

Introducing Elm to a JS App



@rtfeldman



2013



2014



2015



2016



noredink

IN PRODUCTION

2 billion questions answered

100,000 lines of elm code

0 runtime exceptions 



functional programming language

compiles to JavaScript

DIFFERENT SEMANTICS

GUARANTEES

no **null** or **undefined**

all values are **immutable**

functions have **no side effects**

GOAL

elm in production

lots of JS in production

STATUS QUO

lots of JS in production



elm in production



INTEROP

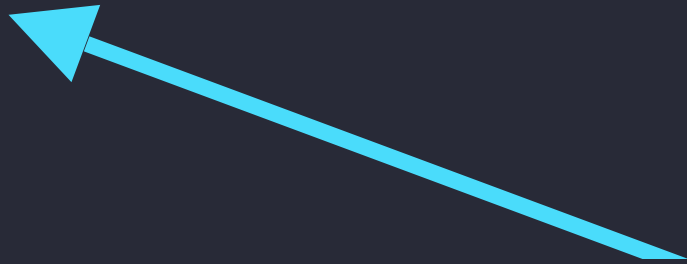
how can Elm

MAINTAIN GUARANTEES

while interoperating with JS?

```
<div id="elm-app">
```

```
</div>
```



Ellie

elm for

RENDERING

Page

e

Elm App

JS App



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NoRedInk builds stronger writers through interest-based curriculum, adaptive exercises, and actionable data.

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elm

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lots of JS in production



elm in production

PLANT
A SEED

WATCH IT
GROW



INTERACTIVITY

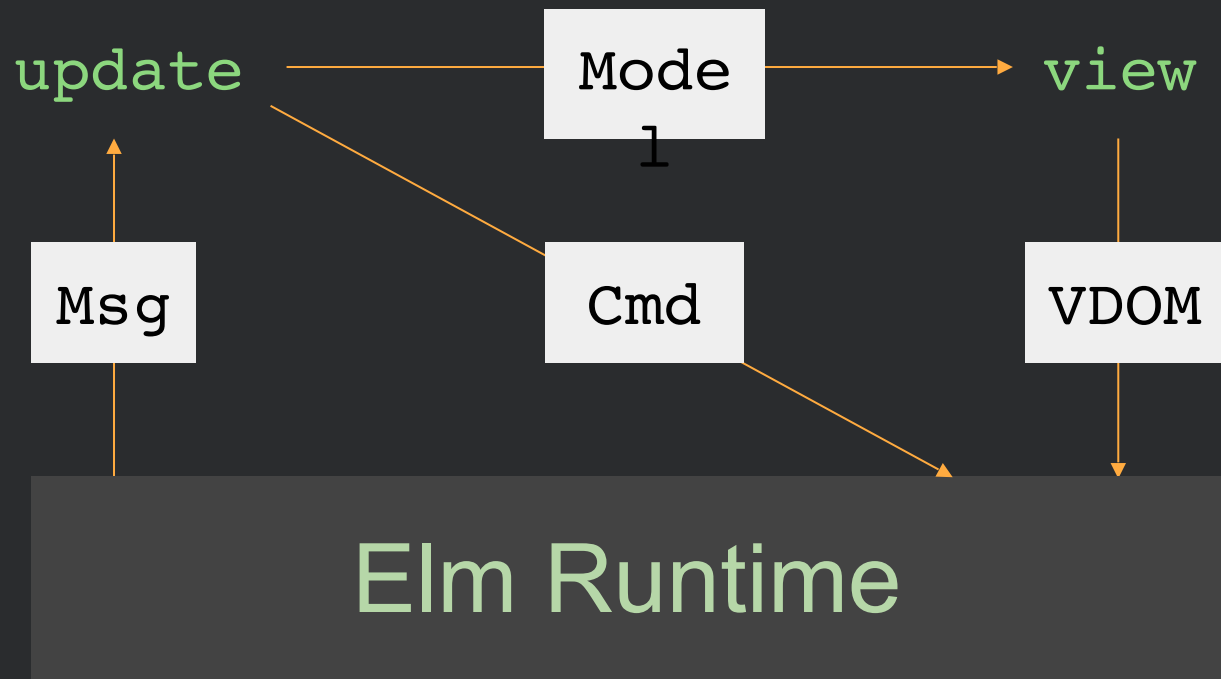


the elm architecture

VIEW FUNCTION



ARGUMENTS → VIRTUAL DOM





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or

 [Log in with Google](#)

