Module, AMD, RequireJS

othree @ JSDC 2012

Object

Object Oriented Programming

Why OOP

- Maintainable & Scalable
- Gathering related variables & methods

Object from OOP

- Inheritance
- Polymorphism
- Encapsulation

Encapsulation

- A language mechanism for restricting access to some of the object's components.

http://en.wikipedia.org/wiki/Encapsulation_(object-oriented_programming)

Why Encapsulation

- Protect variable from unwanted change

JavaScript is Prototype-based

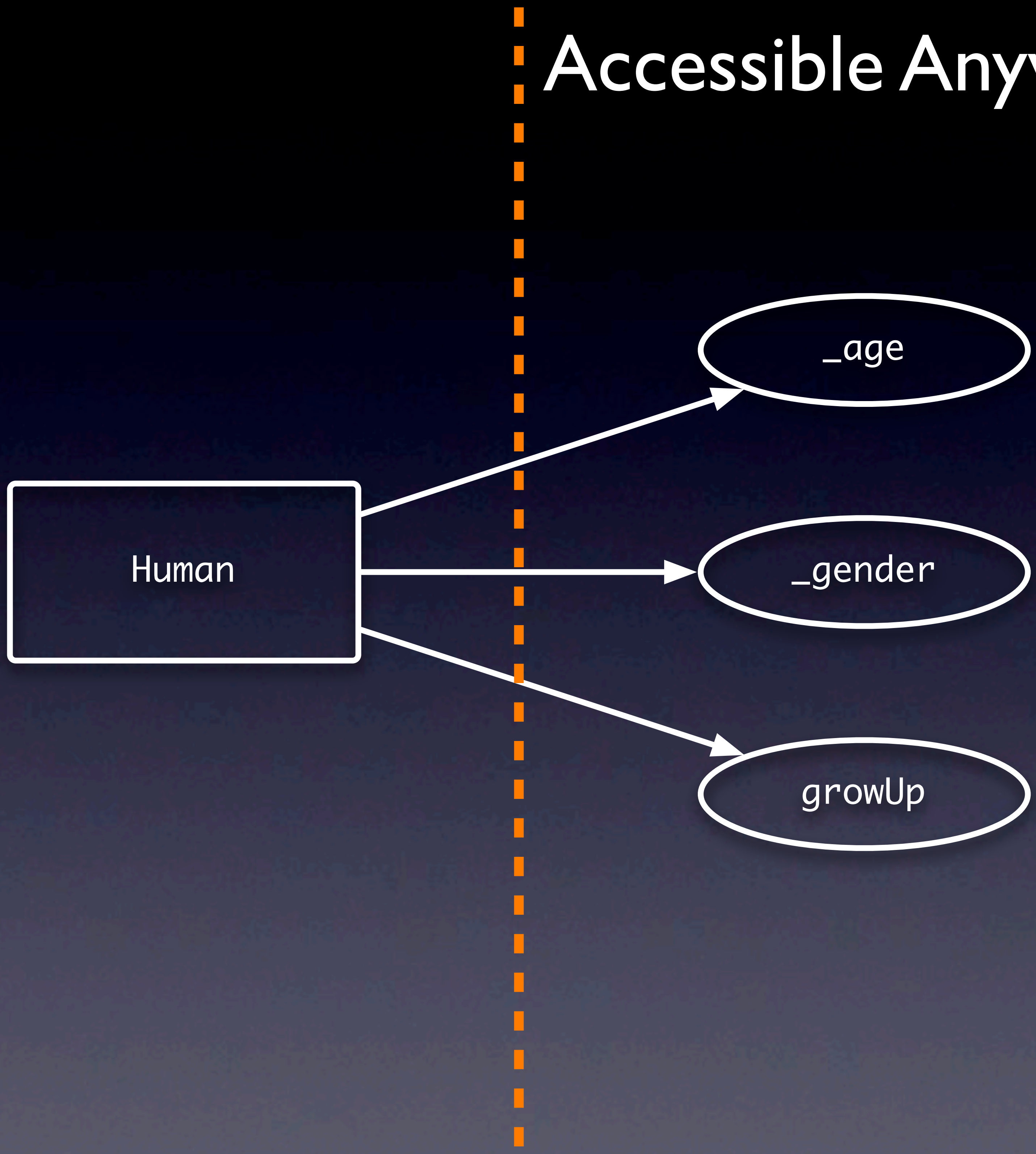
Private Data in JavaScript

Naming Convention

```
function Human(sgender) {
    //Private
    this._age = 1;
    this._gender = sgender || 'Male';

    //Public
    this.growUp = function () {
        this._age++;
    };
}
```

