

# Using RequireJS for building modular JavaScript applications

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jQuery Europe 2013

@skurfuerst



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Training





**NEOS**



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## Immer das richtige Werkzeug

Bei der Entwicklung setzen wir auf zukunftsträchtige Technologien als Grundlage für stabile, skalierbare und flexible Webanwendungen. Bereits in der Konzeptionsphase sind wir Ihr Partner und betreuen Sie während des gesamten Entwicklungsprozesses.

## Website

Neben unserer täglichen Arbeit engagieren wir uns im TYPO3 Kernteam und an weiteren Open Source Projekten.

## Webanwendungen

Im Gegensatz zu Desktopanwendungen bieten Ihnen Webanwendungen bei der richtigen Technologiewahl vielfältige Vorteile hinsichtlich Bereitstellung, Plattformunabhängigkeit und Wartung. Wir analysieren Ihre Problemstellungen, wählen die besten Technologien aus und

## Page options

## Title

Development

## Name (URL)

development

## url

## titel

## hash tags

## Visibility

## Hide before date

No date set

# Seamless Frontend Editing

# Frontend Editing

CreateJS

Aloha

EmberJS

RequireJS

VIE

Hallo

Neos





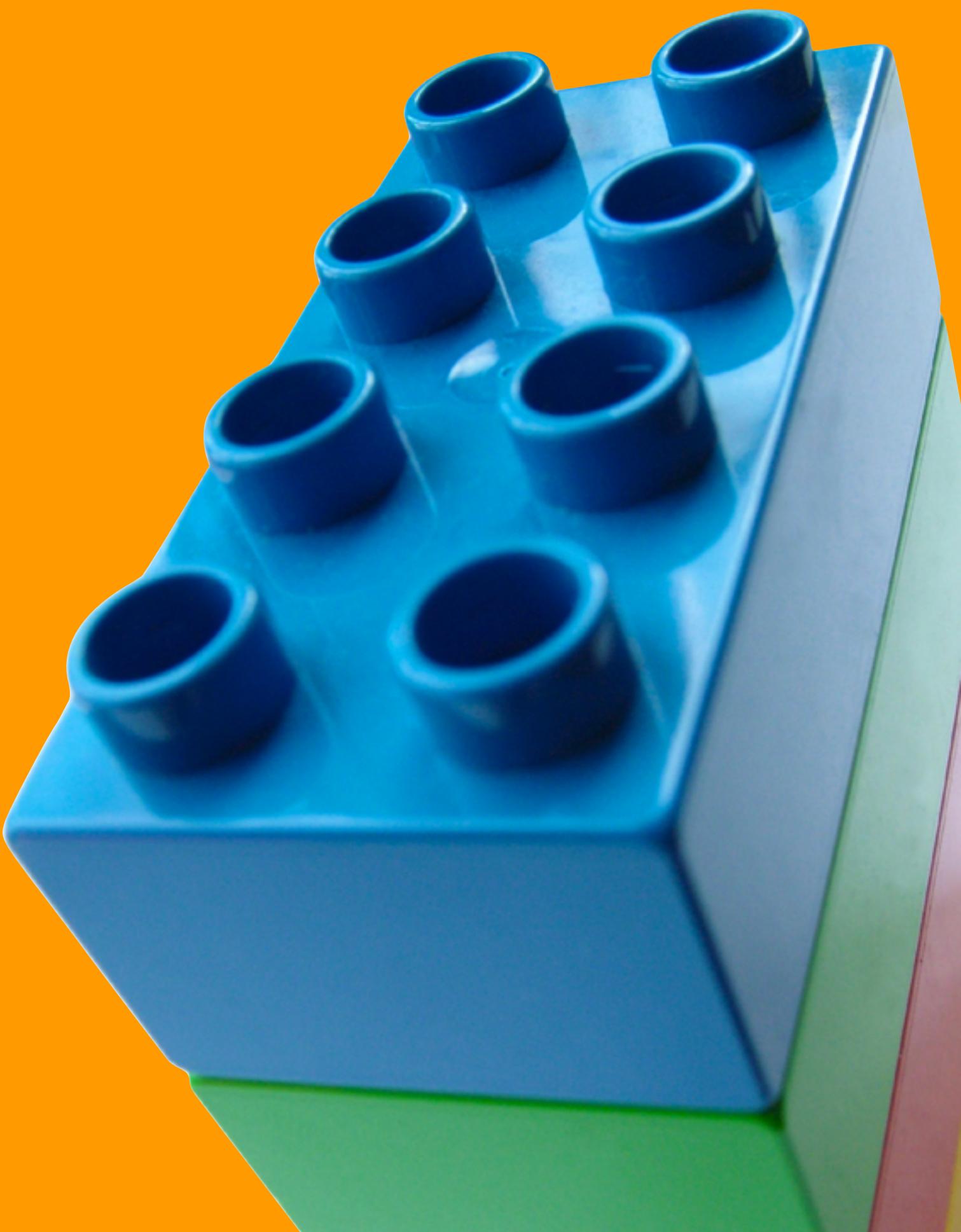






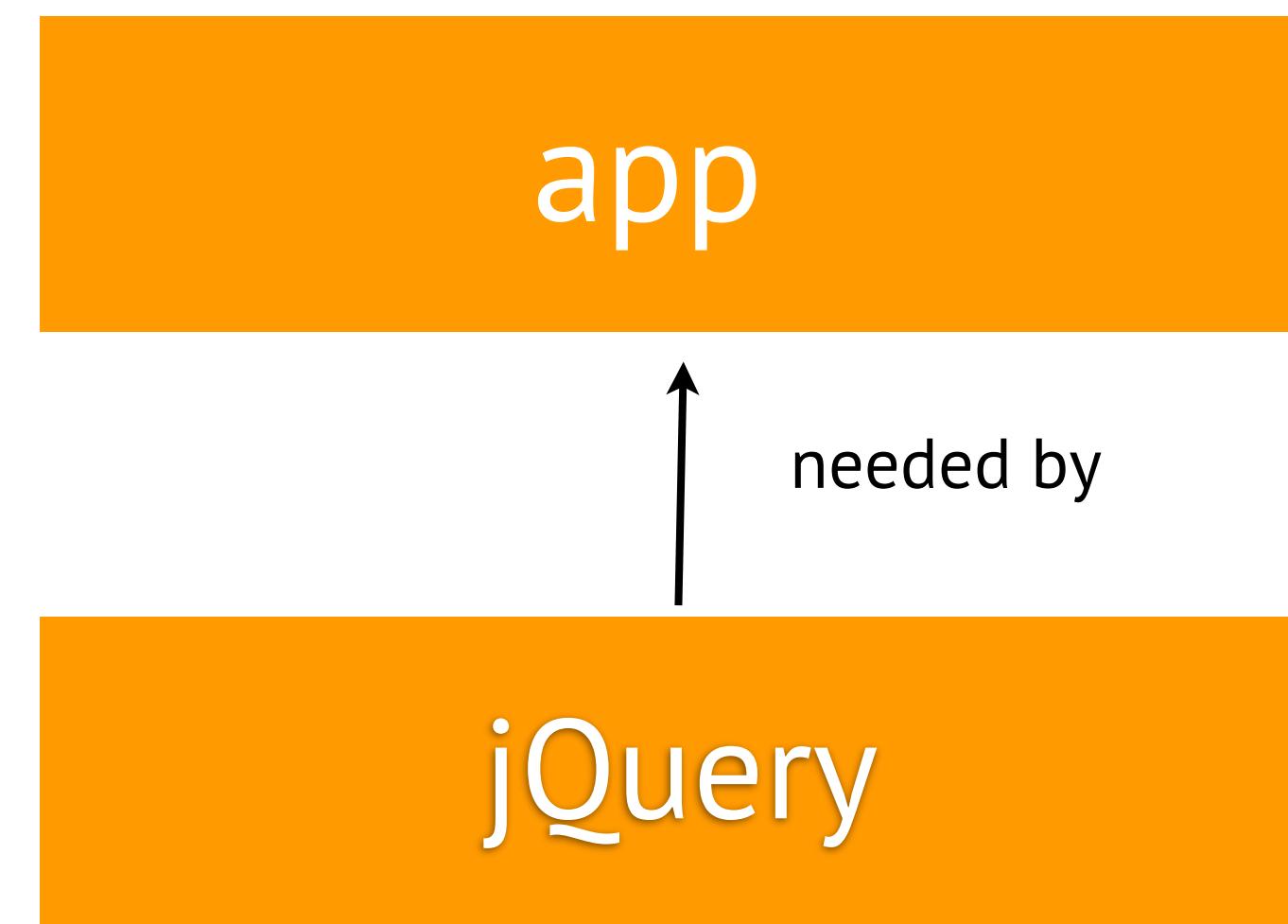
# How to build modular JavaScript applications?

# let's build a simple app

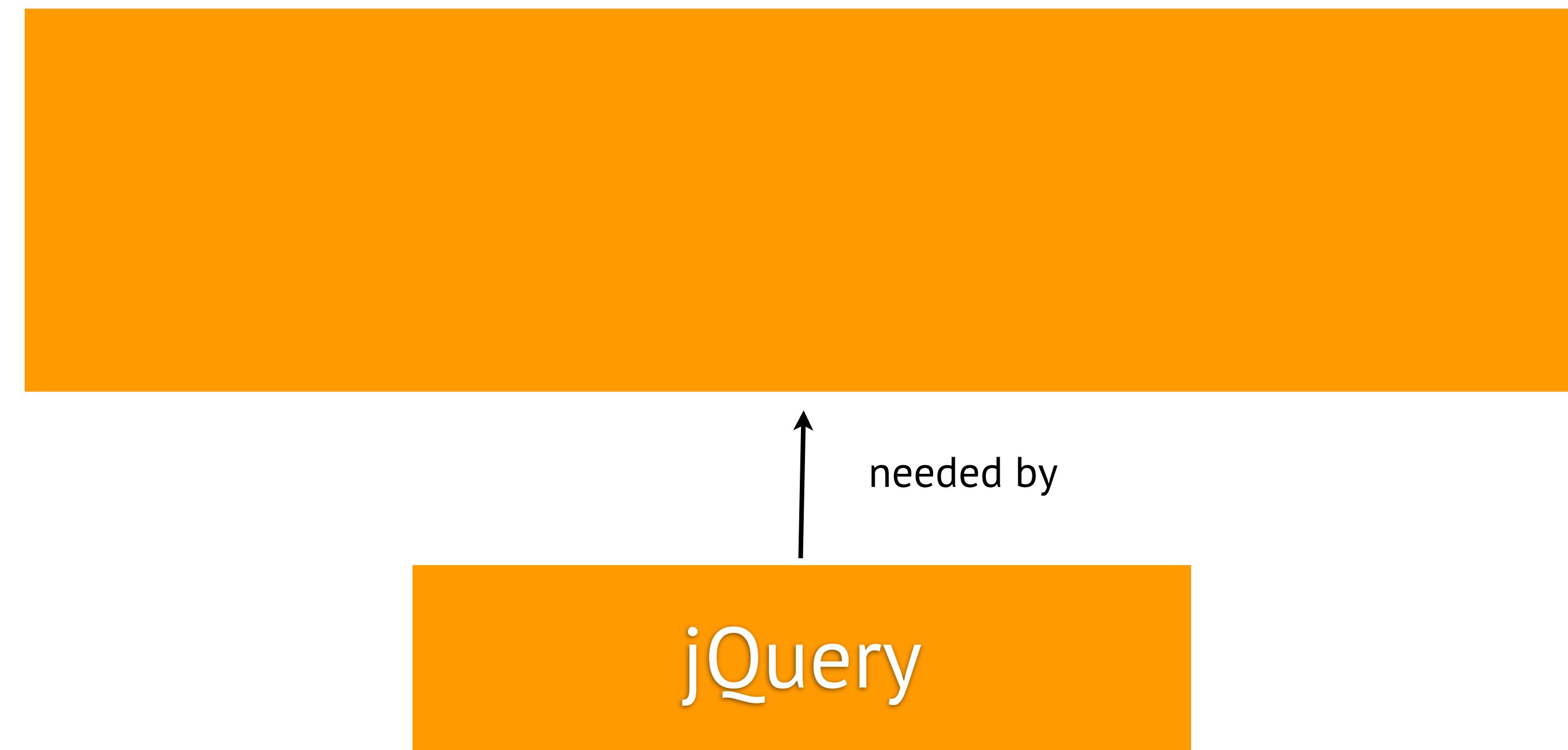


<http://www.sxc.hu/photo/338064>

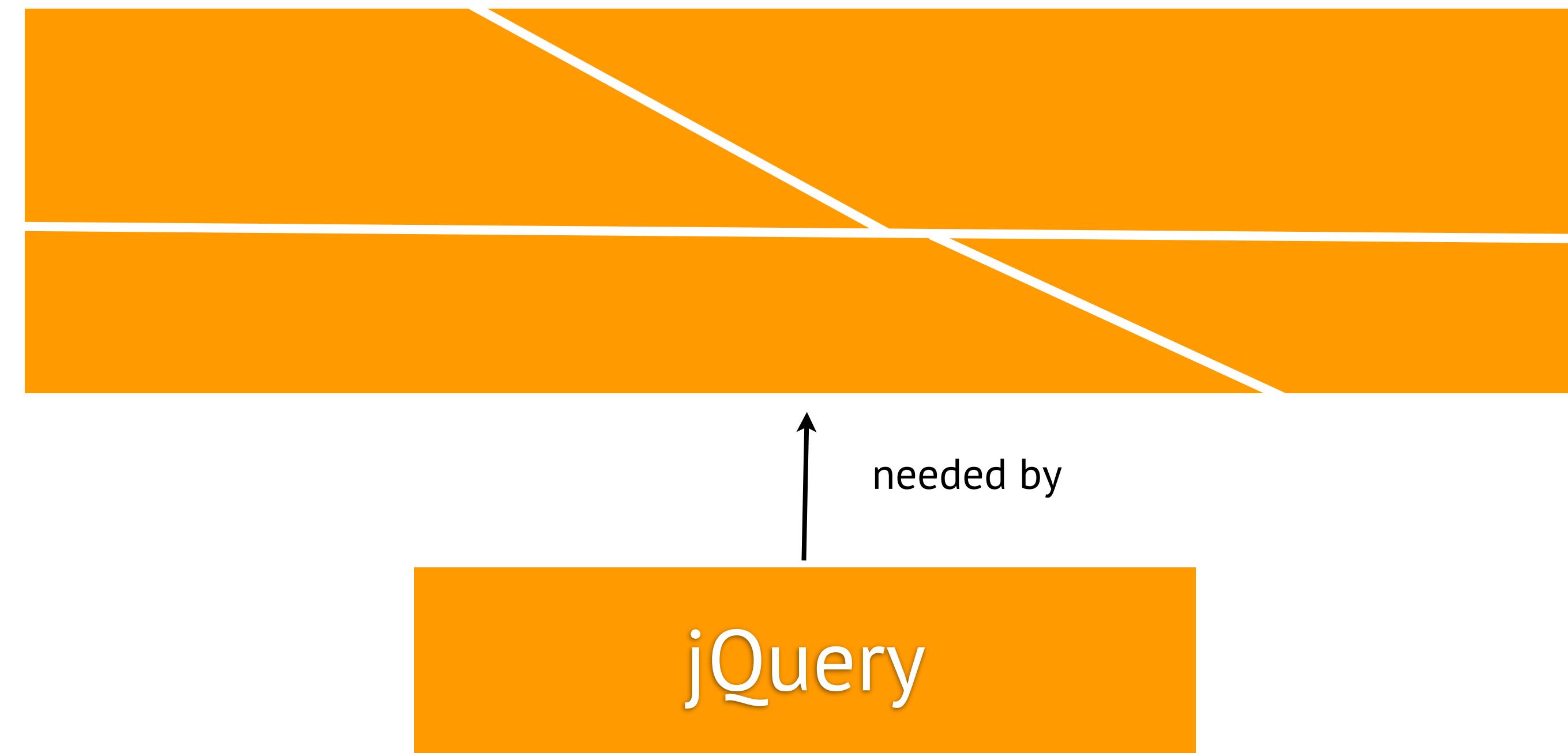
```
<script src="jQuery.js"></script>  
<script src="app.js"></script>
```



```
<script src="jQuery.js"></script>  
<script src="app.js"></script>
```



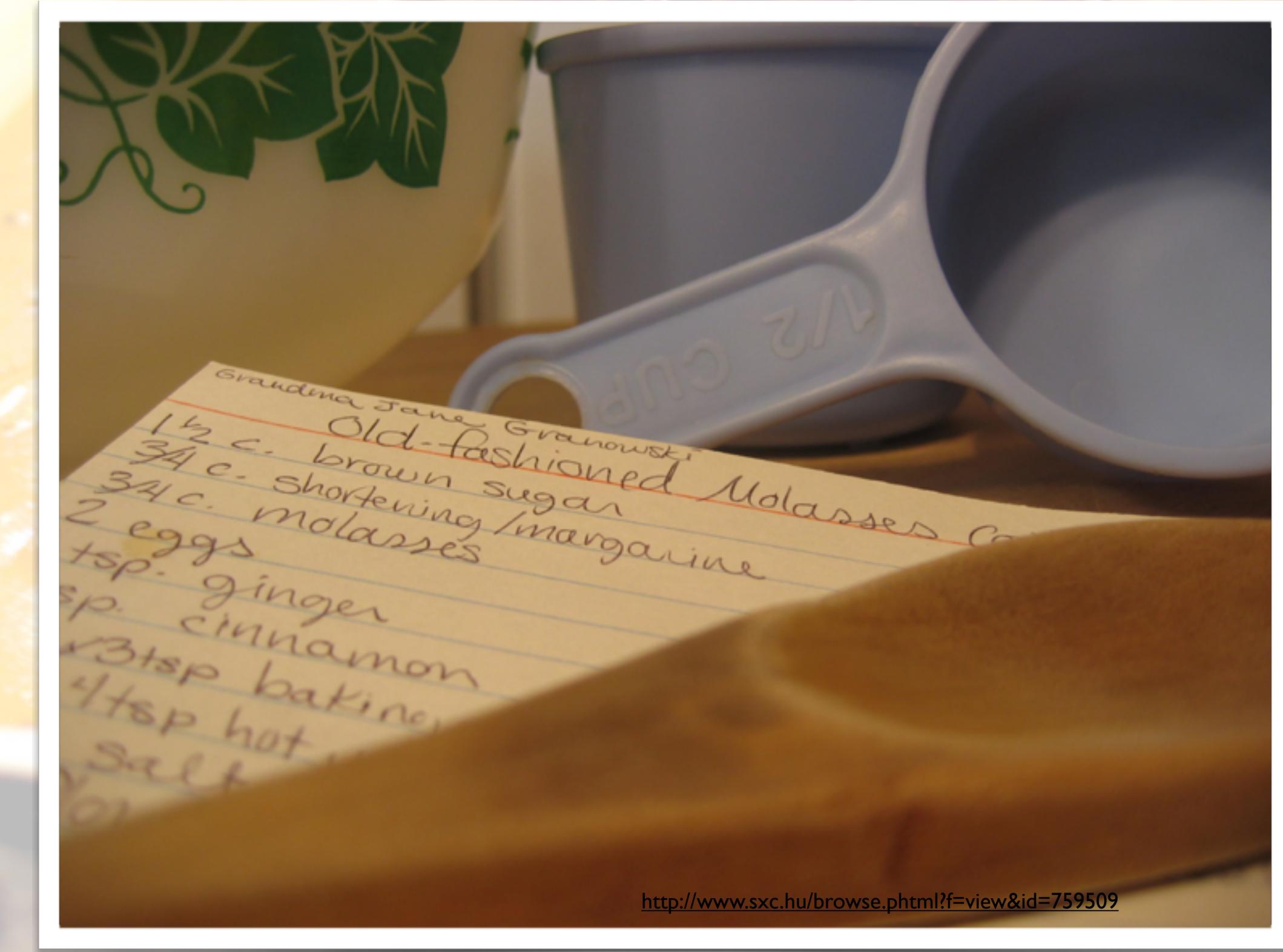
```
<script src="jQuery.js"></script>  
<script src="app.js"></script>
```