 [Log in with Clever](#)

Interoperating with JavaScript

Elm code talks to **JavaScript**
the way it talks to **servers**
...by sending and receiving
data!

app.js

```
var elem = document.getElementById("elm-app");
```

```
var app = Elm.MyApp.embed(elem);
```

app.js

```
var elem = document.getElementById("elm-app");
```

```
var app = Elm.MyApp.embed(elem);
```

```
app.ports.dataFromElm.subscribe(
```

app.js

```
var elem = document.getElementById("elm-app");
```

```
var app = Elm.MyApp.embed(elem);
```

```
app.ports.dataFromElm.subscribe((data) =>
```

app.js

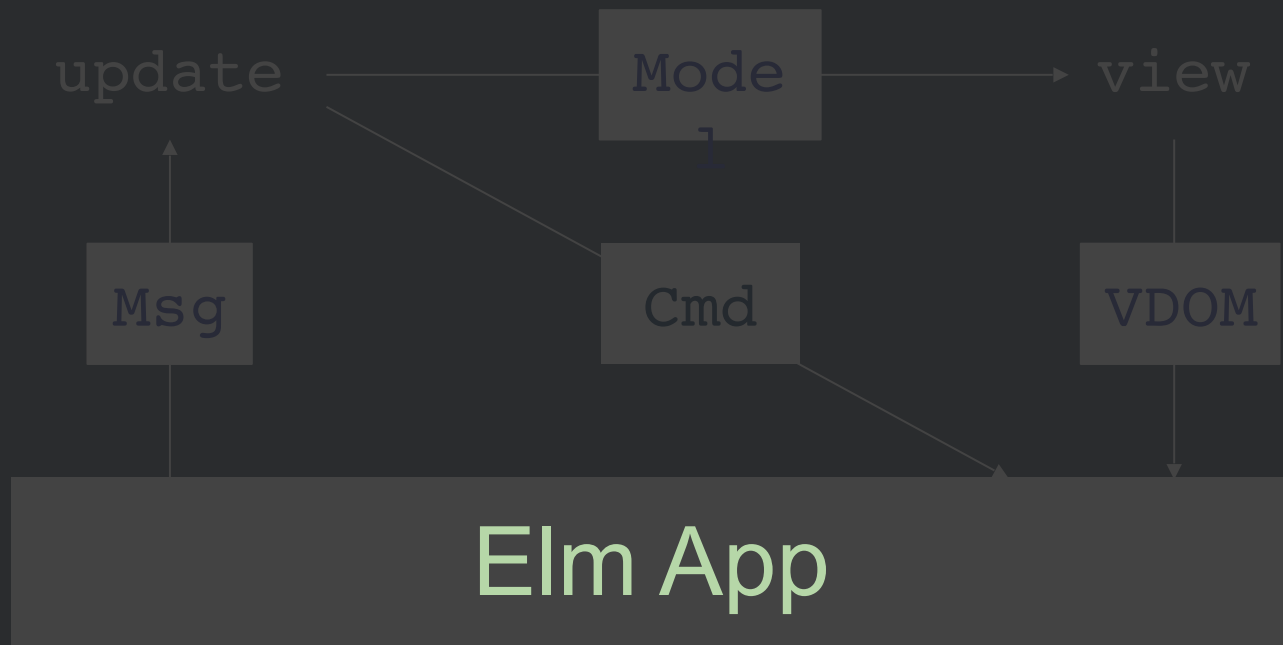
```
var elem = document.getElementById("elm-app");
```

```
var app = Elm.MyApp.embed(elem);
```

