ['hello', 'ictskills']
```

Arrays

Methods: *unshift, shift*

```
const greet = ['hello', 'ictskills'];
greet.unshift('2016');
console.log(greet); // => ['2016', 'hello', 'ictskills']
```

```
greet.shift();
console.log(greet); // => ['hello', 'ictskills']
```

Arrays

Methods: *sort*

```
// The default sort order is according to string Unicode code points.
const numbers = [6, 11, 22, 43, 19, 10];
numbers.sort();
console.log(numbers); // => [10, 11, 19, 22, 43, 6]
```

```
// Provide customized comparator function to sort numbers in ascending order.
function compare(a,b) {
    return a - b;
}

numbers.sort(compare);
console.log(numbers); // => [6, 10, 11, 19, 22, 43]
```

Arrays

Element types

- Array elements may be different types

```
const cars = ['Ford', 'Honda', 'Nissan', 'Peugot'];
const manual = {
  title:'Fix Me',
  author:'H. Wrench',
};
cars.push(manual);
cars.push('Lexus');
cars.shift();
for (let i = 0; i < cars.length; i += 1)
{
  console.log(cars[i]);
}
```

```
Honda
Nissan
Peugot
Object {title: "Fix Me", author: "H. Wrench"}
Lexus
```

JavaScript

Object v Array

```
// Objects: comprise key:value pairs
const book = {};
book.title = 'Java';
book.author = 'Chapman';
console.log(book);

// Retrieval:
console.log(book.title); // => Java
```

```
// Arrays: Use for numerically indexed data
const cars = [];
cars[4] = 'Toyota';
// Retrieval:
console.log(cars.length); // => 5
console.log(cars[0]); // => undefined
console.log(cars[4]); // => Toyota: length increases automatically
console.log(cars[6]); // => undefined
console.log(cars.length); // => 5: No array bounds error
```

JavaScript Inheritance

ES5 inheritance example

```
const shape = {
  xPosition: 0.0,
  yPosition: 0.0,
};

const circle = Object.create(shape);

circle.area = function () {
  return Math.round(Math.PI * Math.pow(this.radius, 2));
};

circle.xPosition = 100;
circle.radius = 50;

console.log('area ' + circle.area()); // 7854
console.log('xPosition ' + circle.xPosition); // 100
console.log('yPosition ' + circle.yPosition); // 0 (default)
```

JavaScript Inheritance

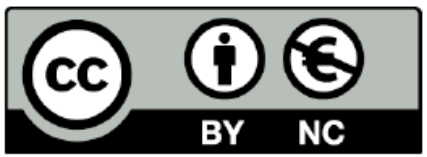
ES6 simulates classical inheritance

```
class Shape {
  constructor(xPosition, yPosition) {
    this.xPosition = xPosition;
    this.yPosition = yPosition;
  }
}

class Circle extends Shape {
  constructor(xPosition, yPosition, radius) {
    super(xPosition, yPosition);
    this.radius = radius;
  }

  area() {
    return Math.round(Math.PI * Math.pow(this.radius, 2));
  }
}

const circle = new Circle(100.0, 100.0, 50.0);
console.log('area ' + circle.area()); // 7854
```

JavaScript

Presentation summary

- Arrays
  - Store multiple elements in single variable.
  - Elements may be different types.
  - Rich set Array methods available.
- Inheritance
  - Prototypal
  - Syntactic sugar - ES6



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