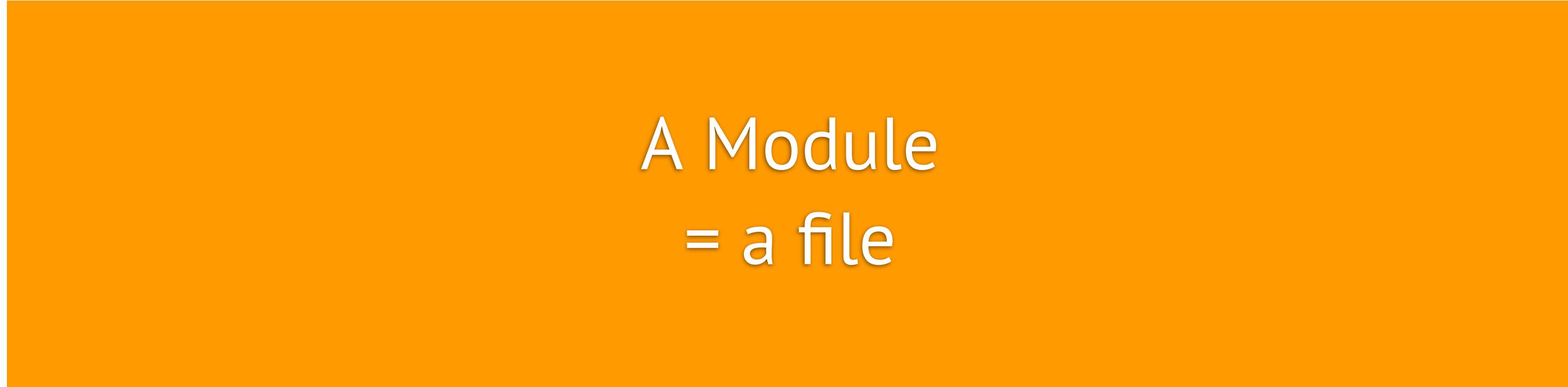






+



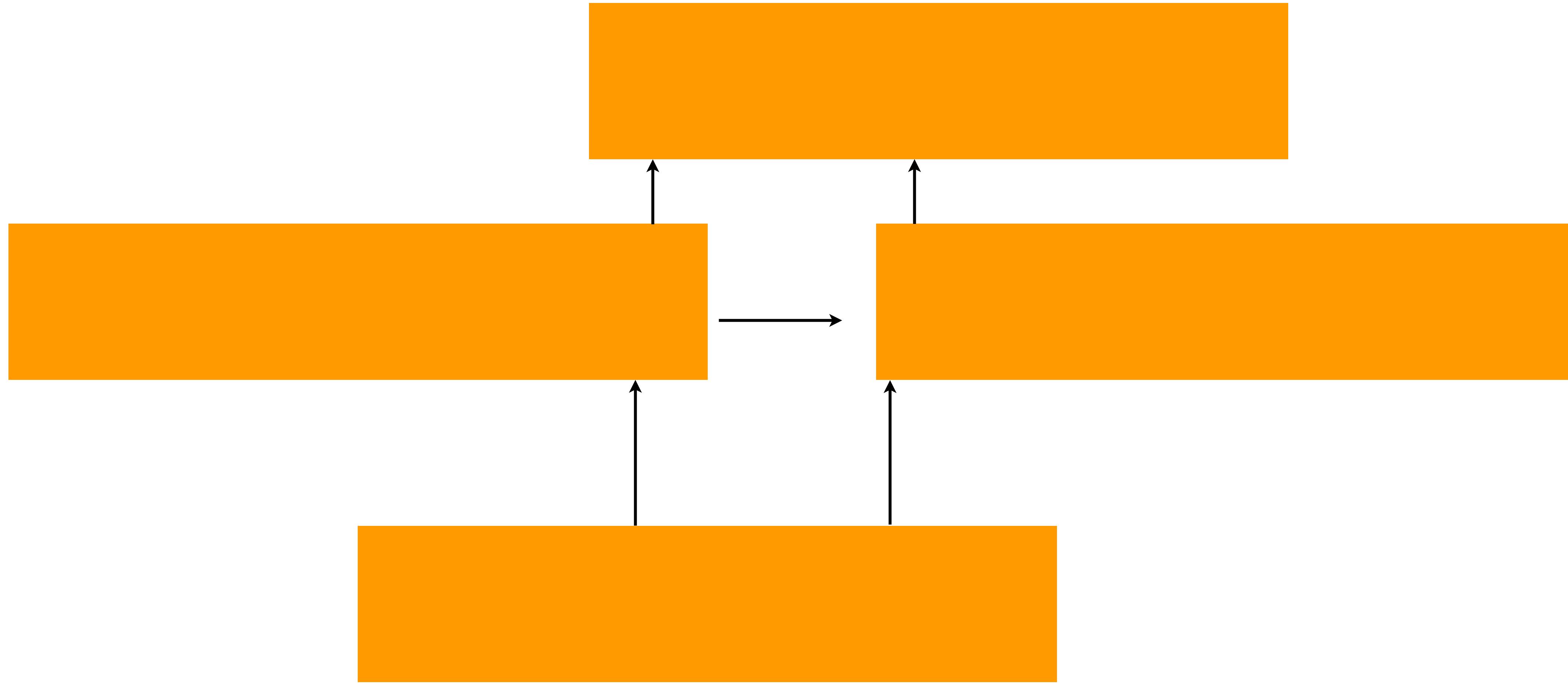


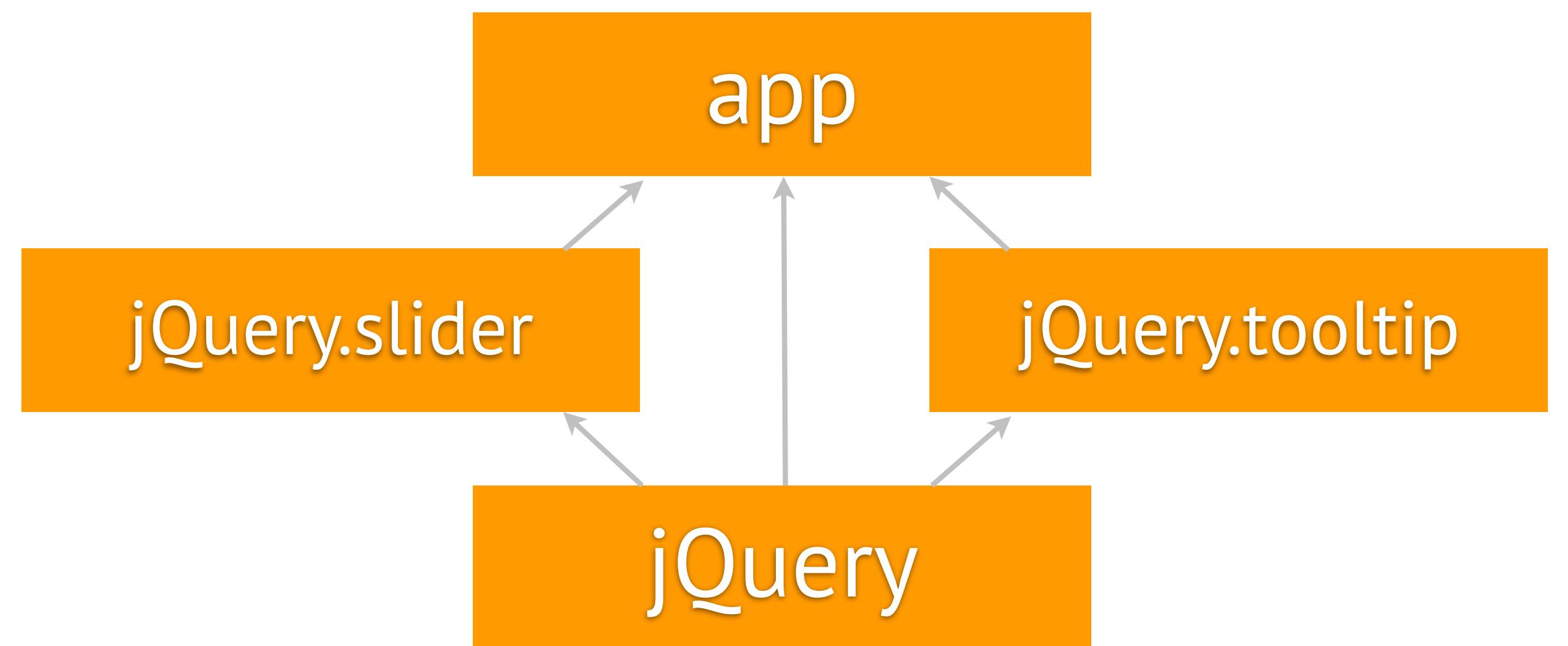
A Module  
= a file

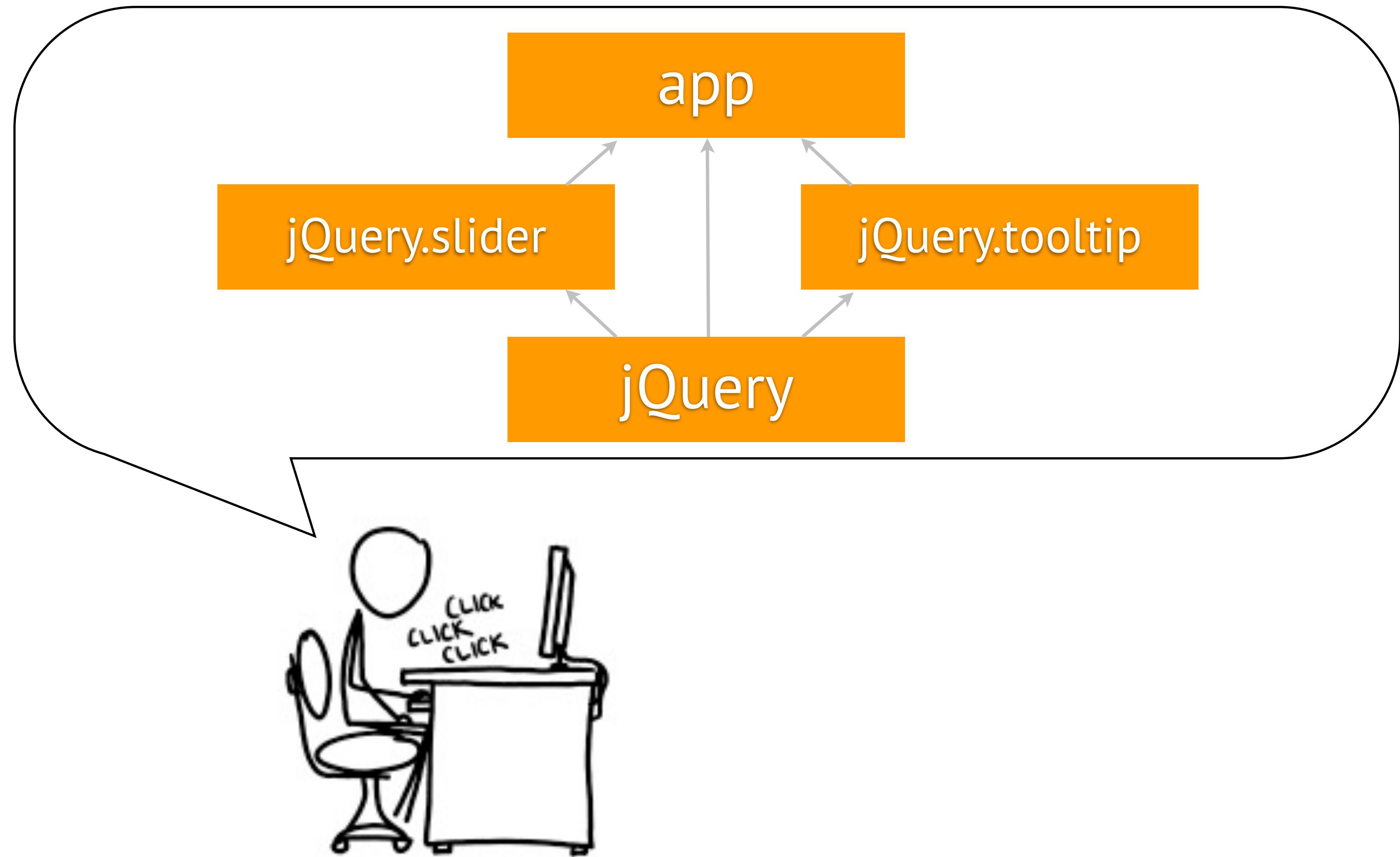
# Application

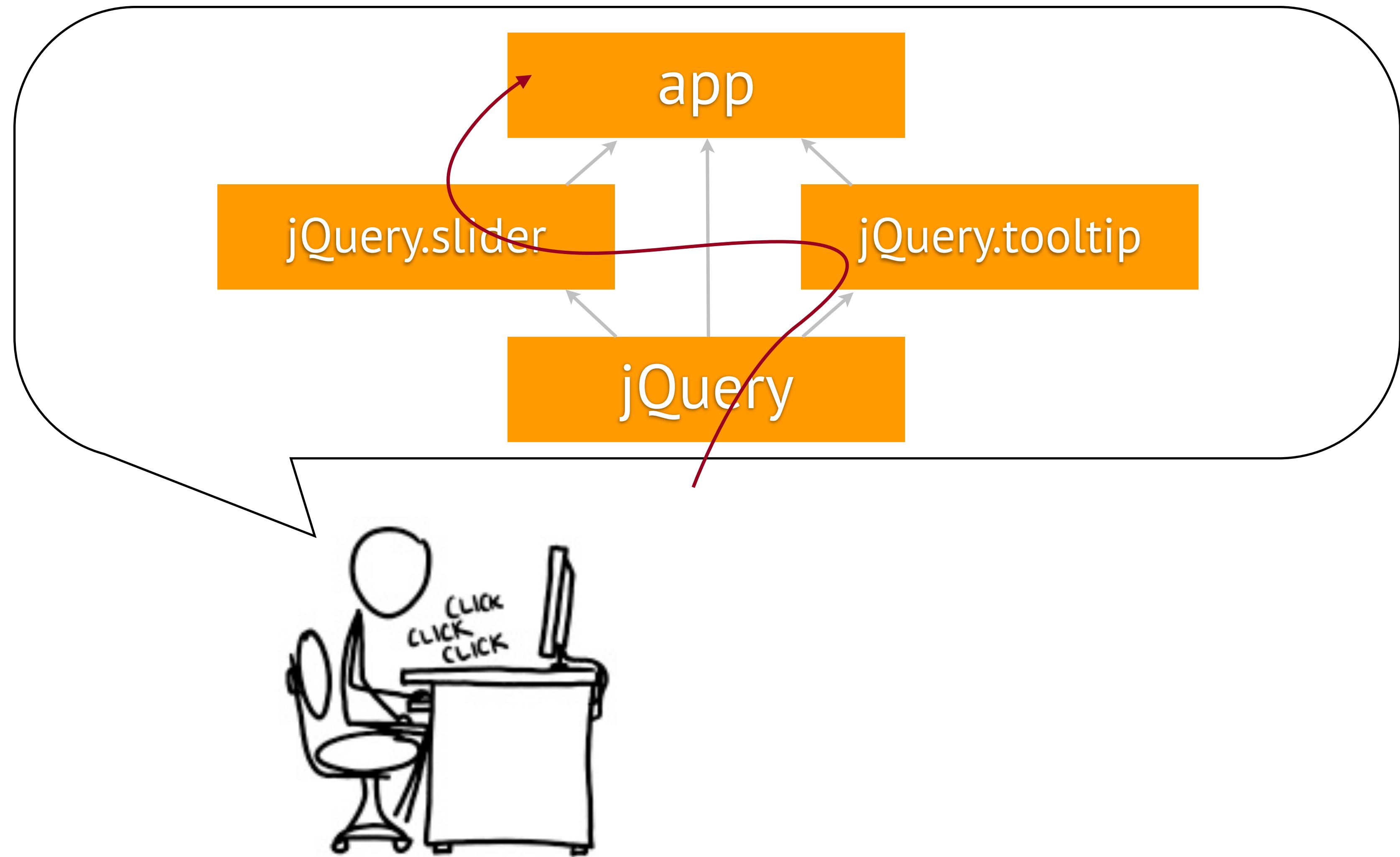


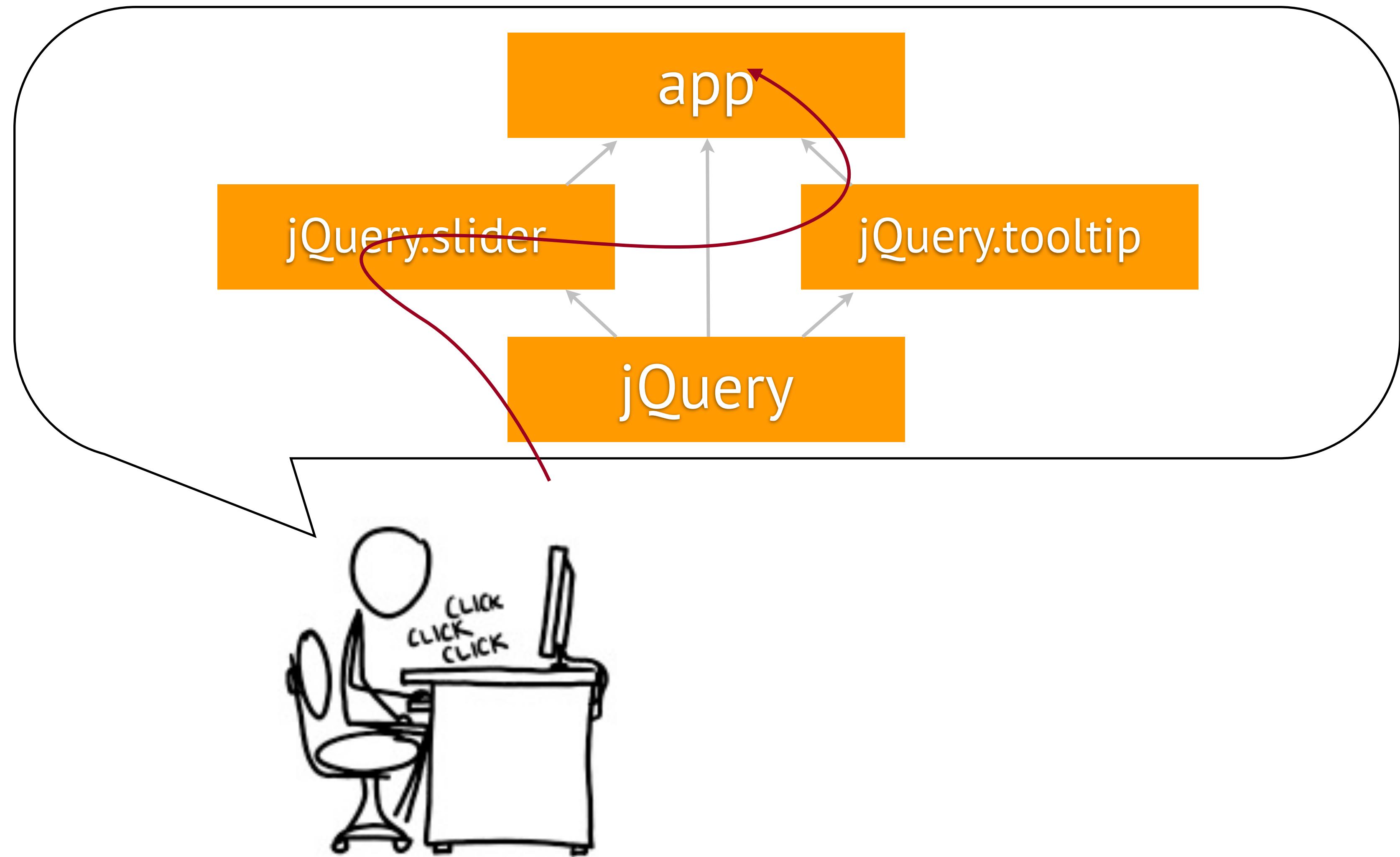
# Application

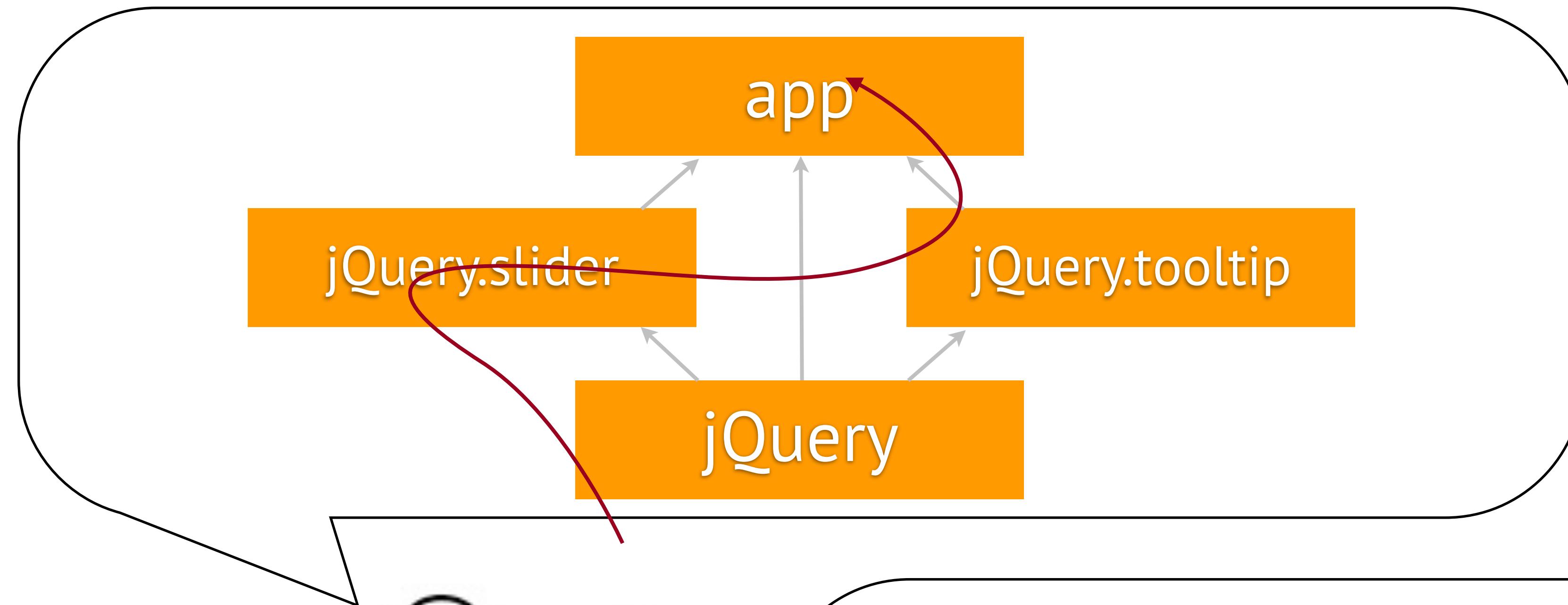