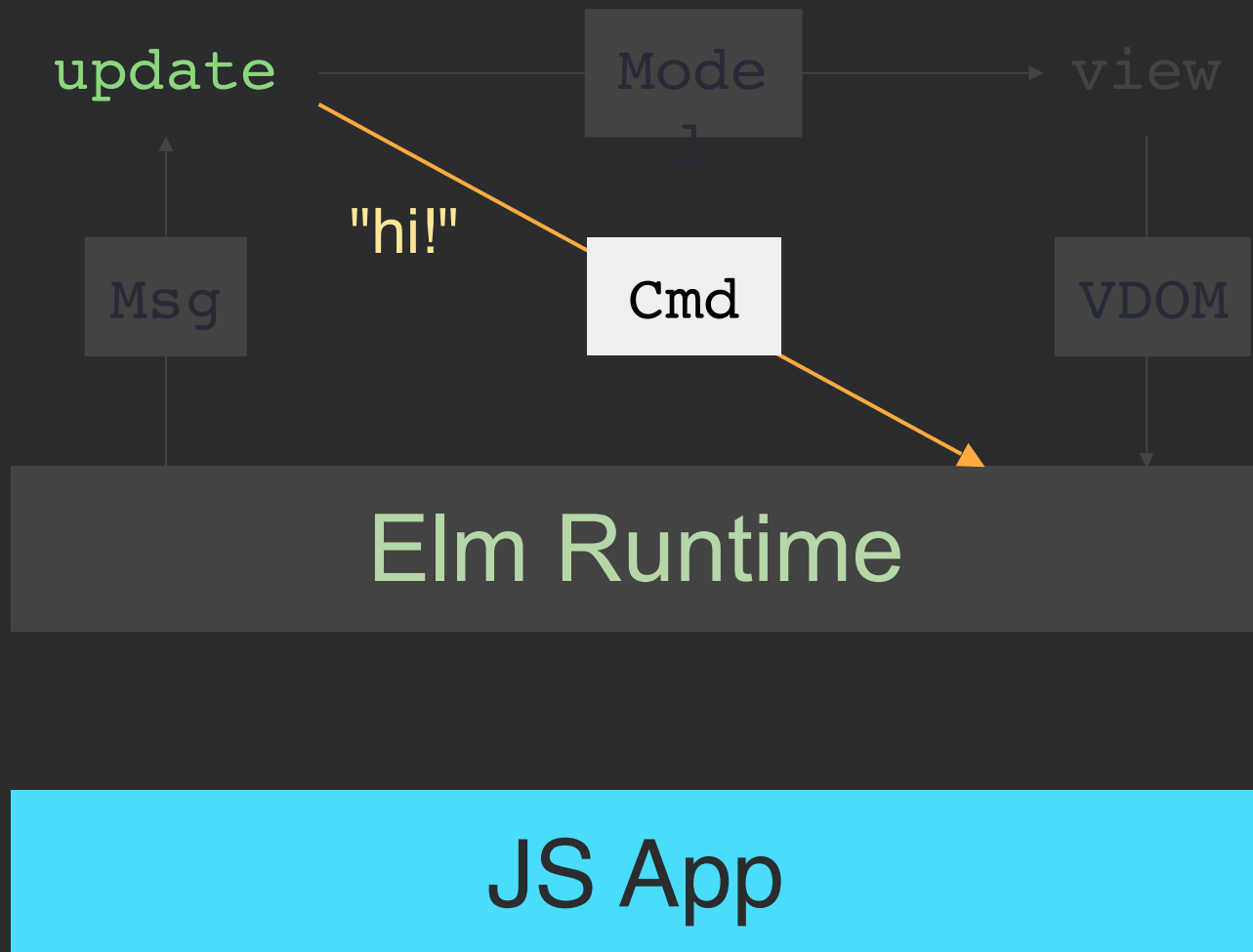
```
app.ports.dataFromElm.subscribe((data) => {
```