Accessible Anywhere



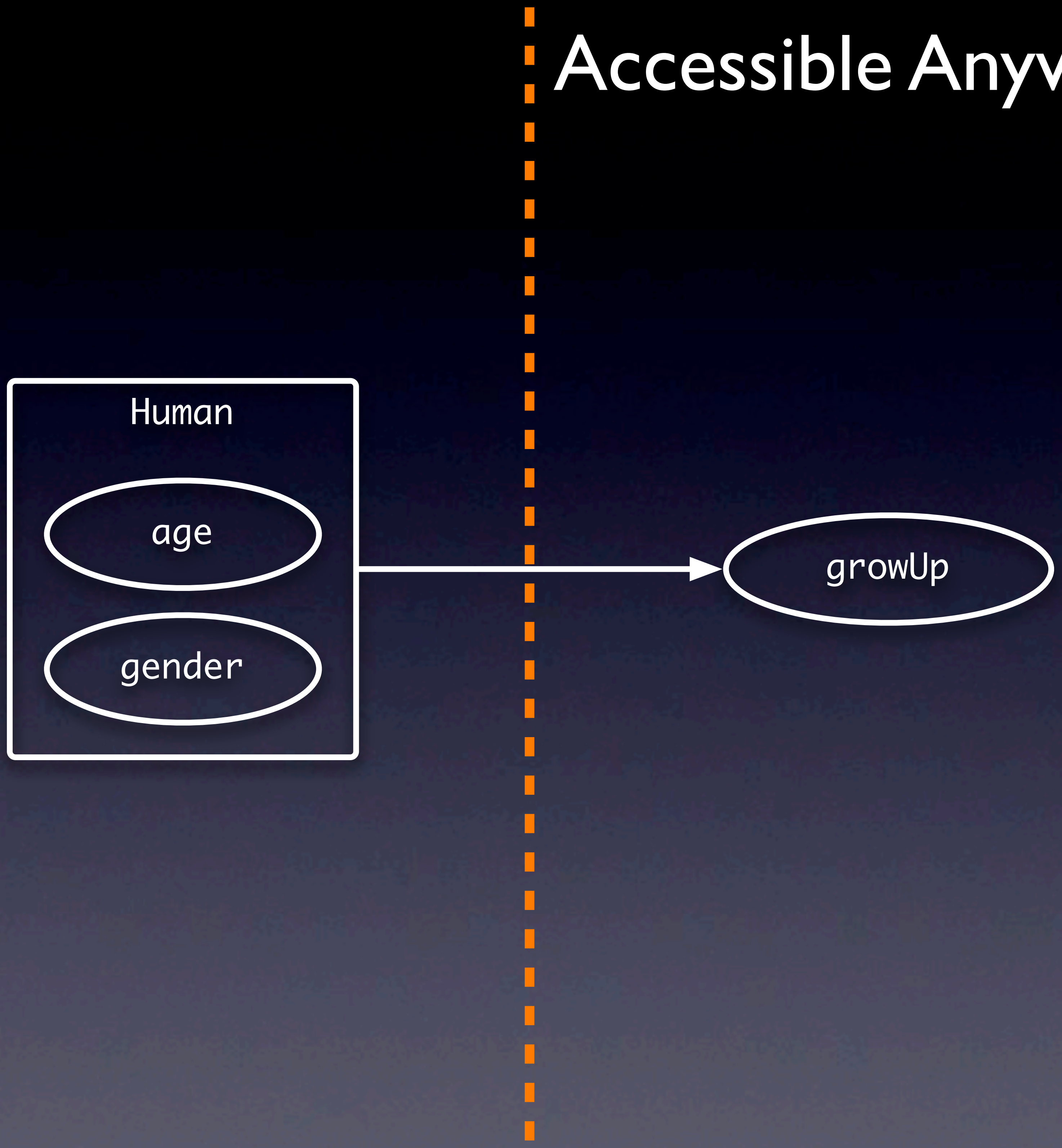
Privileged Method

```
function Human(sgender) {
    //Private
    var age = 1,
        gender = sgender || 'Male';

    //Privileged Method
    this.growUp = function () {
        age++;
    };
}
```