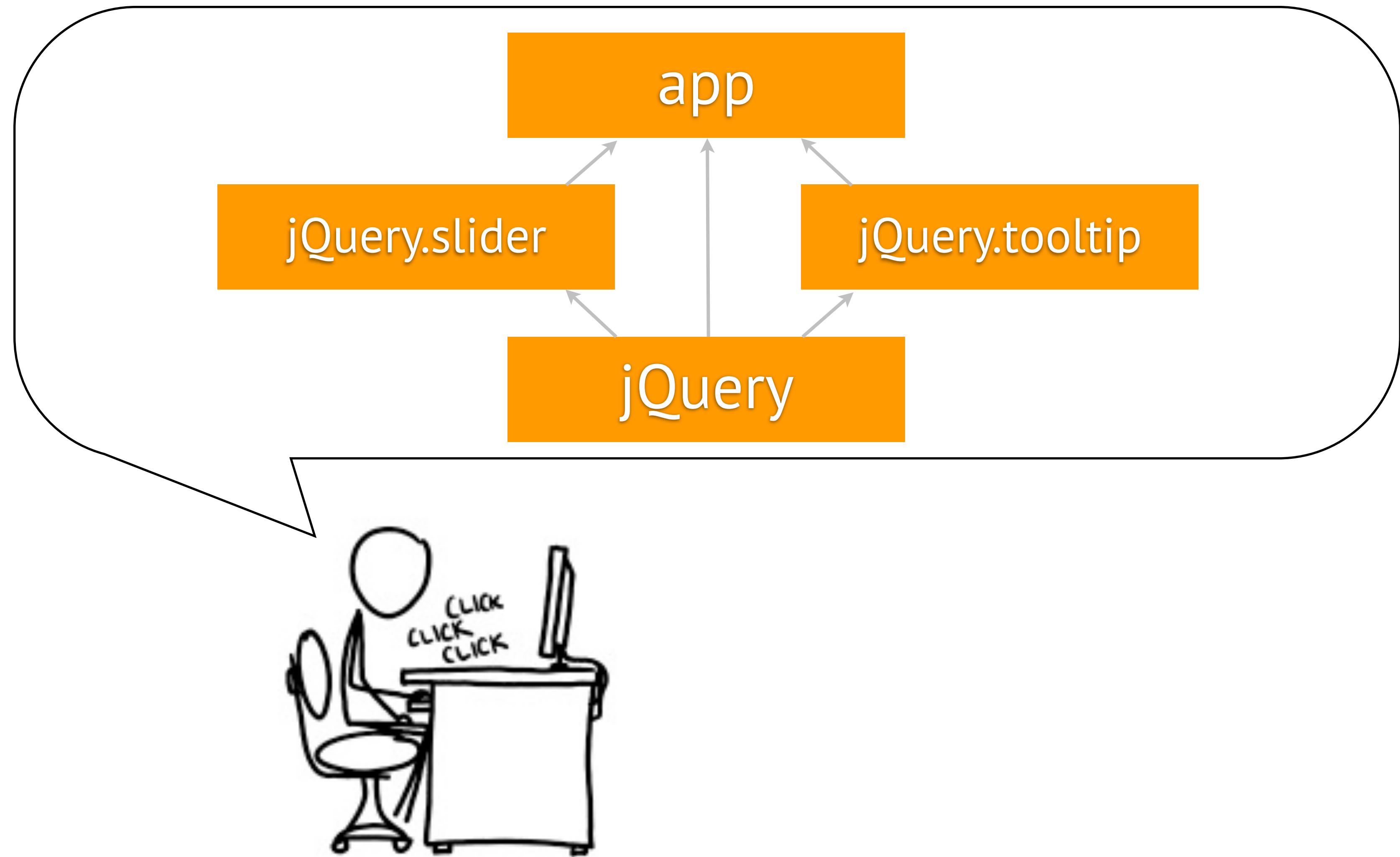


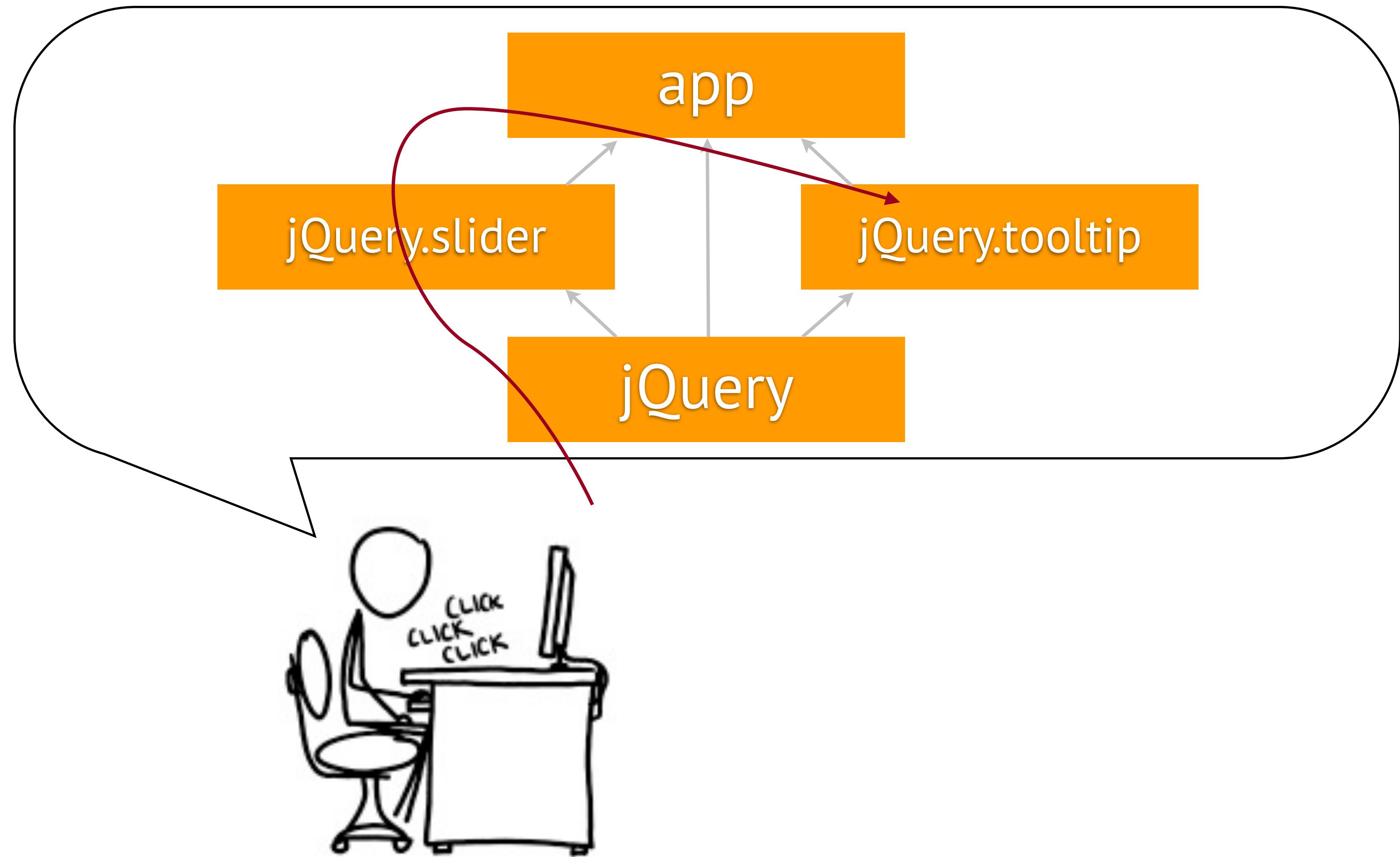


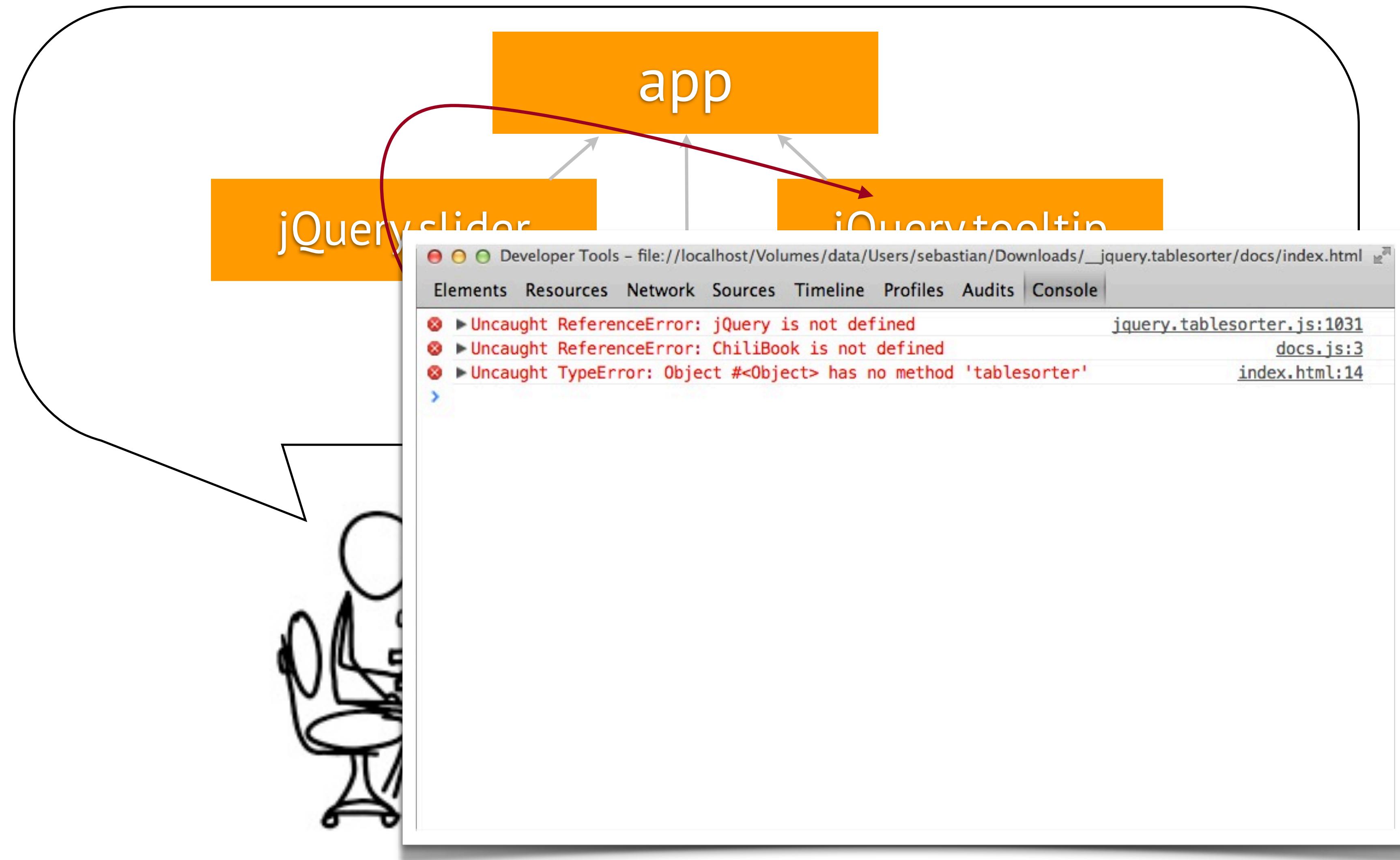


A speech bubble originates from the person at the desk, containing the following code snippets:

```
<script src="jQuery.js"></script>
<script src="jQuery.slider.js"></script>
<script src="jQuery.tooltip.js"></script>
<script src="app.js"></script>
```