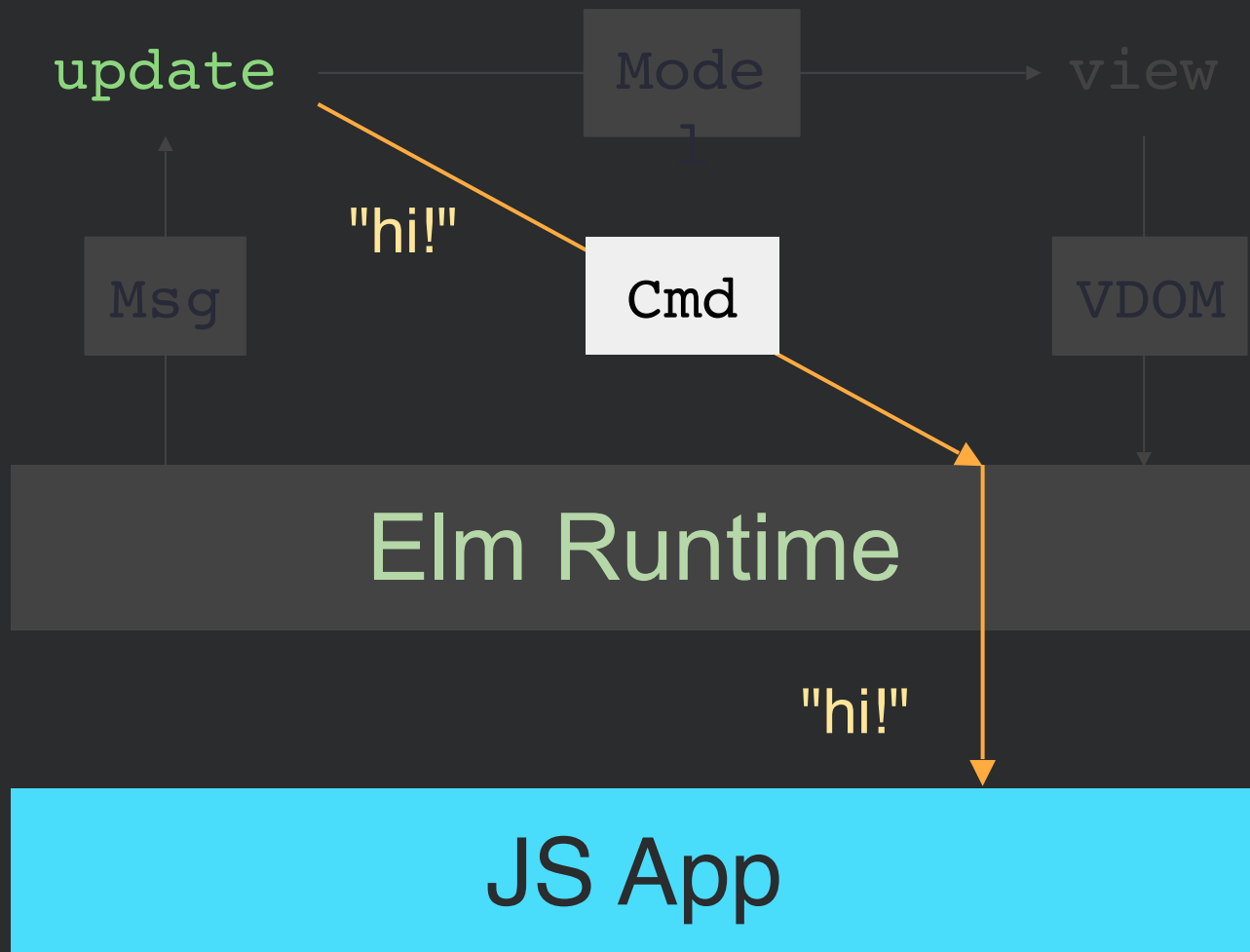
```
  console.log("Elm says: " + data);
```

```
});
```



JS App





app.js

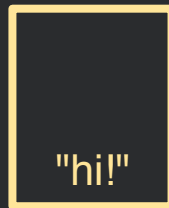
```
var elem = document.getElementById("elm-app");
```

```
var app = Elm.MyApp.embed(elem);
```

```
app.ports.dataFromElm.subscribe((data) => {
```

```
  console.log("Elm says: " + data);
```

```
});
```



app.js

```
var elem = document.getElementById("elm-app");
```

```
var app = Elm.MyApp.embed(elem);
```

```
app.ports.dataFromElm.subscribe((data) => {
```

```
    // we can do whatever we want here!
```

```
});
```

Page

Elm App



JS App



Dreamwriter



elm

B I S



This is Dreamwriter

Introduction

1. Editor

2. Outline

3. Notes

Credits



Credits

Built by [@rtfeldman](#) using the [Elm programming language](#).
[Dreamwriter](#) is a labor of love; it is free and [open source](#).



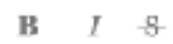
Dreamwriter

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Icons made by Freepik, Yannick, [leomoon](#), SimpleIcon, and
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226 words saved

☐ sync to Dropbox



- This is Dreamwriter
- Introduction
- 1. Editor
- 2. Outline
- 3. Notes
- Credits



