Full-stack Application Development

Novelties in ECMAScript 6+

Where to Find The Code and Materials?

https://github.com/iproduct/react-typescript-academy-2022

EcmaScript 6 – ES 2015, Harmony [https://github.com/lukehoban/es6features]

- arrows
- classes
- enhanced object literals
- template strings
- destructuring
- default + rest + spread
- let + const
- iterators + for..of
- Generators
- unicode
- Modules + module loaders
- map + set + weakmap + weakset
- proxies
- symbols
- subclassable built-ins
- Promises
- math + number + string + array + object APIs
- binary and octal literals
- reflect api
- tail calls

ES6 Classes [http://es6-features.org/]

```
class Shape {
    constructor (id, x, y) {
        this.id = id
        this.move(x, y)
    }
    move (x, y) {
        this.x = x
        this.y = y
    }
}
```

```
class Rectangle extends Shape {
    constructor (id, x, y, width, height) {
        super(id, x, y)
        this.width  = width
        this.height = height
    }
}
class Circle extends Shape {
    constructor (id, x, y, radius) {
        super(id, x, y)
        this.radius = radius
    }
}
```

Enhanced Object Literals

```
var obj = {
    // __proto__
    __proto__: theProtoObj,
    // Shorthand for ‘handler: handler’
    handler,
    // Methods
    toString() {
     // Super calls
     return "d " + super.toString();
    },
    // Computed (dynamic) property names
    [ 'prop_' + (() => 42)() ]: 42
};
```

Template Strings

```
// Basic literal string creation
`In JavaScript '\n' is a line-feed.`

// Multiline strings
`In JavaScript this is
 not legal.`

// String interpolation
var name = "Bob", time = "today";
`Hello ${name}, how are you ${time}?`
```

Tagged Templates

```
function myTag(strings, personExp, ageExp) {
  let str0 = strings[0]; // "That "
  let str1 = strings[1]; // " is a "
  let str2 = strings[2]; // "."
  let ageStr;
  if (ageExp > 99){
    ageStr = 'centenarian';
  } else {
    ageStr = 'youngster';
  }
return `${str0}${personExp}${str1}${ageStr}${str2}`;
}
```

```
let person = 'Mike';
let age = 28;

let output =
  myTag`That ${ person } is a ${ age }.`;

console.log(output);
// That Mike is a youngster.
```

Symbols, Iterators, for-of

```
let fibonacci = {
  [Symbol.iterator]() {
    let pre = 0, cur = 1;
    return {
      next() {
        [pre, cur] = [cur, pre + cur];
        return { value: cur }
      }
    }
  }
}

for (var n of fibonacci) {
  // truncate the sequence at 1000
  if (n > 1000)
    break;
  console.log(n);
}
```

Iterators - II

```
let fibonacci = {
  [Symbol.iterator]() {
    let pre = 0, cur = 1, index = 0;
    return {
      next() {
        [pre, cur] = [cur, pre + cur];
        index++;
        return { done: cur > 1000, value: cur };
      }
    }
  }
}

for (var n of fibonacci) {
  console.log(n);
}
```

Generators

```
var fibonacci = {
  [Symbol.iterator]: function*() {
    var pre = 0,
      cur = 1;
    for (let i = 0; i < 15; i++) {
      var temp = pre;
      pre = cur;
      cur += temp;
      if (cur < 1000) yield cur;
    }
  }
};

for (var n of fibonacci) {
  // truncate the sequence at 1000
  console.log(n);
}
```

Block Scope Vars: let [http://es6-features.org/]

```
for (let i = 0; i < a.length;
   i++) {
    let x = a[i]
    …
}

for (let i = 0; i < b.length;
   i++) {
    let y = b[i]
    …
}
```

```
const callbacks = []
for (let i = 0; i <= 2; i++) {
    callbacks[i] =
        function () { return i * 2 }
}

callbacks[0]() === 0
callbacks[1]() === 2
callbacks[2]() === 4
```

ES6 Arrow Functions and this

- ECMAScript 6:

```
this.nums.forEach((v) => {
    if (v % 5 === 0)
        this.fives.push(v)
})
```

- ECMAScript 5:

```
var self = this;
this.nums.forEach(function (v) {
    if (v % 5 === 0)
        self.fives.push(v);
});
```