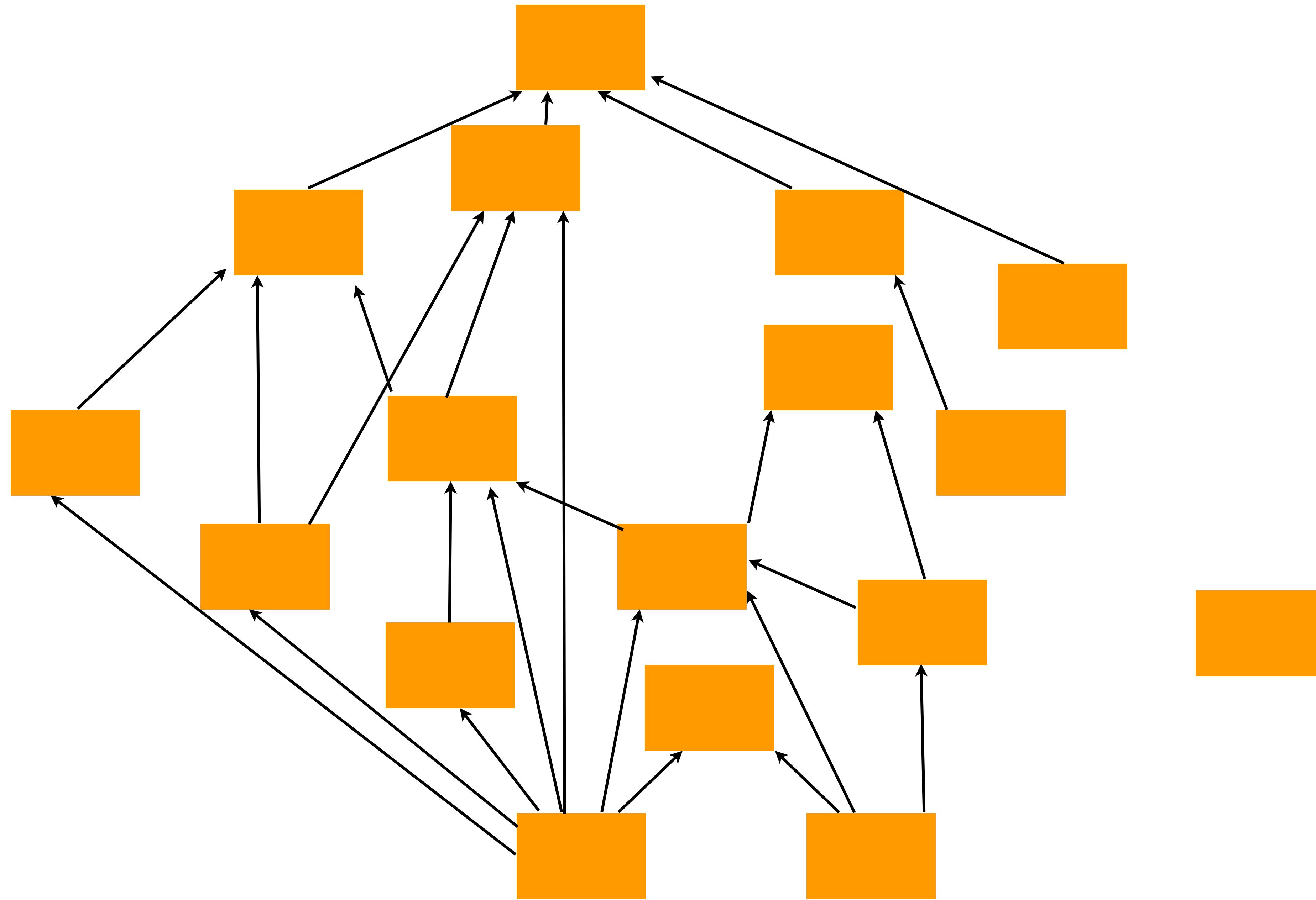


<http://www.sxc.hu/photo/338064>

# a real application







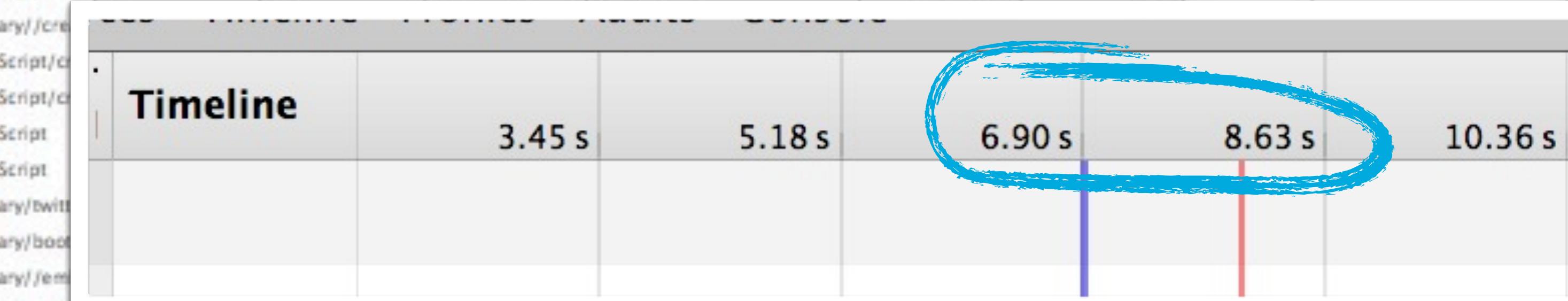
managing 100s of  
dependencies is  
hard

**slow**



jquery-1.7.2.js	/_Resources/Static/Packages/TYPO3.Neos/Library/jquery	GET	200	application/javascript	require.js:33	(from cache)	119 ms
underscore.min.js	/_Resources/Static/Packages/TYPO3.Neos/Library/_/lib	GET	200	application/javascript	require.js:33	(from cache)	4 ms
entity.js	/_Resources/Static/Packages/TYPO3.Neos/JavaScript/_/vie	GET	200	application/javascript	require.js:33	(from cache)	3 ms
controller.js	/_Resources/Static/Packages/TYPO3.Neos/JavaScript/neo	GET	200	application/javascript	require.js:33	(from cache)	4.5 KB
model.js	/_Resources/Static/Packages/TYPO3.Neos/JavaScript/neo	GET	200	application/javascript	require.js:33	(from cache)	18.1 KB
backbone-min.js	/_Resources/Static/Packages/TYPO3.Neos/Library/_/vie/lib	GET	200	application/javascript	require.js:33	(from cache)	17.7 KB
instance.js	/_Resources/Static/Packages/TYPO3.Neos/JavaScript/_/vie	GET	200	application/javascript	require.js:33	(from cache)	109 ms
dictionary-object.js	/_Resources/Static/Packages/TYPO3.Neos/JavaScript/_/emt	GET	200	application/javascript	require.js:33	(from cache)	5.6 KB
create.js	/_Resources/Static/Packages/TYPO3.Neos/JavaScript	GET	304	Not Modified	application/javascript	require.js:33	234.8
common.js	/_Resources/Static/Packages/TYPO3.Neos/JavaScript/neo	GET	304	Not Modified	application/javascript	require.js:33	234.8
ember.js	/_Resources/Static/Packages/TYPO3.Neos/JavaScript	GET	200	application/javascript	require.js:33	(from cache)	14.0 KB
jquery-ui.js	/_Resources/Static/Packages/TYPO3.Neos/JavaScript	GET	200	application/javascript	require.js:33	(from cache)	15 ms
jQueryJionbars.0.2.1.js	/_Resources/Static/Packages/TYPO3.Neos/Library/jquery	GET	200	application/javascript	require.js:33	(from cache)	15 ms
aloha.js	/_Resources/Static/Packages/TYPO3.Neos/JavaScript	GET	200	application/javascript	require.js:33	(from cache)	11 ms
jquery.tagsinput.min.js	/_Resources/Static/Packages/TYPO3.Neos/Library/_/creati	GET	200	application/javascript	require.js:33	(from cache)	10 ms
rangy-core-1.2.3.js	/_Resources/Static/Packages/TYPO3.Neos/Library/_/creati	GET	200	application/javascript	require.js:33	(from cache)	10 ms
jquery.type3.collectionWidgets.js	/_Resources/Static/Packages/TYPO3.Neos/JavaScript/crea	GET	200	application/javascript	require.js:33	(from cache)	9 ms
type3MeldgaardEditable.js	/_Resources/Static/Packages/TYPO3.Neos/JavaScript/crea	GET	200	application/javascript	require.js:33	(from cache)	9 ms
text.js	/_Resources/Static/Packages/TYPO3.Neos/JavaScript	GET	200	application/javascript	require.js:33	(from cache)	6 ms
vie.js	/_Resources/Static/Packages/TYPO3.Neos/JavaScript	GET	200	application/javascript	require.js:33	(from cache)	12 ms
bootstrap-alert.js	/_Resources/Static/Packages/TYPO3.Neos/Library/twitter	GET	304	Not Modified	application/javascript	require.js:33	233.8
bootstrap-notify.js	/_Resources/Static/Packages/TYPO3.Neos/Library/bootstrap	GET	304	Not Modified	application/javascript	require.js:33	233.8
ember-0.9.7.js	/_Resources/Static/Packages/TYPO3.Neos/Library/_/ember	GET	200	application/javascript	require.js:33	(from cache)	5.8 ms
jquery-ui-1.9b1.js	/_Resources/Static/Packages/TYPO3.Neos/Library/jquery	GET	200	application/javascript	require.js:33	(from cache)	66 ms
jquery.rdfquery.min.js	/_Resources/Static/Packages/TYPO3.Neos/Library/_/vie/_li	GET	200	application/javascript	require.js:33	(from cache)	25 ms
vie-latest.debug.js	/_Resources/Static/Packages/TYPO3.Neos/Library/_/vie	GET	200	application/javascript	require.js:33	(from cache)	51 ms
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hallo.js	/_Resources/Static/Packages/TYPO3.Neos/Library/hallo	GET	200	application/javascript	require.js:33	(from cache)	17.1 KB
create.js	/_Resources/Static/Packages/TYPO3.Neos/Library/_/create	GET	200	application/javascript	require.js:33	(from cache)	17 ms
jquery.hotkeys.js	/_Resources/Static/Packages/TYPO3.Neos/Library/jquery	GET	200	application/javascript	require.js:33	(from cache)	14 ms
w.js	/_Resources/Static/Packages/TYPO3.Neos/JavaScript/neo	GET	200	application/javascript	require.js:33	(from cache)	16.5 KB
linkplugin.js	/_Resources/Static/Packages/TYPO3.Neos/JavaScript/hall	GET	200	application/javascript	require.js:33	(from cache)	16.1 KB
editors.js	/_Resources/Static/Packages/TYPO3.Neos/JavaScript/neo	GET	200	application/javascript	require.js:33	(from cache)	20 ms
jquery.popover.js	/_Resources/Static/Packages/TYPO3.Neos/Library/jquery	GET	200	application/javascript	require.js:33	(from cache)	11 ms
jquery.jcropmin.js	/_Resources/Static/Packages/TYPO3.Neos/Library/_/jcrop/_/j	GET	200	application/javascript	require.js:33	(from cache)	14 ms
plupload.js	/_Resources/Static/Packages/TYPO3.Neos/Library/pluplo	GET	200	application/javascript	require.js:33	(from cache)	10 ms
jquery.cookie.js	/_Resources/Static/Packages/TYPO3.Neos/Library/jquery	GET	200	application/javascript	require.js:33	(from cache)	13 ms
jquery.dynatree.js	/_Resources/Static/Packages/TYPO3.Neos/Library/jquery	GET	200	application/javascript	require.js:33	(from cache)	10 ms
bootstrap-dropdown.js	/_Resources/Static/Packages/TYPO3.Neos/Library/twitter	GET	200	application/javascript	require.js:33	(from cache)	19 ms
elements.js	/_Resources/Static/Packages/TYPO3.Neos/JavaScript/neo	GET	304	Not Modified	application/javascript	require.js:33	234.8
plupload.html5.js	/_Resources/Static/Packages/TYPO3.Neos/Library/pluplo	GET	200	application/javascript	require.js:33	(from cache)	1.6 KB
topbar.js	/_Resources/Static/Packages/TYPO3.Neos/JavaScript/neo	GET	200	application/javascript	require.js:33	(from cache)	9 ms
button.js	/_Resources/Static/Packages/TYPO3.Neos/JavaScript/neo	GET	200	application/javascript	require.js:33	(from cache)	9 ms

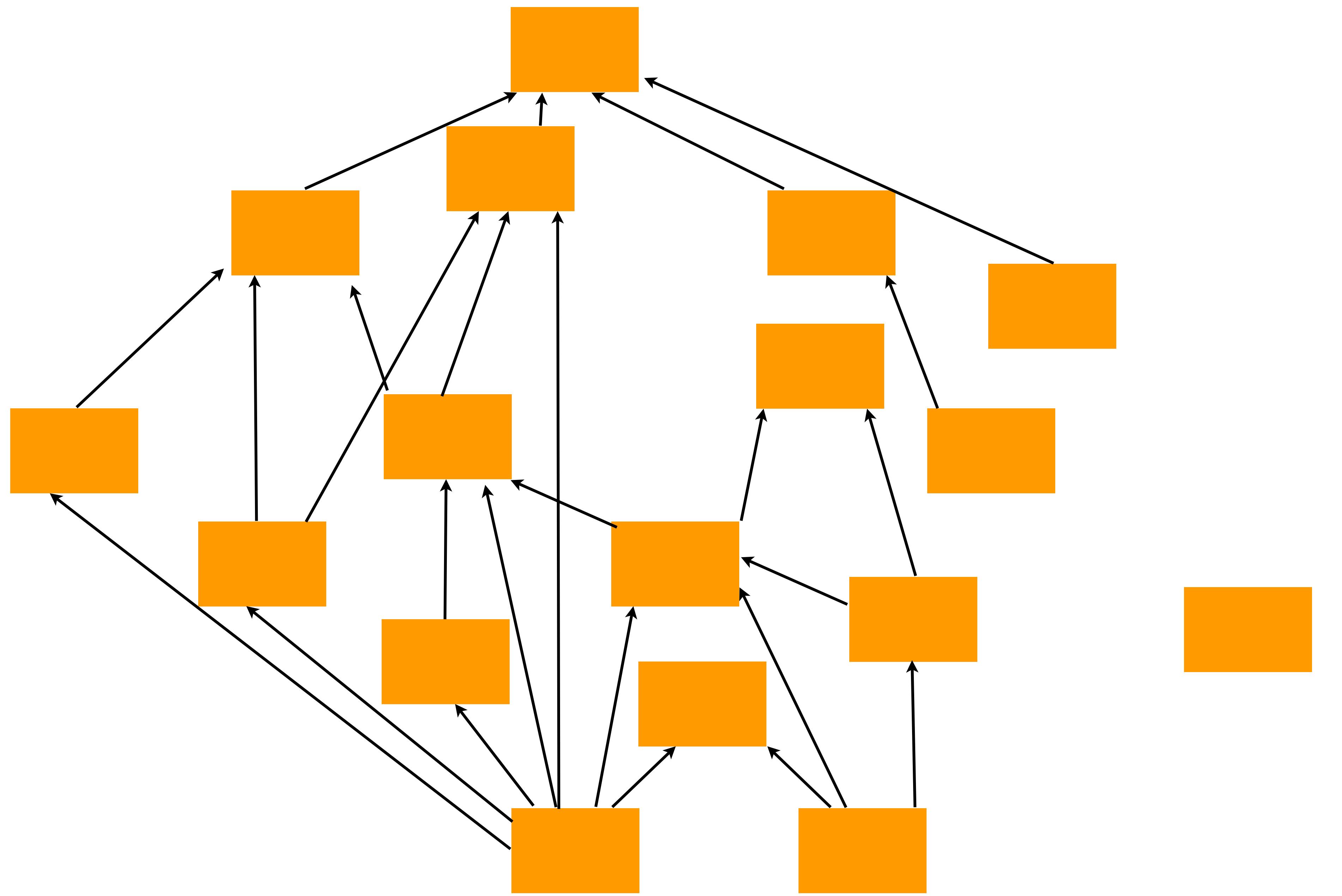
jquery-1.7.2.js	GET	200	application/javascript	require.js:33	(from cache)	119 ms	
underscore.min.js	GET	200	application/javascript	require.js:33	(from cache)	4 ms	
entity.js	GET	200	application/javascript	require.js:33	(from cache)	3 ms	
controller.js	GET	200	application/javascript	require.js:33	4.5 KB	111 ms	
model.js	GET	200	application/javascript	require.js:33	18.1 KB	110 ms	
backbone-min.js	GET	200	application/javascript	require.js:33	17.7 KB	5 ms	
instance.js	GET	200	application/javascript	require.js:33	6.0 KB	109 ms	
dictionary-object.js	GET	200	application/javascript	require.js:33	5.6 KB	4 ms	
create.js	GET	304	Not Modified	application/javascript	require.js:33	234.8	25 ms
common.js	GET	304	Not Modified	application/javascript	require.js:33	234.8	25 ms
ember.js	GET	200	application/javascript	require.js:33	(from cache)	14.0 KB	15 ms
jquery-ui.js	GET	200	application/javascript	require.js:33	(from cache)	15 ms	15 ms
jQueryJionbars.0.2.1.js	GET	200	application/javascript	require.js:33	(from cache)	15 ms	15 ms
aloha.js	GET	200	application/javascript	require.js:33	(from cache)	11 ms	11 ms
jquery-tagsinput.min.js	GET	200	application/javascript	require.js:33	(from cache)	10 ms	10 ms
rangy-core-1.2.3.js	GET	200	application/javascript	require.js:33	(from cache)	10 ms	10 ms
jquery-type3-collectionWidgets.js	GET	200	application/javascript	require.js:33	(from cache)	10 ms	10 ms
type3MidgardEditable.js	GET	200	application/javascript	require.js:33	(from cache)	10 ms	10 ms
test.js	GET	200	application/javascript	require.js:33	(from cache)	10 ms	10 ms
vie.js	GET	200	application/javascript	require.js:33	(from cache)	10 ms	10 ms
bootstrap-alert.js	GET	200	application/javascript	require.js:33	(from cache)	10 ms	10 ms
bootstrap-notify.js	GET	200	application/javascript	require.js:33	(from cache)	10 ms	10 ms
ember-0.9.7.js	GET	200	application/javascript	require.js:33	(from cache)	10 ms	10 ms
jquery-ui-1.9b1.js	GET	200	application/javascript	require.js:33	(from cache)	10 ms	10 ms