J
S

Credits

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B I ~~S~~



elm app



JS App

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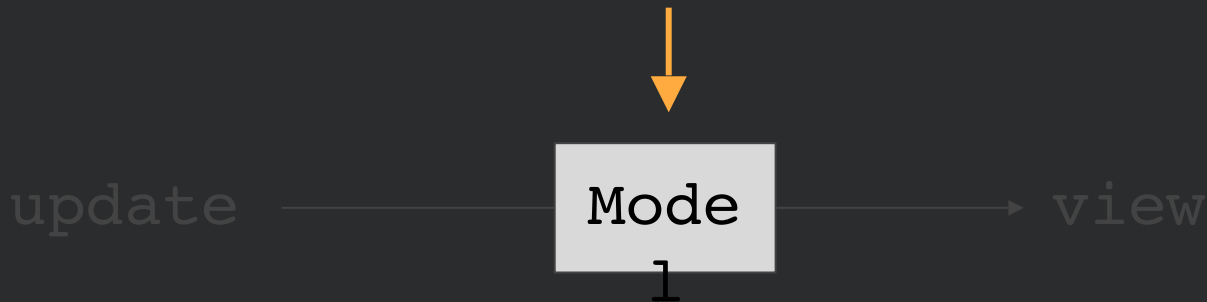
Sending data from JS to Elm

Initialization Flags

app.js

```
var elem = document.getElementById("elm-app");
```

```
var app = Elm.Main.embed(elem, "yo!");
```