http://javascript.crockford.com/private.html

Accessible Anywhere



Module Pattern

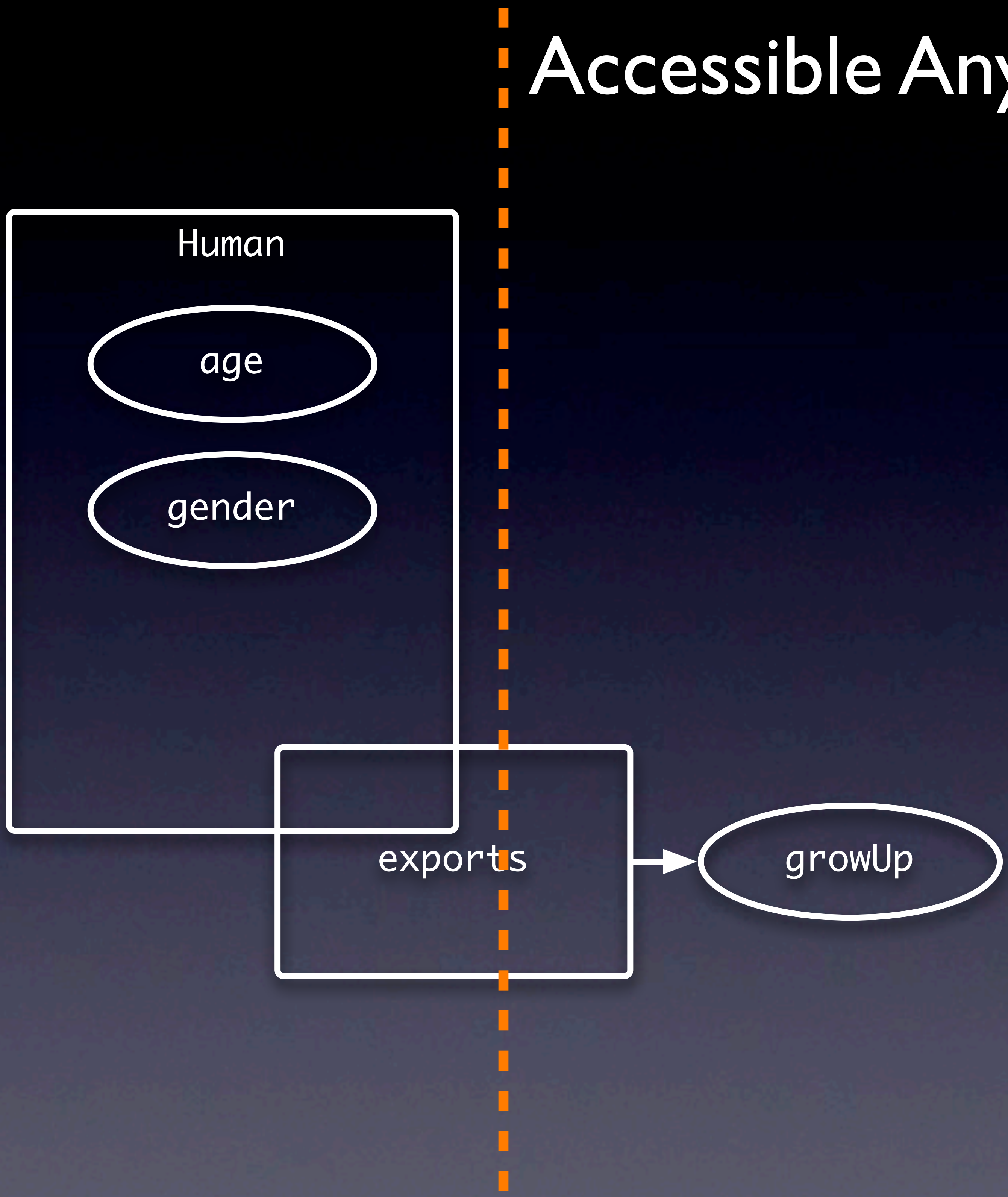
Module Pattern

```
function Human(sgender) {
    //Private
    var age = 1,
        gender = sgender || 'Male';

    //Public
    return {
        growUp: function () {
            age++;
        }
    };
}
```

http://yuiblog.com/blog/2007/06/12/module-pattern/

Accessible Anywhere



Advantage

- Easy
- Keep private data safe

Disadvantage

- Hard to inherit

Large Application

- Lots of modules
- Complex dependency

Lots of Modules

- One file per module
- Lots of files:
  - Performance Issue
  - Async loading?