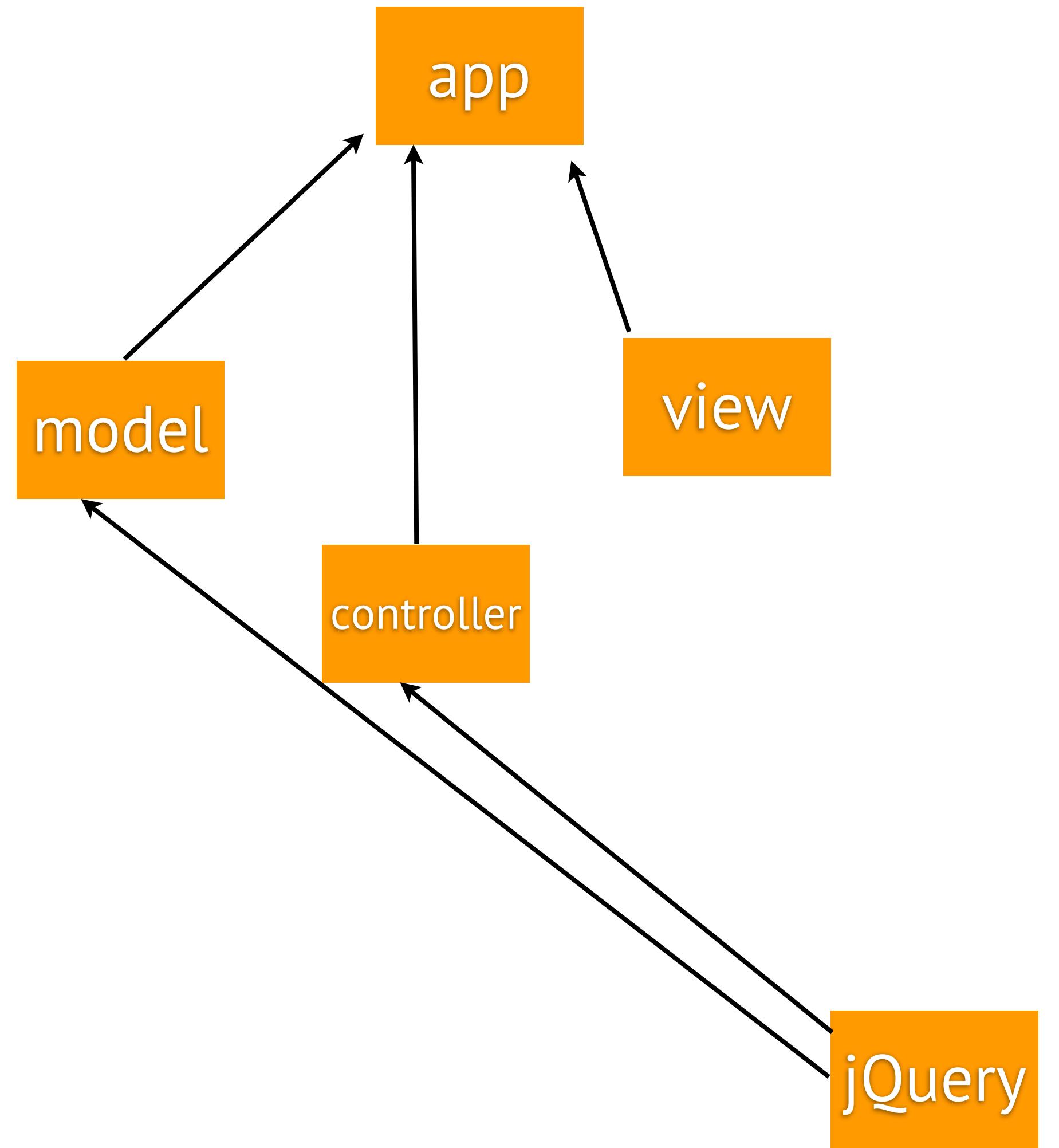


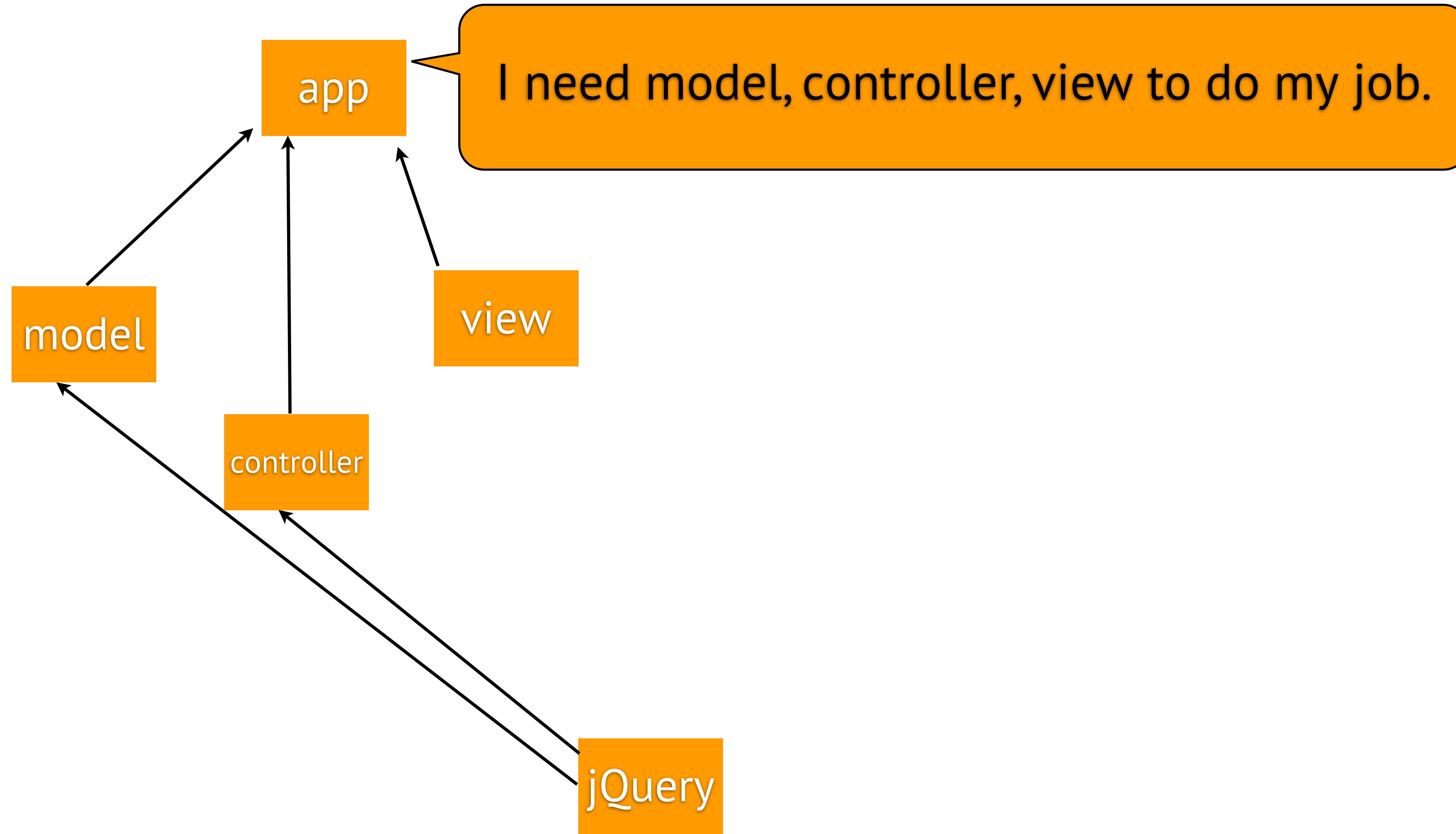
jquery-dfquery.min.js	GET	200	application/javascript	require.js:33	(from cache)	25 ms
vie-latest.debug.js	GET	200	application/javascript	require.js:33	(from cache)	51 ms
contentmodule.js	GET	200	application/javascript	require.js:33	17.5 KB	6 ms
hallo.js	GET	200	application/javascript	require.js:33	17.1 KB	2 ms
hallo	GET	200	application/javascript	require.js:33	(from cache)	17 ms
create.js	GET	200	application/javascript	require.js:33	(from cache)	17 ms
jquery.hotkeys.js	GET	200	application/javascript	require.js:33	(from cache)	16 ms
w.js	GET	200	application/javascript	require.js:33	16.5 KB	3 ms
16.1 KB						
linkplugin.js	GET	200	application/javascript	require.js:33	(from cache)	20 ms
editors.js	GET	200	application/javascript	require.js:33	(from cache)	20 ms
jquery.popover.js	GET	200	application/javascript	require.js:33	(from cache)	41 ms
jquery.jcropmin.js	GET	200	application/javascript	require.js:33	(from cache)	11 ms
jquery.jcrop.js	GET	200	application/javascript	require.js:33	(from cache)	14 ms
jquery.cookie.js	GET	200	application/javascript	require.js:33	(from cache)	11 ms
jquery.dynatree.js	GET	200	application/javascript	require.js:33	(from cache)	14 ms
bootstrap-dropdown.js	GET	200	application/javascript	require.js:33	(from cache)	10 ms
elements.js	GET	304	Not Modified	application/javascript	require.js:33	234.8
plupload.js	GET	200	application/javascript	require.js:33	(from cache)	1.6 KB
plupload.html5.js	GET	200	application/javascript	require.js:33	(from cache)	18 ms
topbar.js	GET	200	application/javascript	require.js:33	(from cache)	5 ms
button.js	GET	200	application/javascript	require.js:33	(from cache)	9 ms

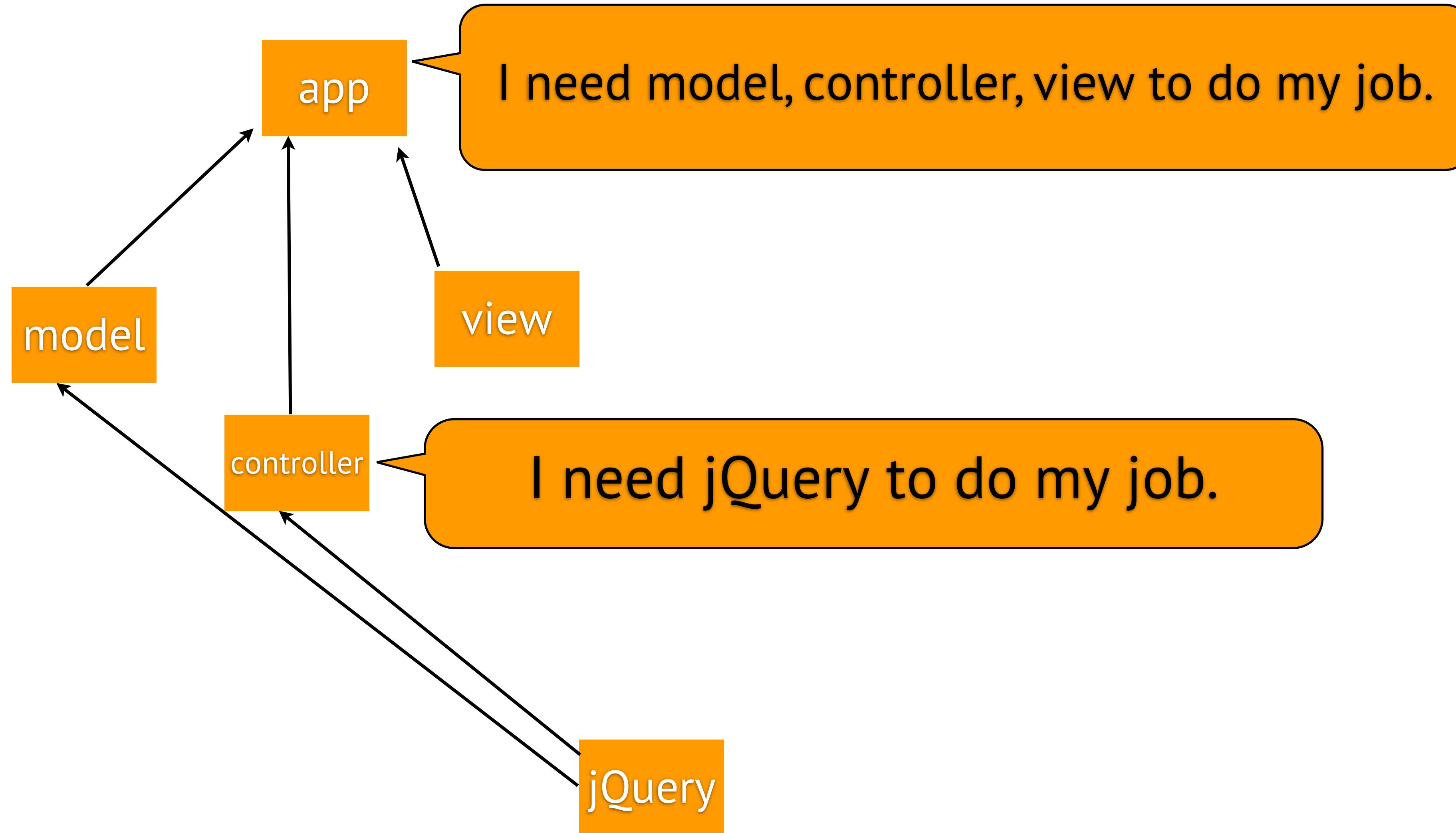


What if each module **defines** its  
dependencies?









app

I need model, controller, view to do my job.

```
// app.js
define(
  dependencies,
  callback
) ;
```

app

I need model, controller, view to do my job.

```
// app.js
define(
  dependencies,
  callback
) ;
```

module name == file name

↑ except .js file extension

app

I need model, controller, view to do my job.

```
// app.js
define(
  dependencies, ← as soon as those are loaded...
  callback ← ... execute this callback
);
```

module name == file name

↑ except .js file extension

app

I need model, controller, view to do my job.

```
// app.js
define(
  ["model", "controller", "view"],
  callback
);
```

app

I need model, controller, view to do my job.

```
// app.js
define(
  ["model", "controller", "view"],
  function(model, controller, view) {
}
);
```

dependent modules are passed as arguments

app

I need model, controller, view to do my job.

```
// app.js
define(
  ["model", "controller", "view"],
  function(model, controller, view) {
}
);
```

dependent modules are passed as arguments

controller

I need jQuery to do my job.

```
// controller.js
define(
  ["jQuery"] ,
  function($) {
    var controller = {};
    // build up controller as needed

    return controller; ← the module is returned from the callback function
  }
);
```



# A

asynchronous

# M

module

# D

definitions

# A M D

- define() modules
- file name == module name
- callback arguments == module dependencies
- return value == module

A M D

Framework Agnostic!

# RequireJS

Is an implementation of an AMD-compliant module loader.

Is a dependency management  
solution for JavaScript.



# James Burke

Open source web developer. Mozilla Labs,  
RequireJS, volo.

```
// app.js
define(
  ["model", "controller", "view"],
  function(model, controller, view) {
  }
);
```



AMD modules

```
// controller.js
define(
  ["jQuery"],
  function($) {
    var controller = {};
    // build up controller as needed

    return controller;
  }
);
```

```
// app.js
define(
  ["model", "controller", "view"],
  function(model, controller, view) {
  }
);
```



AMD modules

```
// controller.js
define(
  ["jQuery"],
  function($) {
    var controller = {};
    // build up controller as needed

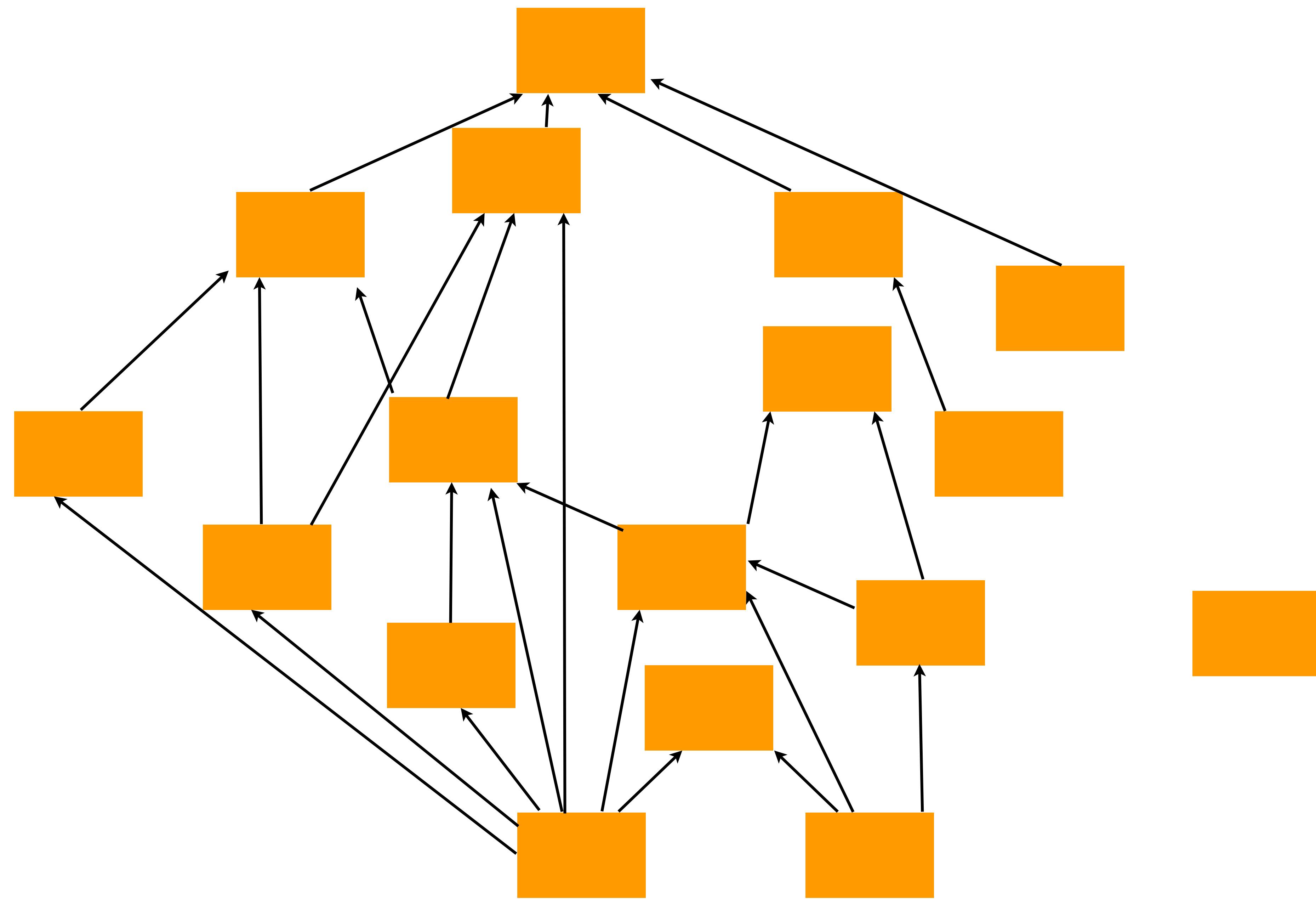
    return controller;
  }
);
```