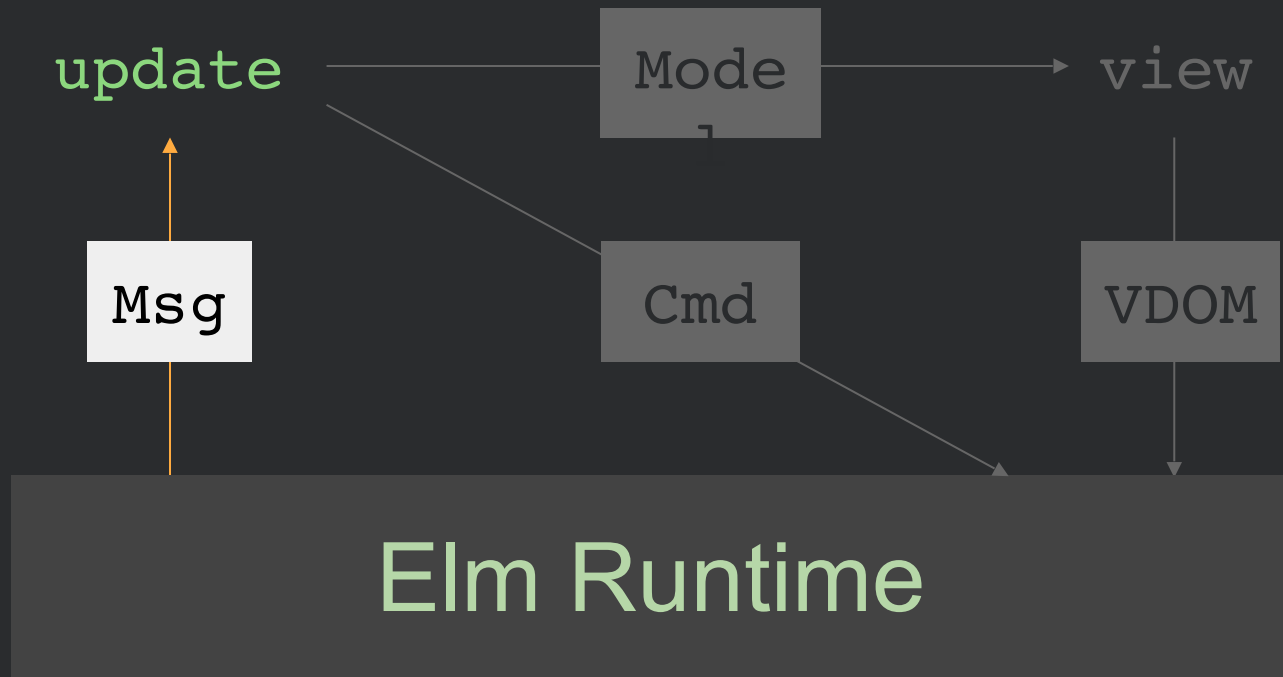
Back-and-forth communication

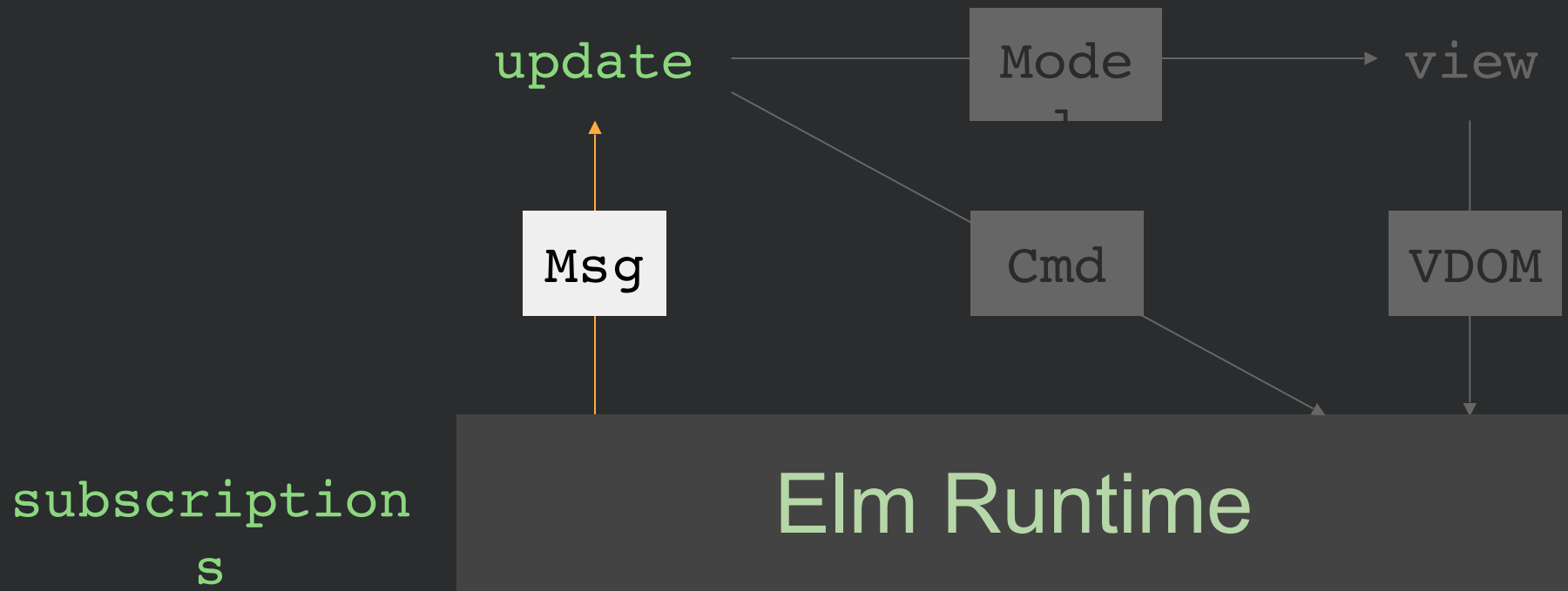
app.js

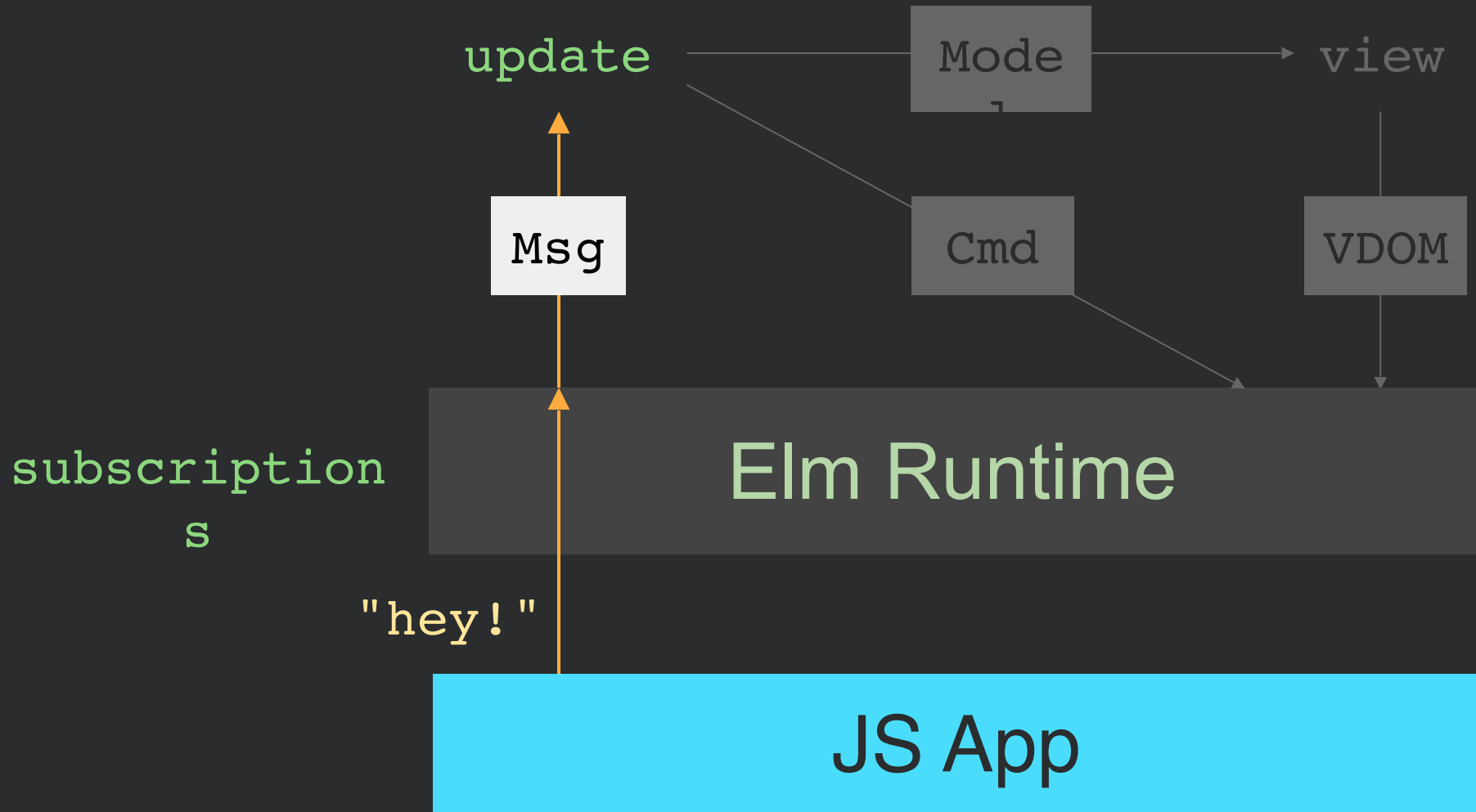
```
var elem = document.getElementById("elm-app");
```

```
var app = Elm.Main.embed(elem);
```

```
app.ports.dataToElm.send("hey!");
```

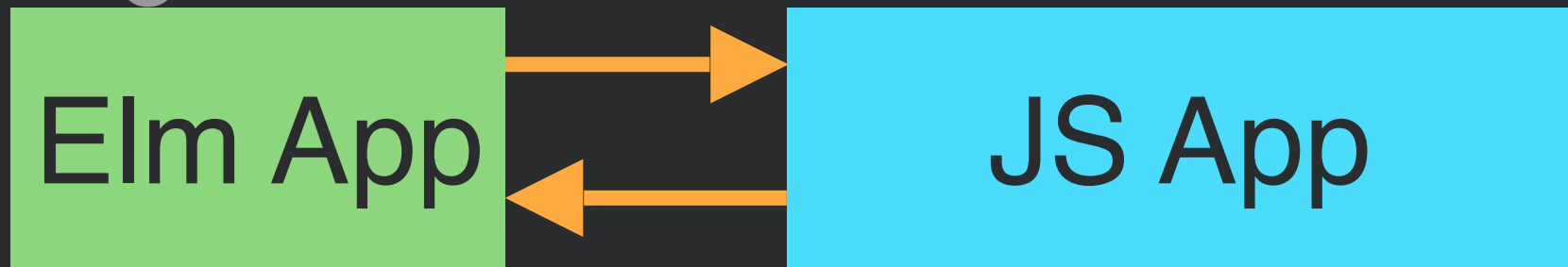








Page



Dreamwriter



B I S



elm app



JS App

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MULTIPLE EMBEDS

app.js

```
var menu = Elm.Menu.embed(menuElem);
```

```
var sidebar = Elm.Sidebar.embed(sbElem);
```

```
var footer = Elm.Footer.embed(footerElem);
```


Page

e

JS App

Elm App

Elm App

Elm App

Account Information | Update Interests

Premium Code:

Title:

First Name:

Last Name:

Email:

Time zone:

Username:

Password:

[Change Password](#)



Link with Google Account



Link with Clever Account



Link a Co-Teacher Account

Update Account

lazy-loaded elm
app

Account Information | Update Interests

Premium Codes:

Title:

First Name:

Last Name:

Email:

Time zone:

(GMT-08:00) America/Los_Angeles

Username:

Password:

[Change Password](#)

Update Account

Confirm Your Premium Code

You have entered the premium code for Top Cool for School.