Array and Object Destructuring

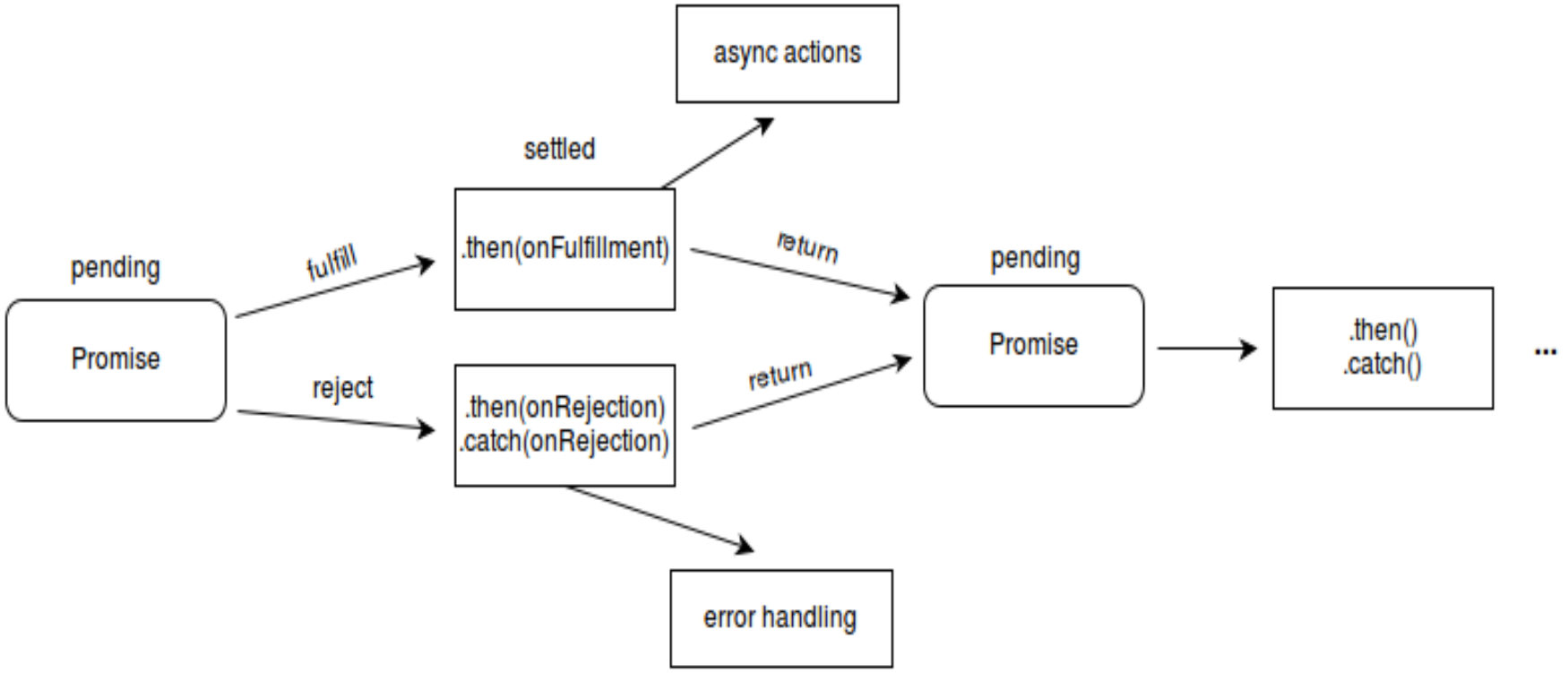
```
let persons = [
  { name: 'Michael Harrison',
    parents: {
      mother: 'Melinda Harrison',
      father: 'Simon Harrison',
    }, age: 35},
  { name: 'Robert Moore',
    parents: {
      mother: 'Sheila Moore',
      father: 'John Moore',
    }, age: 25}];
for (let {name: n, parents: { father: f }, age } of persons) {
  console.log(`Name: ${n}, Father: ${f}, age: ${age}`);
}
```

ES6 Promises [http://es6-features.org/]

```
function msgAfterTimeout (msg, who, timeout) {
    return new Promise((resolve, reject) => {
        setTimeout(() => resolve(`${msg} Hello ${who}!`), timeout)
    })
}

msgAfterTimeout("", "Foo", 1000).then((msg) => {
    console.log(`done after 1000ms:${msg}`);
    return msgAfterTimeout(msg, "Bar", 2000);
}).then((msg) => {
    console.log(`done after 3000ms:${msg}`)
})
```

ES6 Promises



Source: https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global_Objects/Promise