bootstrap

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

# The Build Process



```
r.js -o buildconfig.js
```

r.js -o buildconfig.js

```
// buildconfig.js
```

```
baseUrl: 'src/>,
```

↑ **base URL**

```
paths: { 'jQuery': 'lib/jquery/jquery' },
```

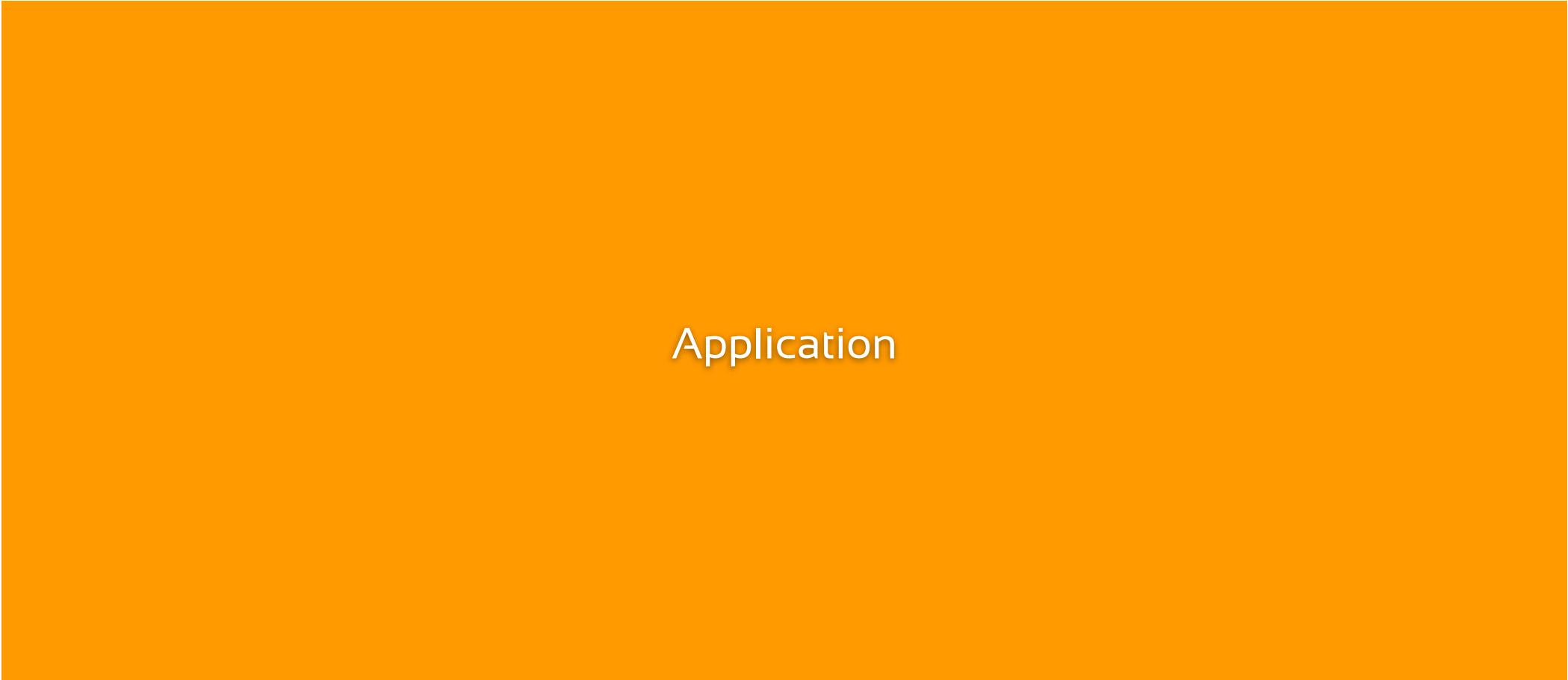
↑ **path mapping**

```
shim: {}
```

↑ **non-AMD code**

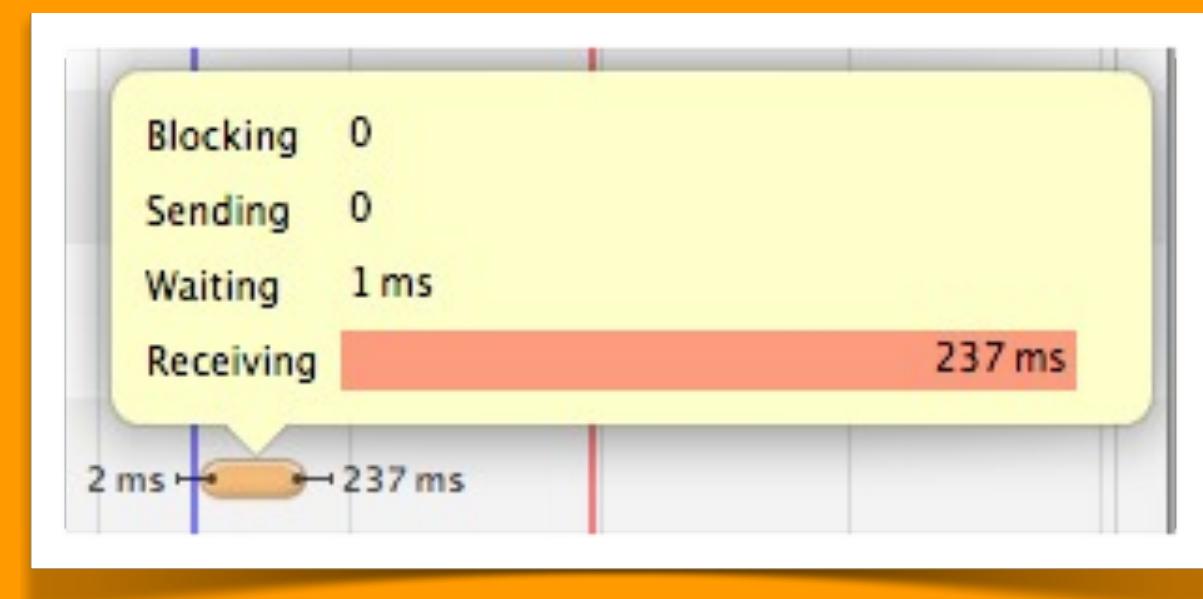
```
// lots of other options
```

# Application



Application

# use minified files *in production*





# Power User Features

# relative module names

```
// frontend/app.js
define([
  'components/jquery',
  'frontend/model/application',
], function(...) {...})
```

# relative module names

```
// frontend/app.js
define([
  'components/jquery',
  './model/application',
], function(...) {...})
```

# non-AMD code

# non-AMD code

```
// simplified  
var root = window;  
root.Backbone = {};  
// remaining backbone here
```

# non-AMD code

```
define(['underscore', 'jquery'], function(_,  
jQuery) {  
    var root = {};  
    root.Backbone = {};  
    // remaining backbone here  
    return root.Backbone;  
});
```

fail

# non-AMD code

→ use shims

# non-AMD code

→ use shims

```
// before loading require.js
require.config({
  shim: {
    'backbone': {
      exports: 'Backbone',
      deps: ['underscore', 'jquery']
    }
  }
});
```

# text dependencies

```
var myTemplate = 'Welcome {name}
```

```
... I hope you enjoy {conferenceName}';
```

fail

# text dependencies

```
var myTemplate = 'Welcome {name}\  
\\  
... I hope you enjoy {conferenceName}';
```

# text dependencies

```
var myTemplate = 'Welcome {name}\  
\\  
... I hope you enjoy {conferenceName}';
```

```
var myTemplate = ['Welcome {name}',  
',',  
'... I hope you enjoy {conferenceName}'  
].join("\n");
```

# text dependencies

```
var myTemplate = 'Welcome {name}\  
\\  
... I hope you enjoy {conferenceName}';
```

```
var myTemplate = ['Welcome {name}',  
',',  
'... I hope you enjoy {conferenceName}'  
].join("\n");
```

fai/

# text dependencies

```
// frontend/app.js
define([
  'text!templates/myTemplate.html'
], function(myTemplate) {...})
```

# text dependencies

```
// frontend/app.js
define([
  'text!templates/myTemplate.html'
  ↑ loader plugin
], function(myTemplate) {...})
```

# text dependencies

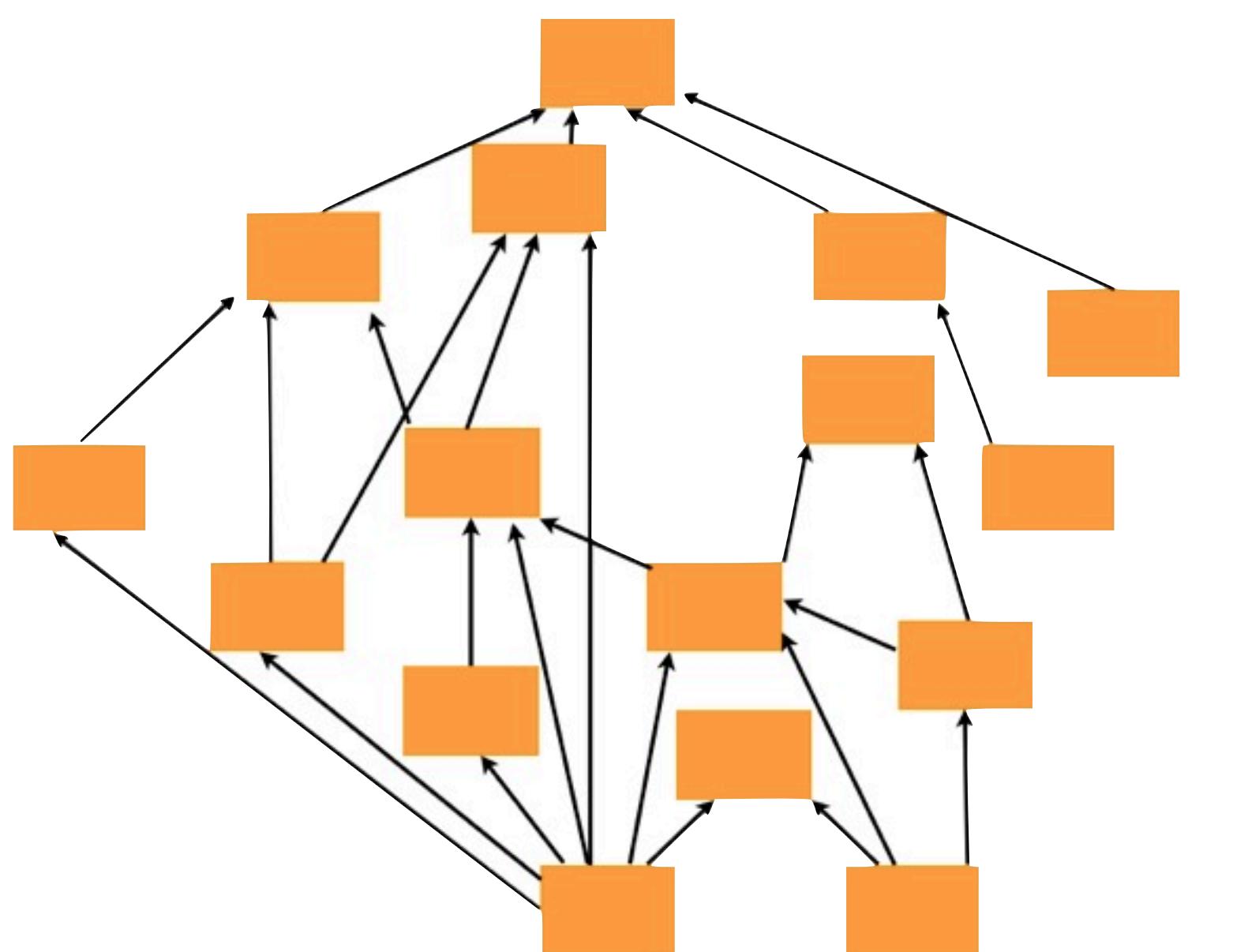
```
// frontend/app.js
define([
  'text!templates/myTemplate.html'
  ↑ loader plugin
], function(myTemplate) {...})
  ↑ template is now inside this variable
```

# CoffeeScript

```
// app.coffee
define(
  ['cs!model', 'cs!controller']
  (model, controller) ->
    # do something here
)
```