Complex Dependency

- Load modules by order
- Hard to know the order by head and hand

Solution?

- Not hard to solve
- But there is no standard API

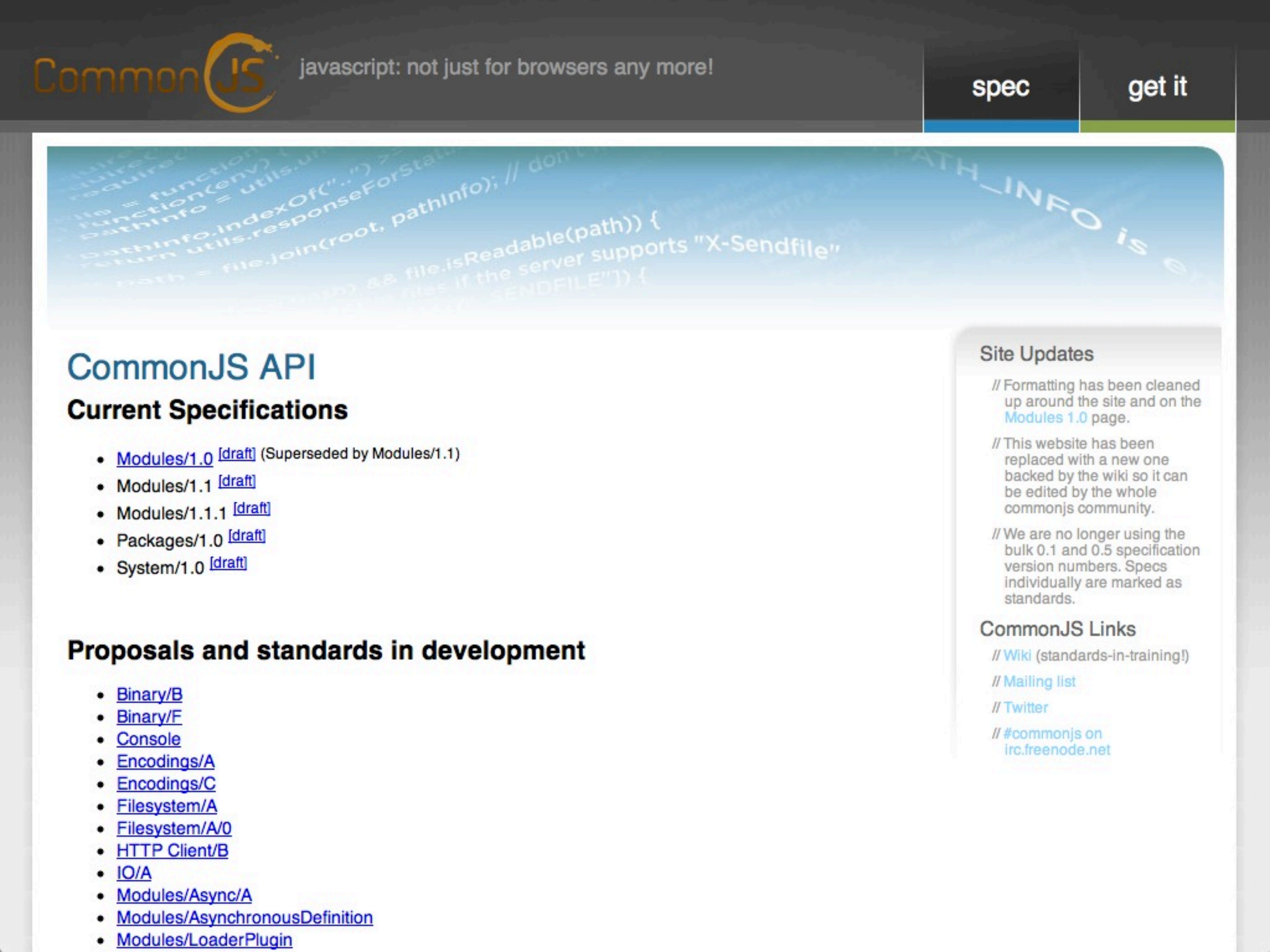
CommonJS

CommonJS

- by Kevin Dangoor
- Volunteers and mailing list
- Unify server side JavaScript API
- Build JavaScript ecosystem
- Not an official organization

CommonJS APIs

- Binary
- Filesystem
- IO
- ...
- Modules



javascript: not just for browsers any more!