Combining ES6 Promises

```
function fetchAsync (url, timeout, onData, onError) { … }
fetchPromised = (url, timeout) => {
    return new Promise((resolve, reject) => {
        fetchAsync(url, timeout, resolve, reject)
    })
}
Promise.all([
    fetchPromised("http://backend/foo.txt", 500),
    fetchPromised("http://backend/bar.txt", 500)
]).then( (data) => {
    let [ foo, bar ] = data
    console.log(`success: foo=${foo} bar=${bar}`)
}).catch( (err) => {
    console.log(`error: ${err}`)
})
```

Combining ES6 Promises

```
function fetchAsync (url, timeout, onData, onError) { … }
fetchPromised = (url, timeout) => {
    return new Promise((resolve, reject) => {
        fetchAsync(url, timeout, resolve, reject)
    })
}
Promise.all([
    fetchPromised("http://backend/foo.txt", 500),
    fetchPromised("http://backend/bar.txt", 500)
]).then( (data) => {
    let [ foo, bar ] = data
    console.log(`success: foo=${foo} bar=${bar}`)
}, (err) => {
    console.log(`error: ${err}`)
})
```

Async – Await – Try – Catch

```
async function init() {
  try {
        const userResult = await fetch("user.json");
        const user = await userResult.json();
        const gitResp = await fetch(`http://api.github.com/users/${user.name}`);
         const githubUser = await gitResp.json();
        const img = document.createElement("img");
        img.src = githubUser.avatar_url;
        document.body.appendChild(img);
        await new Promise((resolve, reject) => setTimeout(resolve, 6000));
        img.remove();
        console.log("Demo finished.");
  } catch (err) {   console.log(err);  }
}
```

JavaScript Module Systems - CommonJS

- math.js:

```
exports.add = function() {
    var sum = 0, i = 0, args = arguments, len = args.length;
    while (i < len) {
        sum += args[i++];
    }
    return sum;
};
```

- increment.js:

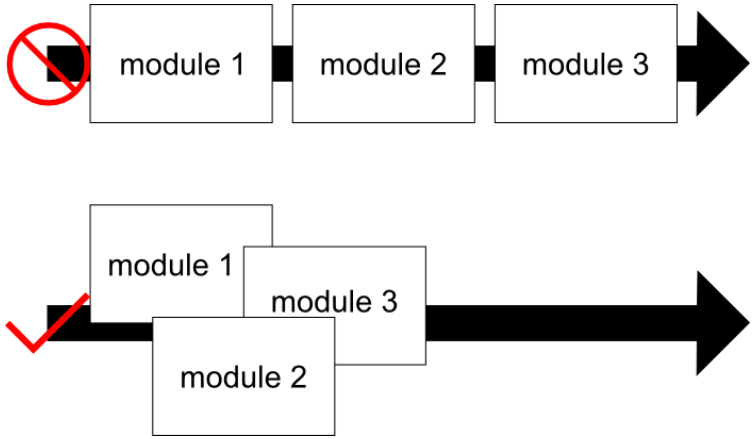
```
var add = require('./math').add;
exports.increment = function(val) {
    return add(val, 1);
};
```

Source: http://wiki.commonjs.org/wiki/Modules/1.1

JavaScript Module Systems – AMD I

```
//Calling define with module ID, dependency array, and factory
//function
define('myModule', ['dep1', 'dep2'], function (dep1, dep2) {
    //Define the module value by returning a value.
    return function () {};
});

define(["alpha"], function (alpha) {
    return {
        verb: function(){
            return alpha.verb() + 2;
        }
    };
});
```



JavaScript Module Systems - AMD II

- Asynchronous module definition (AMD) – API for defining code modules and their dependencies, loading them asynchronously, on demand (lazy), dependencies managed, client-side

```
define("alpha", ["require", "exports", "beta"],
  function(require, exports, beta) {
    exports.verb = function() {
      return beta.verb();
      //OR
      return require("beta").verb();
    }
});
define(function (require) {
    require(['a', 'b'], function (a, b) {//use modules a and b
    });
});
```

JavaScript Module Systems – ES6

```
//  lib/math.js
export function sum (x, y) { return x + y }
export var pi = 3.141593

//  someApp.js
import * as math from "./lib/math"
console.log("2π = " + math.sum(math.pi, math.pi))

//  otherApp.js
import { sum, pi } from "./lib/math"
console.log("2π = " + sum(pi, pi))

// default export from hello.js and import
export default () => ( <div>Hello from React!</div>);
import Hello from "./hello";
```

Thank's for Your Attention!

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