# Quick Development

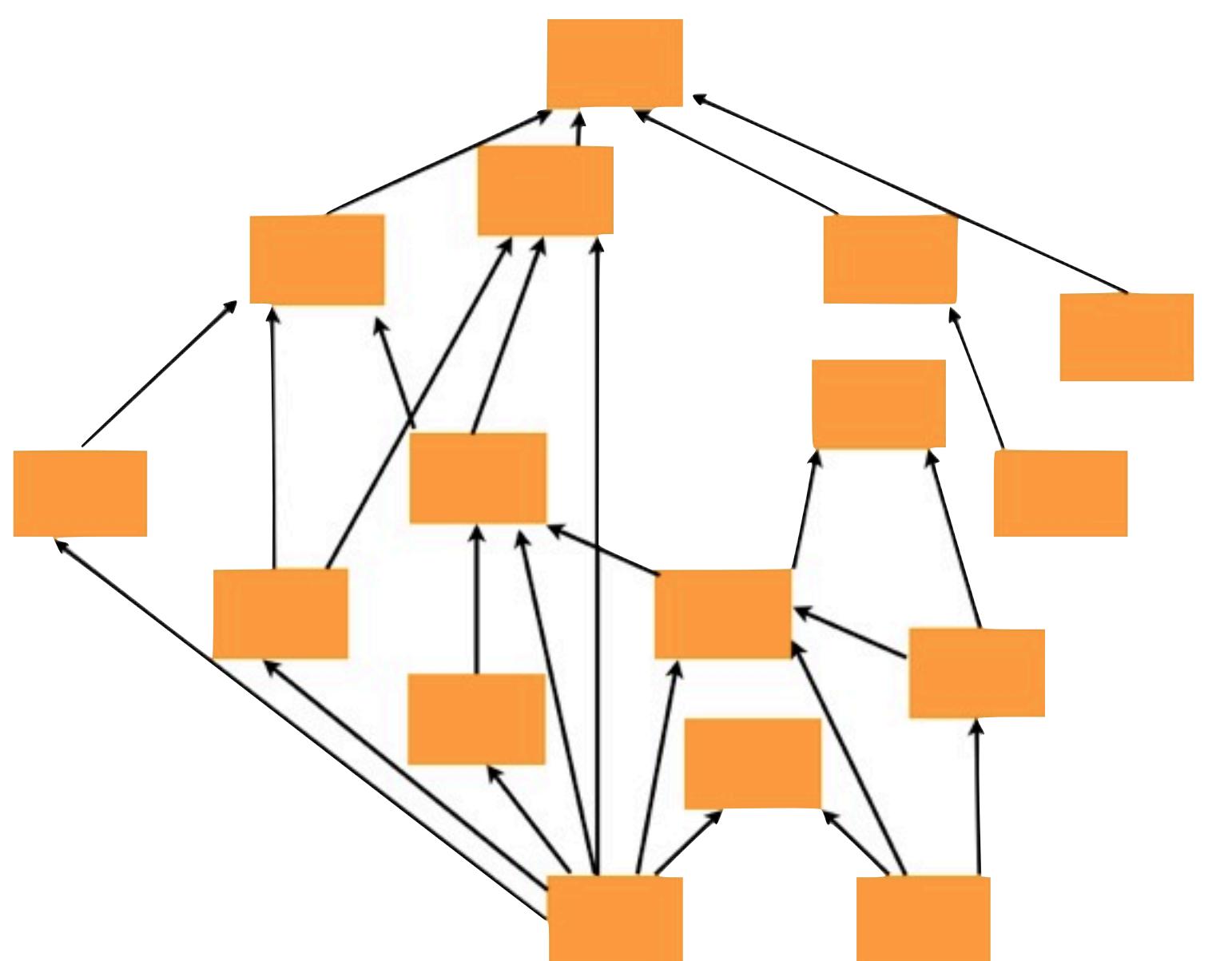
# Development



slow

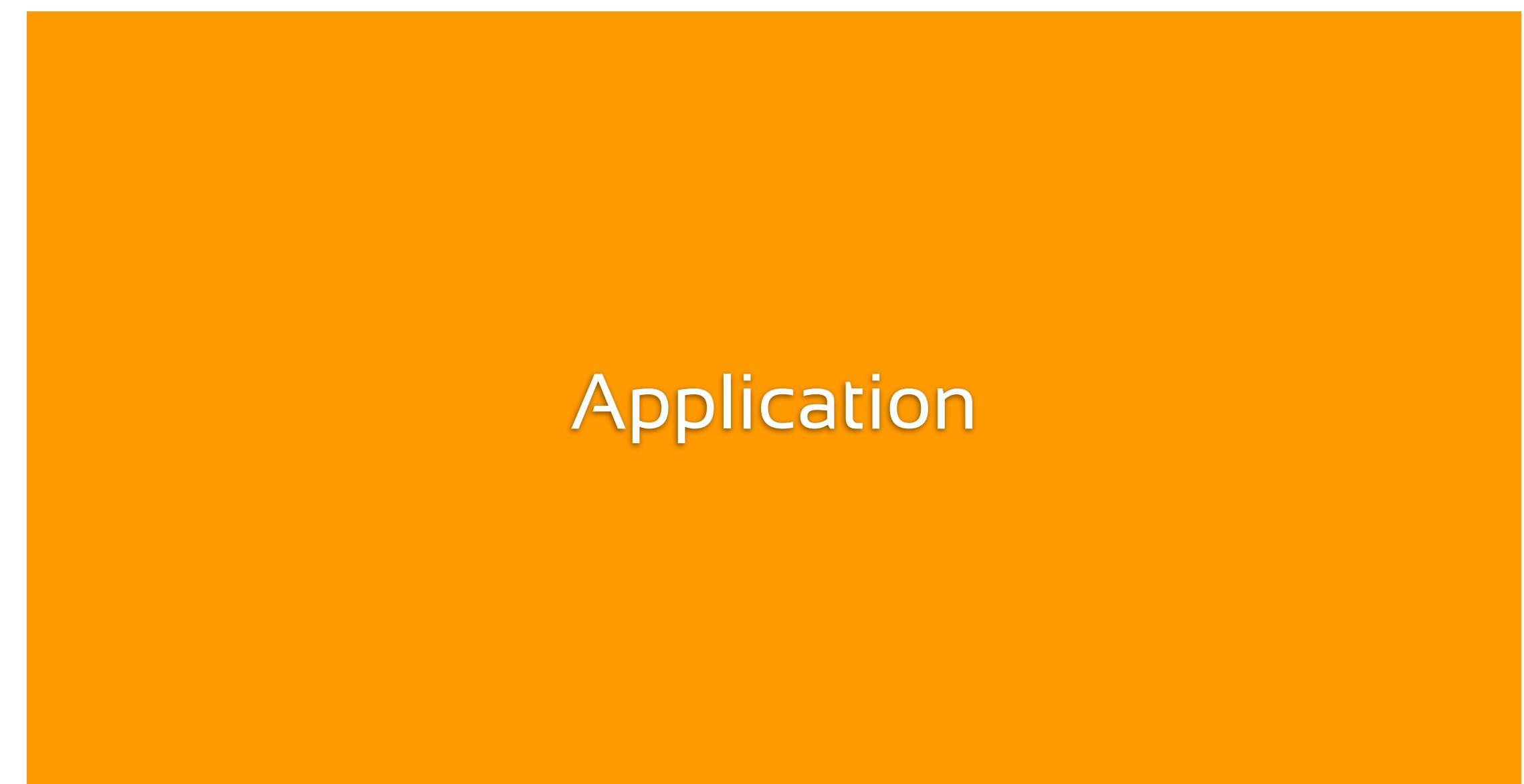
# Quick Development

Development



slow

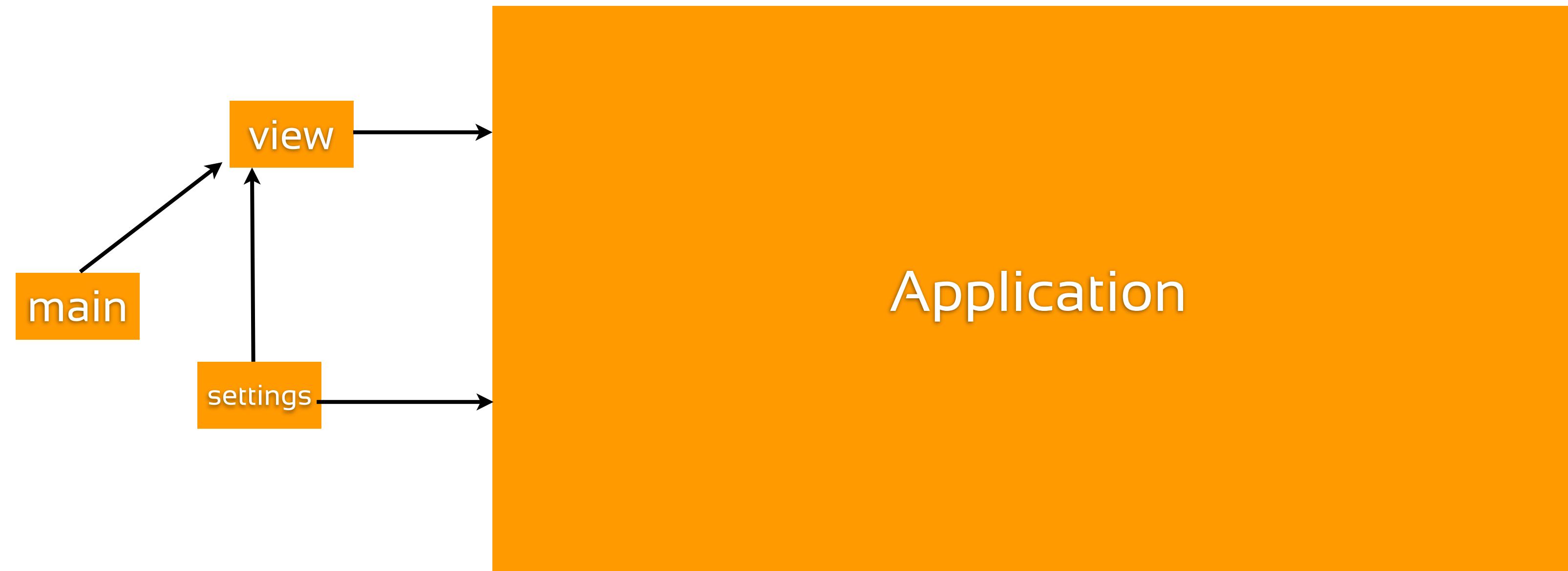
Production



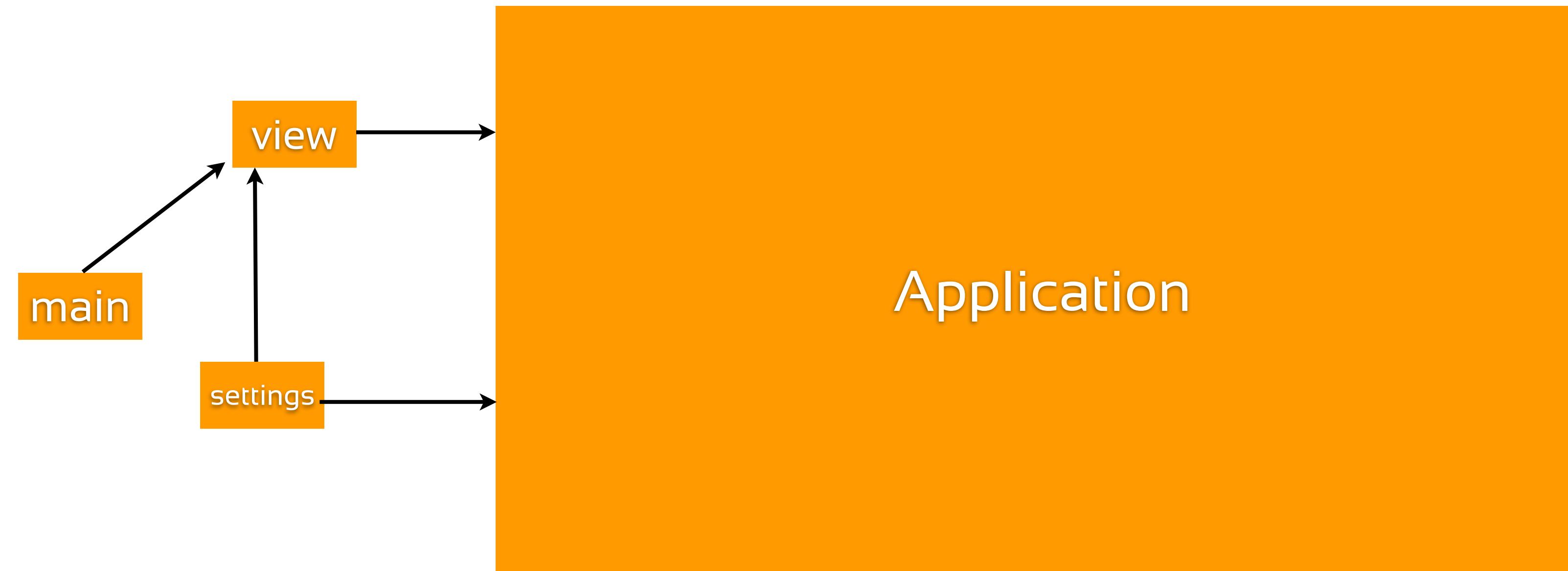
fast

vs

# Quick Development



# Quick Development



```
r.js -o buildconfig.js  
excludeShallow=view,main,settings
```

## Feature Freeze

The first beta of the next major update of our favorite web application is now available.

Join the testing team for making Flow 2.0 the gift on everybody's wishlist.

[Details](#)

### Flow 2.0 Beta 1

Preview the next release

### Get Inspired

Find out more about Flow

### Get Started

Learn the basics in a few minutes

### Screencasts

Learn cool stunts by watching

## What is Flow?

TYPO3 Flow is a web application platform enabling developers creating excellent web solutions and bring back the joy of coding.

It gives you fast results. It is a reliable foundation for complex applications. And it is backed by one of the biggest PHP communities.

## Development Resources

[Quick Start](#)[API Documentation](#)[Screen casts](#)[Mailing Lists](#)[Slides](#)[Bug Tracker](#)[TYPO3 Forge](#)

## Flow Buzz



Young\_Flow3 #ReasonsIUnfollowedYou

You a Hoe

yesterday · reply · retweet · favorite



deKokPieter @ESCI A @kriton\_nl kriton

kennende slepen ze die accountants  
met trillende knieen wel doorheen:).  
Net prachtige dag met @janschipper  
#flow3.0

13 hours ago · reply · retweet · favorite



tom\_noise @robertlemke Why do the

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13 hours ago · reply · retweet · favorite



tom\_noise @robertlemke Why do the

**Arbitrary Web Site**

**Web Widget**

Arbitrary Web Site



prevent interaction

Web Widget

# Wrapped Modules



rename require.js using **namespace**  
<http://requirejs.org/docs/faq-advanced.html>

# Wrapped Modules



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# RequireJS and jQuery

# RequireJS and jQuery

```
// make sure to specify a shim config for
// jquery.slider and jquery.tooltip

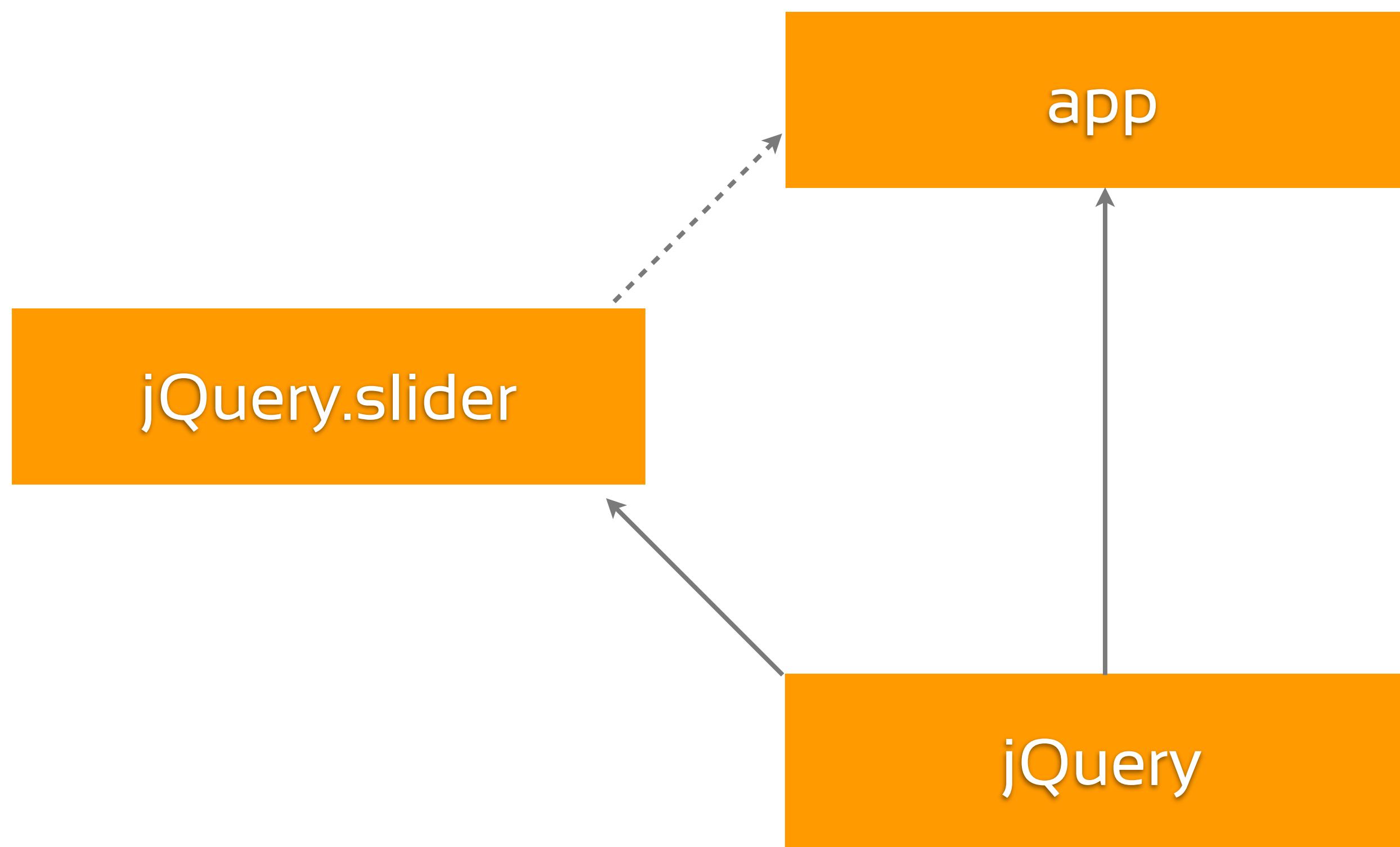
define(
  ["jquery", "jquery.slider", "jquery.tooltip"] ,
  function($) {
    // the jquery.slider.js and jquery.tooltip.js
    // have been loaded.
    $(function() {
      $('body').slider();
    });
  });
});
```

# RequireJS and jQuery

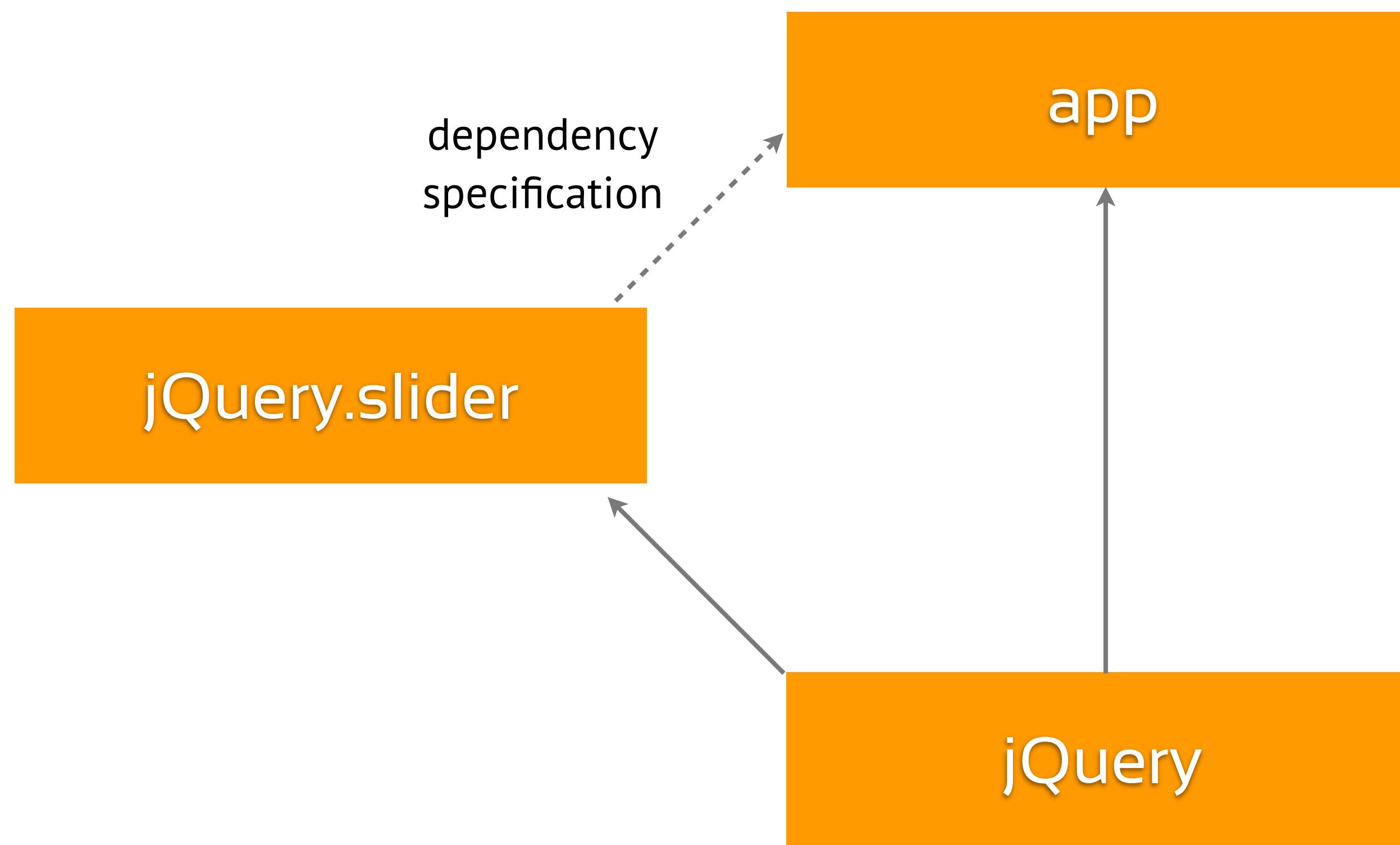
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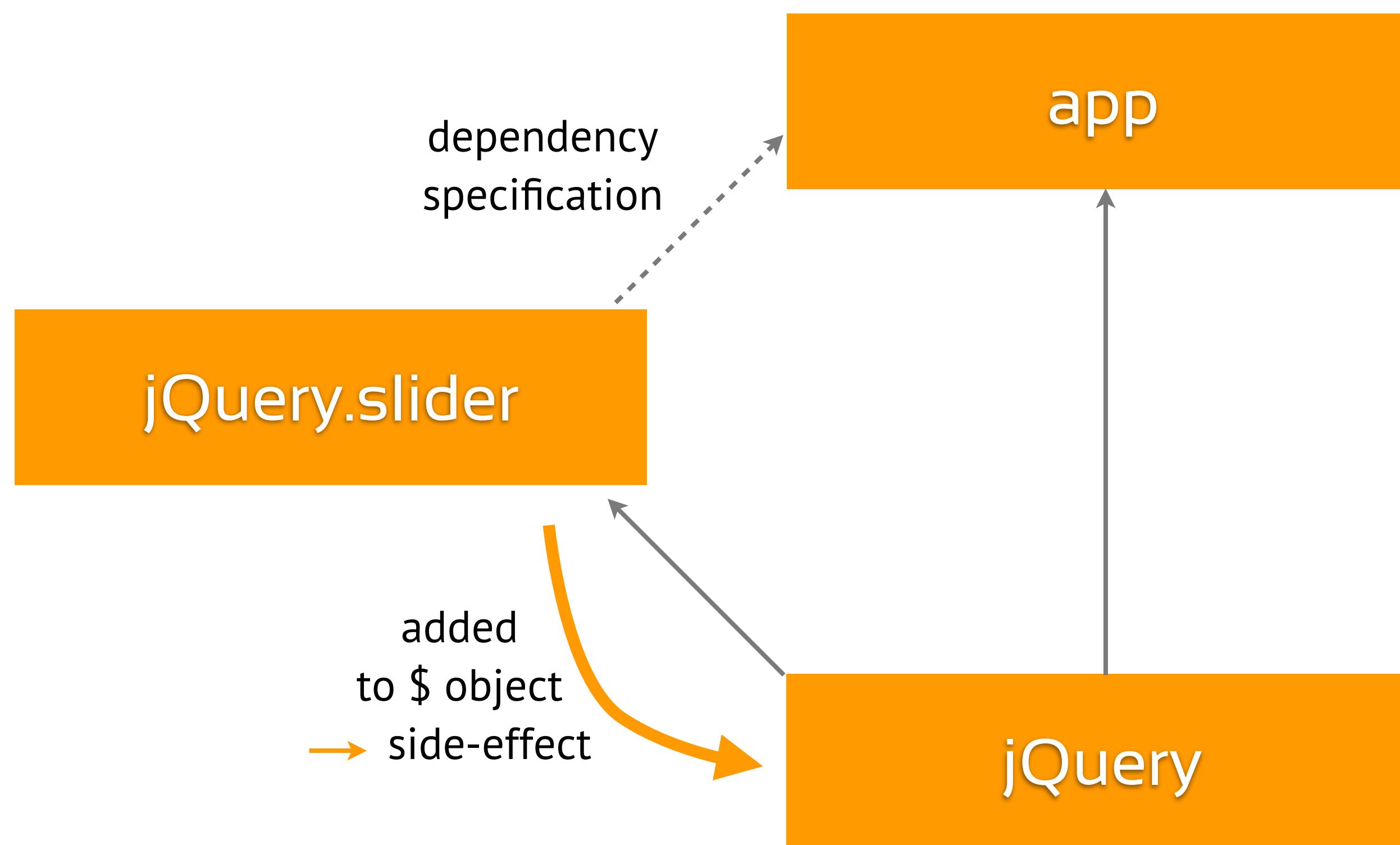
# RequireJS and jQuery