CommonJS API

Current Specifications

- Modules/1.0 [draft] (Superseded by Modules/1.1)
- Modules/1.1 [draft]
- Modules/1.1.1 [draft]
- Packages/1.0 [draft]
- System/1.0 [draft]

Proposals and standards in development

- Binary/B
- Binary/F
- Console
- Encodings/A
- Encodings/C
- Filesystem/A
- Filesystem/A/0
- HTTP Client/B
- IO/A
- Modules/Async/A
- Modules/AsynchronousDefinition
- Modules/LoaderPlugin

Site Updates

// Formatting has been cleaned up around the site and on the Modules 1.0 page.

// This website has been replaced with a new one backed by the wiki so it can be edited by the whole commonjs community.

// We are no longer using the bulk 0.1 and 0.5 specification version numbers. Specs individually are marked as standards.

CommonJS Links

// Wiki (standards-in-training!)

// Mailing list

// Twitter

// #commonjs on irc.freenode.net

CommonJS Module

- Modules/1.0
  - NodeJS
- Modules/AsynchronousDefinition
  - AMD

AMD

Asynchronous Module Definition

```
define(id?, dependencies?, factory);
```

Example

```
define(
    'account',
    ['service', 'pubsub'],
    function (service, pubsub) {
        //do something

        //export public APIs
        return {
            signin: function () { /* ... */ },
            signout: function () { /* ... */ },
            getName: function () { /* ... */ },
            setName: function () { /* ... */ }
        };
    }
);
```

Another Way

```
(function () {
    //10000 lines of code

    exports = {
        signin: function () { /* ... */ },
        signout: function () { /* ... */ }
    };

    define('account', function () {
        return exports;
    });
}());
```

In jQuery

```
if ( typeof define === "function" && define.amd && define.amd.jQuery ) {
	define( "jquery", [], function () { return jQuery; } );
}
```

RequireJS

RequireJS

- AMD Implementation by James Burke
- Async resource loader
- 1.0.8 now, 2.0 under development

Usage

```
<script data-main="main" src="require.js"></script>
```

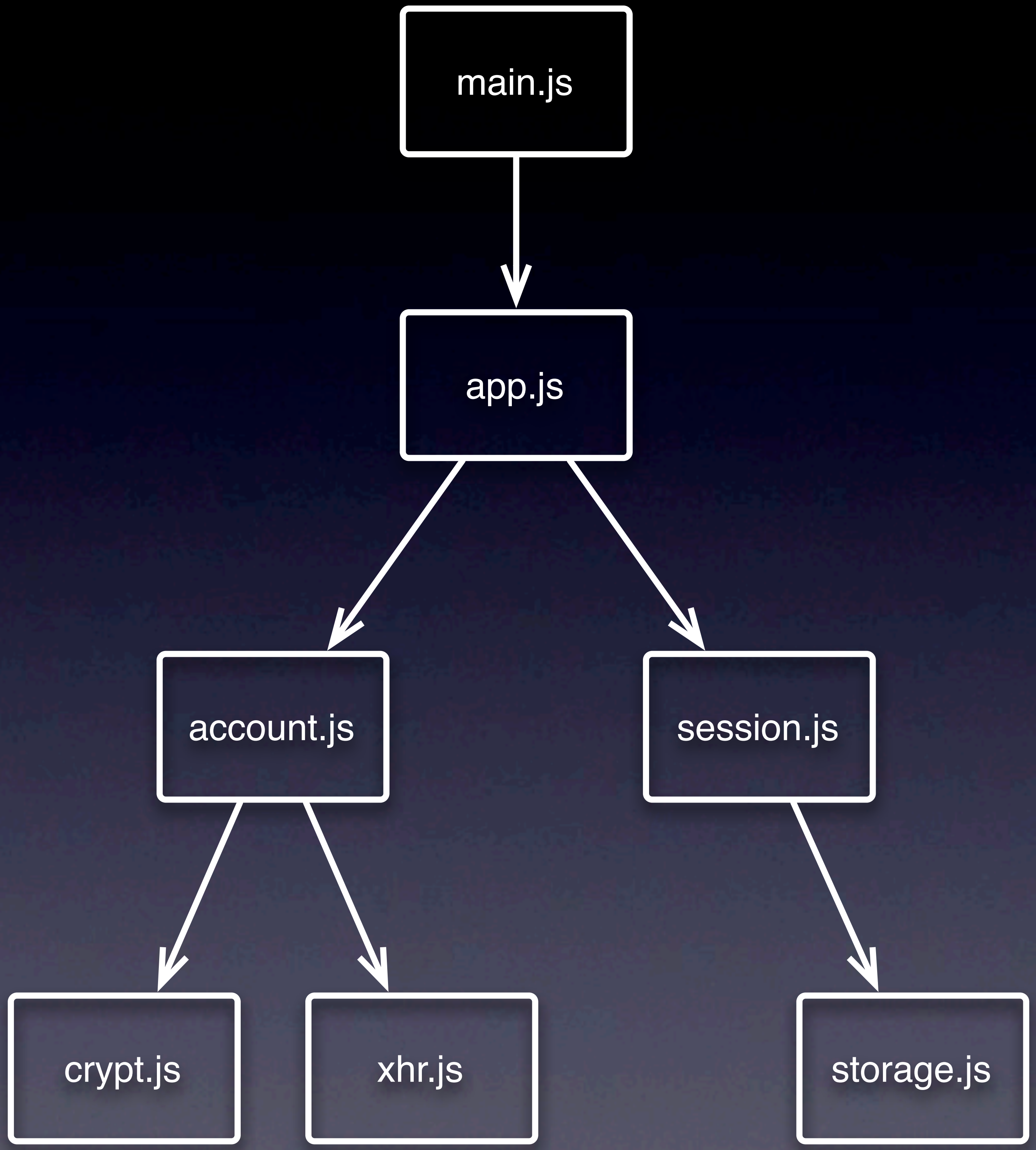
main.js

```
require(["app"], function(app) {
    app.init();
});
```

app.js

```
define(["lib/account", "lib/session"],
    function (account, session) {
        //do something

        return {
            init: function () {
                //init the application
            }
        };
    }
);
```



main.js

app.js

account.js

session.js

crypt.js

xhr.js

storage.js

Features

- AMD
- Path alias
- Circular dependency
- Plugins

Plugins

- order
- text
- wrap, use
- cs (CoffeeScript)

Advantages

- No pollution to global scope
- Everything is organized in module
- Compile CoffeeScript on the fly
- ...etc

Minefield

- Module load fail: hard to debug
  - Wrong path
  - Use require function
  - Plugin error, ex: CoffeeScript syntax error

Still Problems

- Lots of modules
- Lots of files
- Lots of requests
- Low performance

r.js

r.js

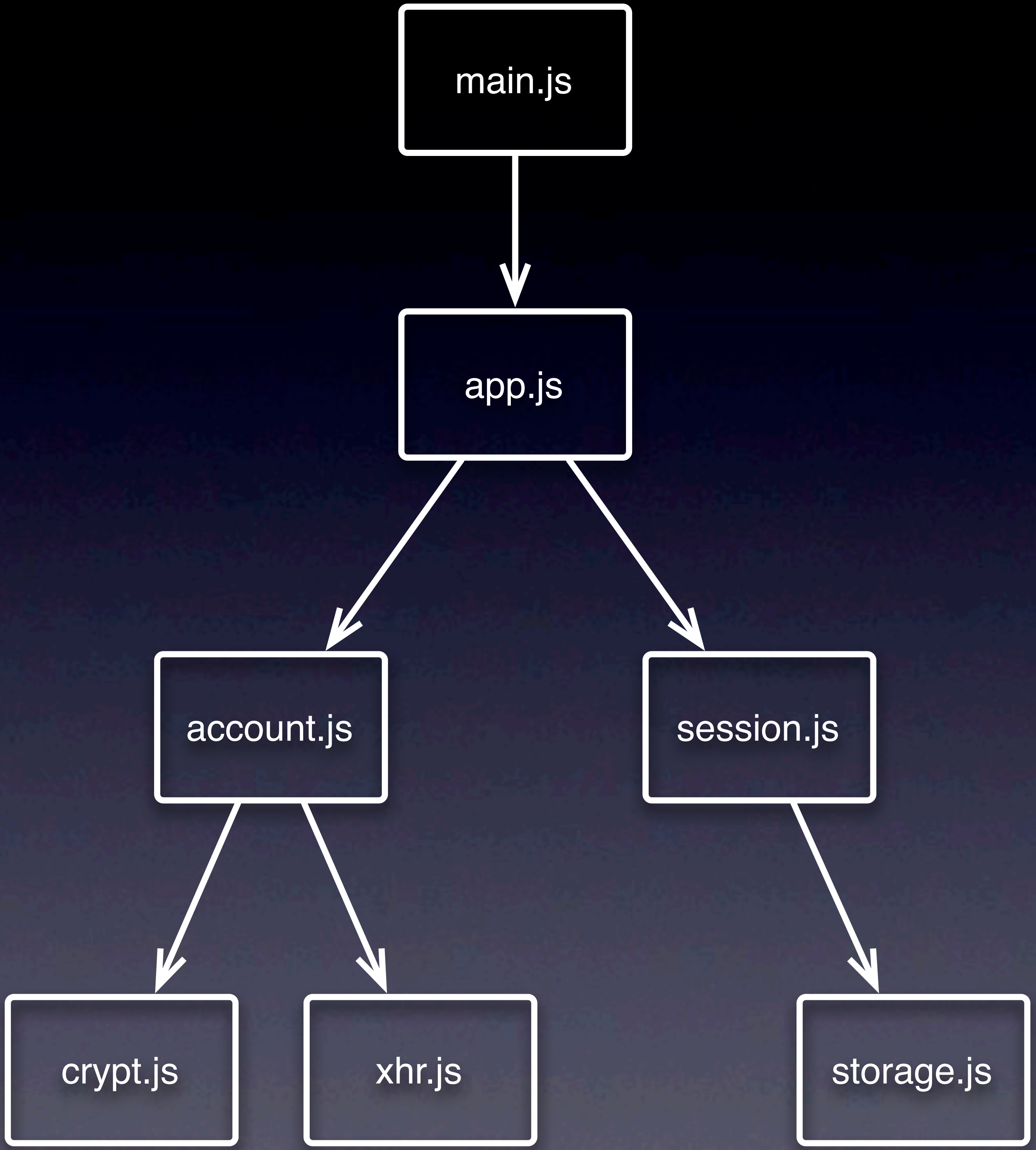
- Optimization tool
- Pack all modules into one file
- Minimize the JavaScript file

Usage

```
node r.js -o build.js
```

build.js

```
({
    appDir: "../",
    baseUrl: "scripts",
    dir: "../../appdirectory-build",
    modules: [
        {
            name: "main"
        }
    ]
})
```


main.js
app.js
account.js
session.js
crypt.js
xhr.js
storage.js

After Optimized

- require.js are large: 86kb

almond.js

almond.js

- Minimal AMD API implement
- Same author

Advantages

- Small: 9kb, 857 bytes minimized and gzipped
- Stable: no change since 0.0.3

Disadvantages

- No plugin support