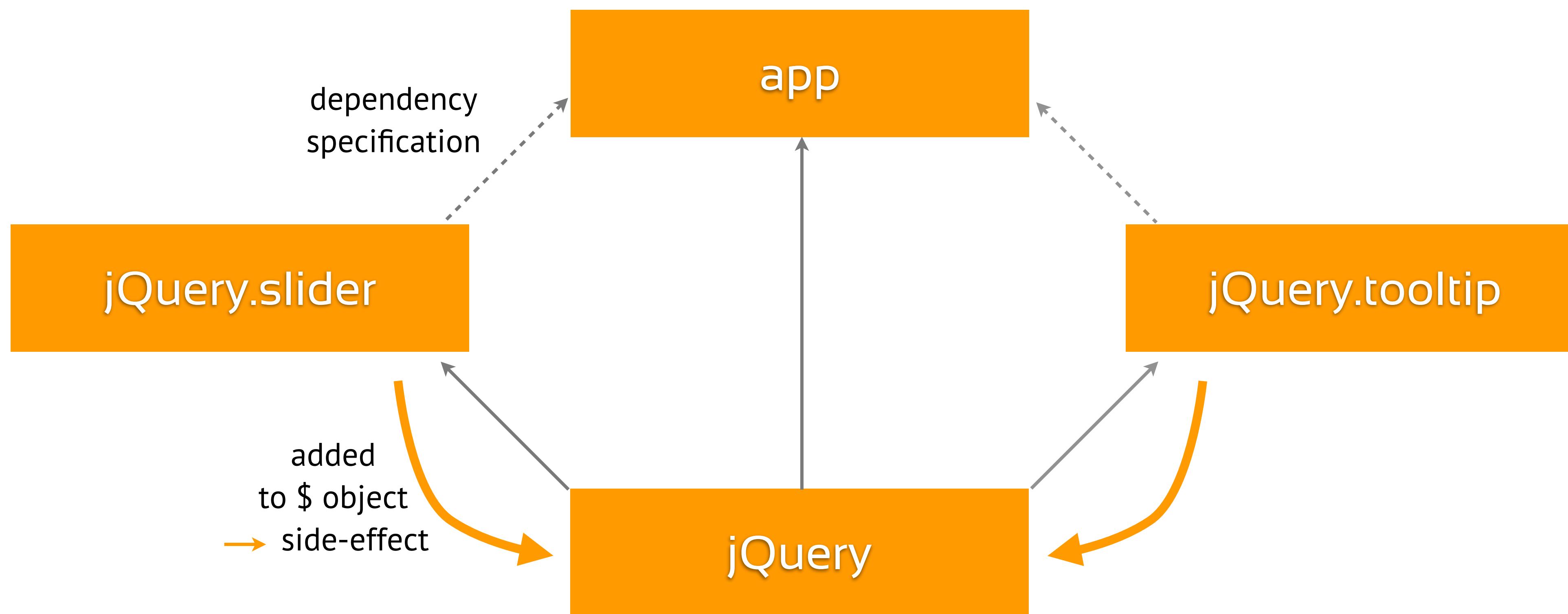
# RequireJS and jQuery



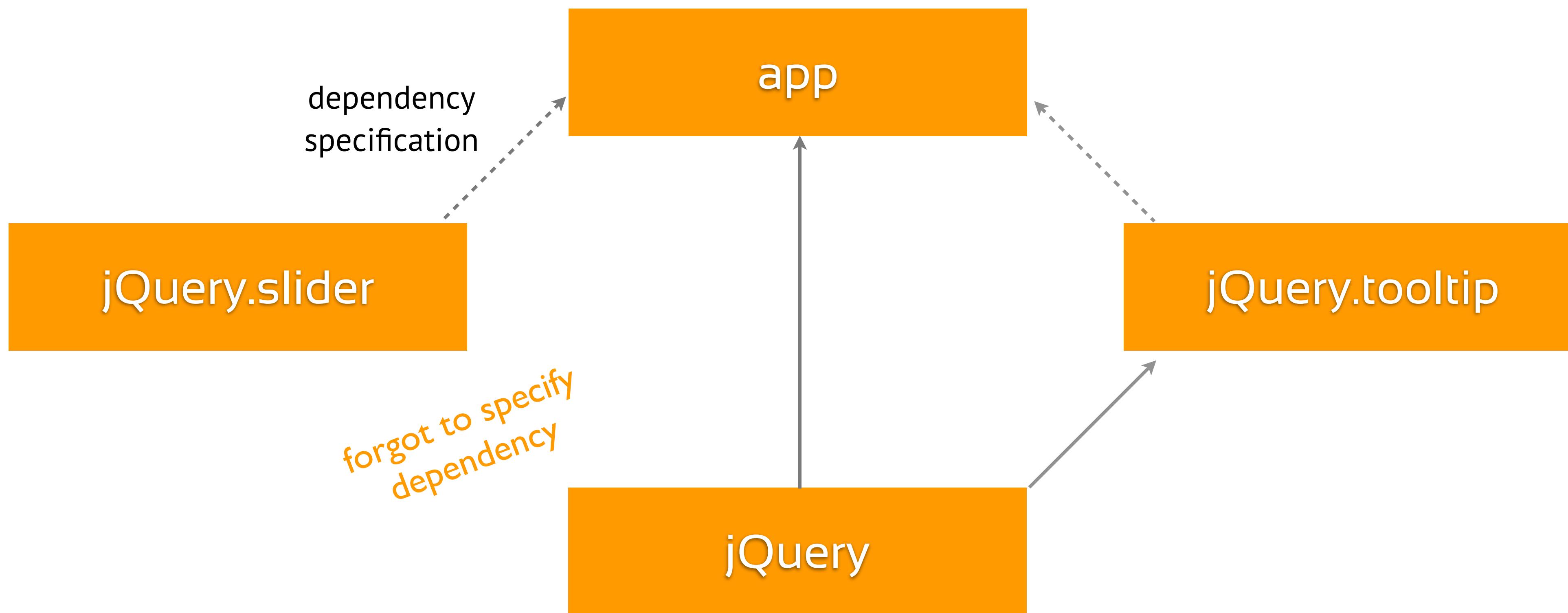
# RequireJS and jQuery



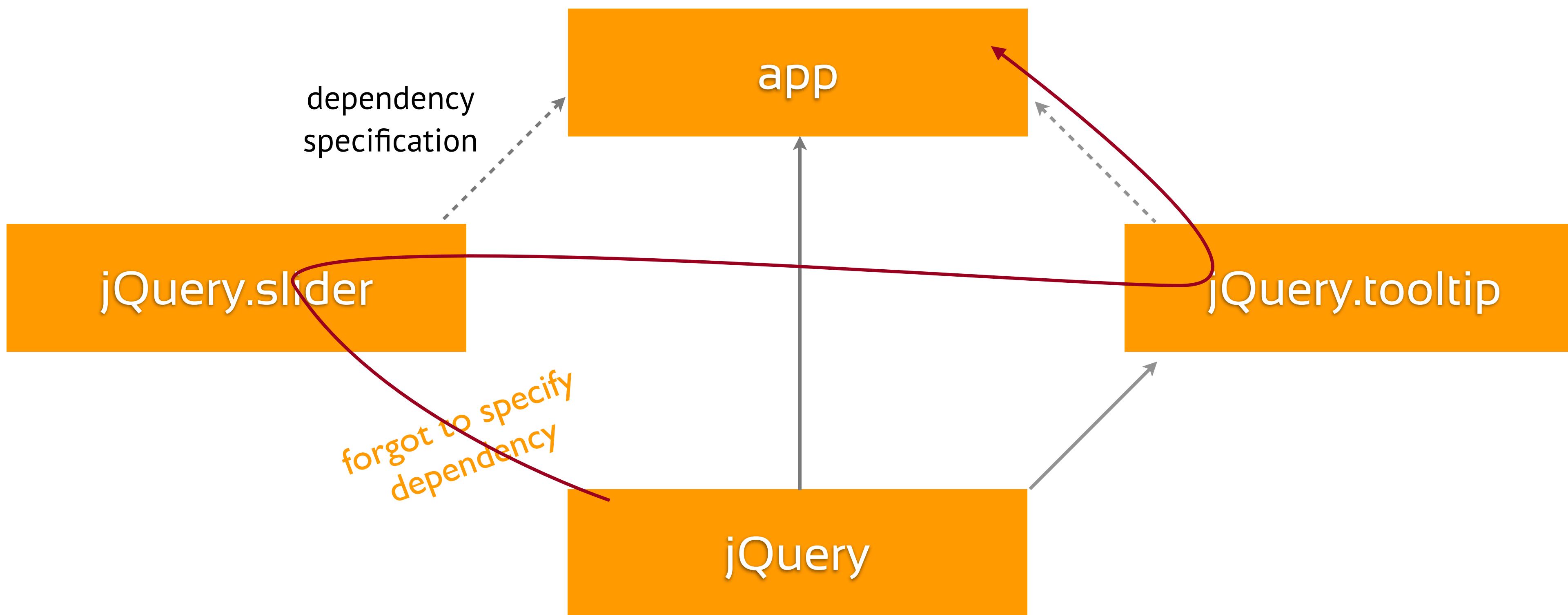
# RequireJS and jQuery



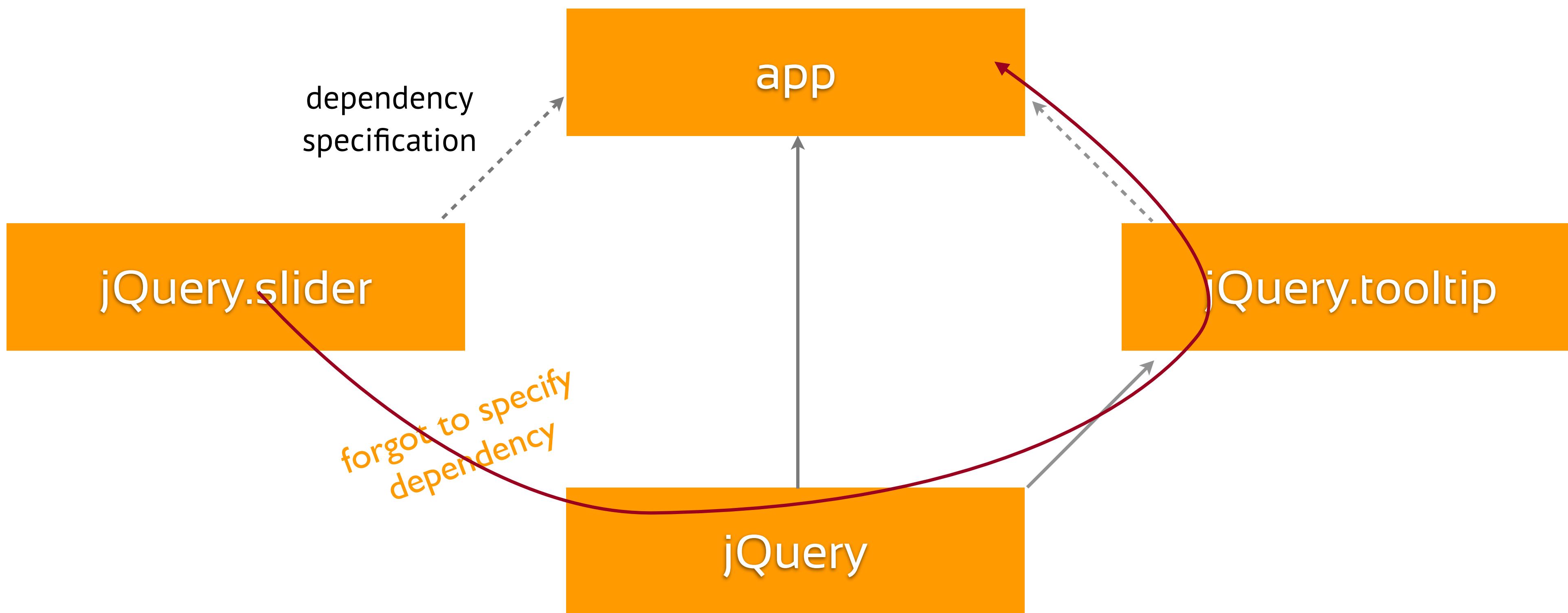
# Finding Missing Dependencies



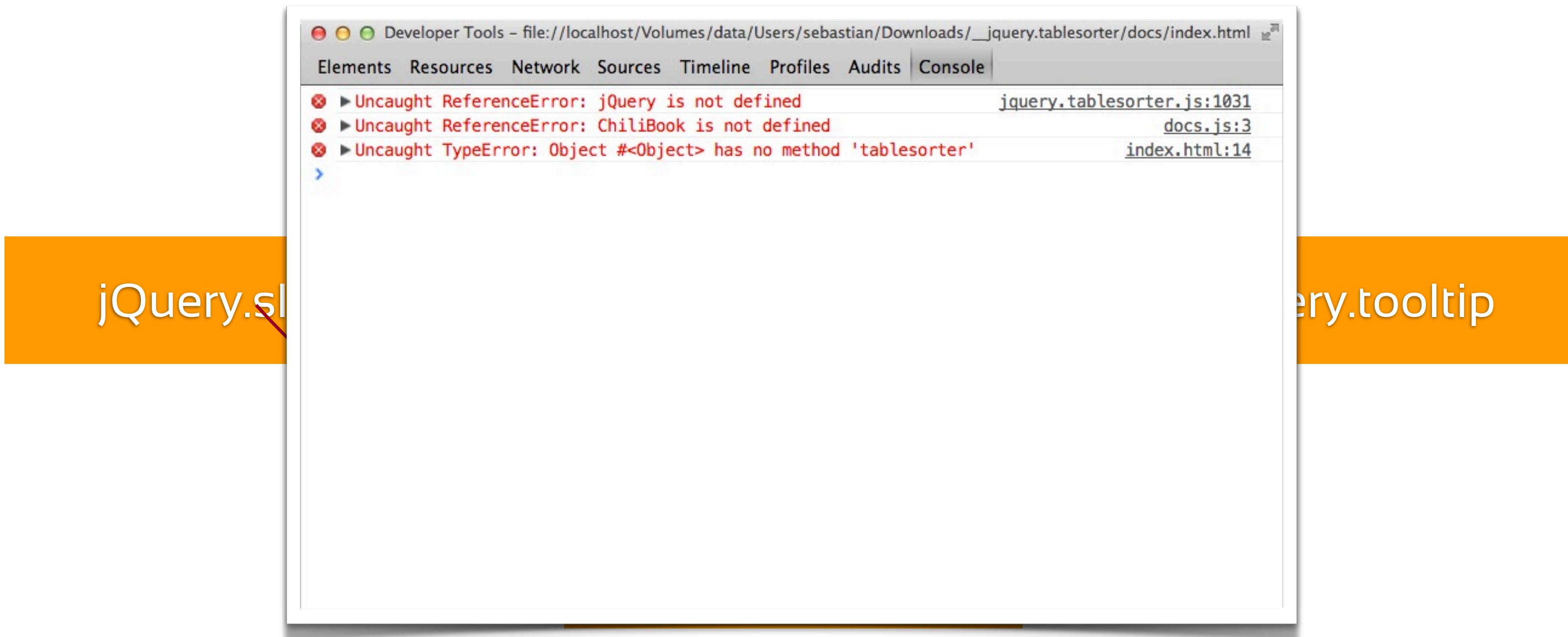
# Finding Missing Dependencies



# Finding Missing Dependencies



# Finding Missing Dependencies



# Finding Missing Dependencies

1

```
// in all JS files:  
define(..., function() {  
  if (window._requirejsLoadingTrace)  
    window._requirejsLoadingTrace.push('jquery.slider');  
  
  // source code follows here  
});
```

instrumentation

# Finding Missing Dependencies

```
// for error and successful runs,  
// do the following in console:  
window._requirejsLoadingTrace
```



collect traces

put them into the dependency finder:

<http://git.typo3.org/FLOW3/Packages/TYPO3.TYPO3.git/blob/HEAD:/Scripts/missing-javascript-dependency-finder.php>

```
$successfulRuns = array(  
    json_decode('["jquery", "jquery.slider", "jquery.tooltip", "app"]')  
);  
$errorRuns = array(  
    'error description' => json_decode('["jquery.slider", "jquery", "jquery.tooltip", "app"]')  
)
```

# Finding Missing Dependencies

```
$ php missing-javascript-dependency-finder.php
```

**jquery.slider -> jquery**

Found 1 orders which might be responsible for loading order problems.

3

check output



# Further Resources

**Official Docs:** <http://requirejs.org>

**Blogs of James Burke:**

<http://jrburke.com/>

<http://tagneto.blogspot.de/>

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# Future

# ES6 Modules

# Conclusion

# Use RequireJS

solves  
**JS dependency management**  
problem

robust  
**build tools**

# **framework agnostic**

offers  
**clean encapsulation**



# Thanks!

<http://speakerdeck.com/skurfuerst>

@skurfuerst

<http://lanyrd.com/profile/skurfuerst/>