- Not a resource downloader
- Lots of restriction
- Different optimize concept

Usage

```
node r.js -o baseUrl=.
        name=path/to/almond.js
        include=main
        out=main-built.js
        wrap=true
```

Tip

- You can use r.js to optimize
- And use almond.js to replace require.js

```
<script src="almond.js"></script>
<script src="main-optimized.js"></script>
```

References

- http://www.yuiblog.com/blog/2007/06/12/module-pattern/
- http://wiki.commonjs.org/wiki/Modules/1.1
- http://wiki.commonjs.org/wiki/Modules/AsynchronousDefinition
- https://github.com/amdjs/amdjs-api/wiki/AMD
- http://requirejs.org/
- https://github.com/jrburke/almond

From Technologies to Solutions

Object-Oriented JavaScript

Create scalable, reusable high-quality JavaScript applications, and libraries

Stoyan Stefanov

PACKT PUBLISHING

Questions Time

Q

- I want to use Underscore and Backbone, but they don’t support RequireJS....

A

- Do nothing
- Use use/wrap plugin
- Use modified version
  https://github.com/jrburke
- Use another script tag to include them first

```
<script src="undersocre+backbone.js"></script>
<script src="almond.js"></script>
<script src="main-optimized.js"></script>
```

```
<script src="yepnope.js"></script>
<script>
    yepnope({
        load: [
            "undersocre+backbone.js",
            "almond.js",
            "main-optimized.js"
        ]
    });
</script>
```

Questions?

Thank You