Continue

Cancel

elm



Go Premium to access text-to-speech

Go Premium!

Account Information | Update Interests | Update Sources

First Name:

Last Name:

Email:

Time zone:

Username:

nriw-dev-student-c04e92ff67-Mee@example.noredlink.com

Password:

[Change Password](#)

Update Account



Link with Google Account

Associated with Clever Account:

5728fb5a954dcc556200dd41

Remove

elm

Accessibility:



Enable Text-to-Speech



Save Settings

Account Information | Update Interests | Update Sources

First Name: Mee

Last Name: Reeves

Email: nriw-dev-e

Time zone: (GMT-08

Username: nriw-dev-student-c04e92ff67-Mee@example.noredink.com

Password: [Change Password](#)

[Update Account](#)

[Save Settings](#)

Are you sure?



Unlinking with Clever will remove you from any of your Clever classes.

Yes, unlink my account

Cancel

elm

elm for

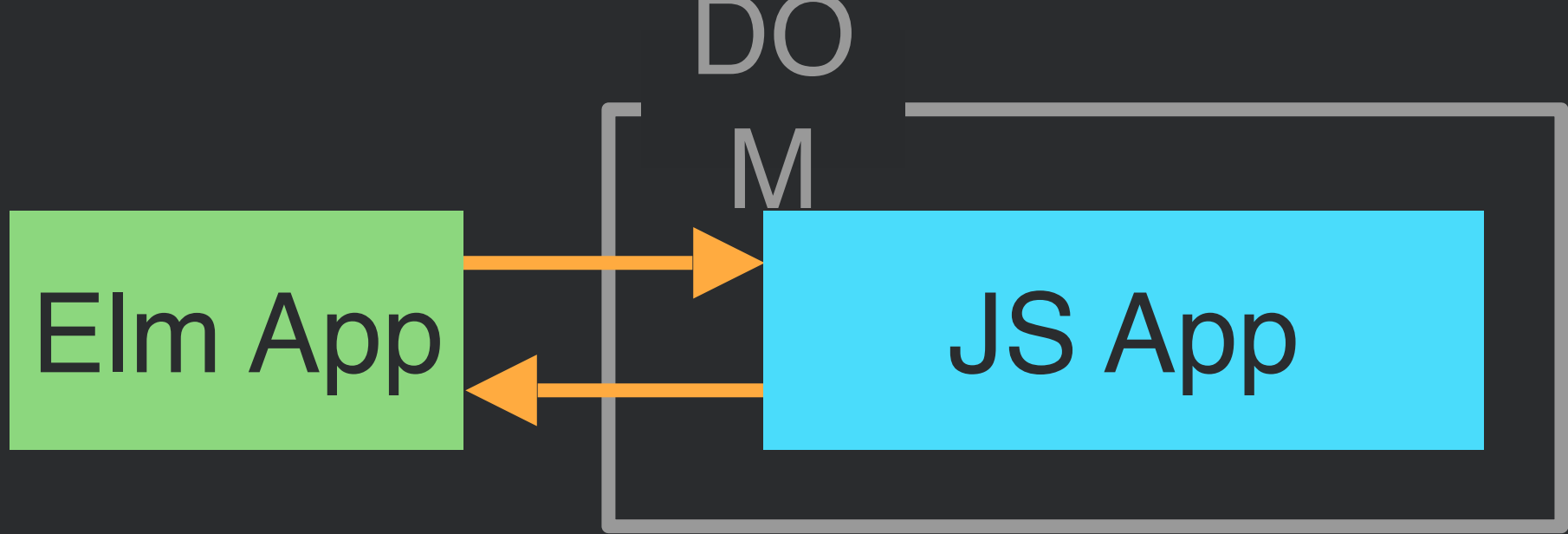
BUSINESS LOGIC

app.js

```
var app = Elm.MyApp.worker();
```

```
// app.ports.foo.send( ... )
```

```
// app.ports.bar.subscribe( ... )
```



elm for

DROP-IN COMPONENTS

app.jsx

```
import Elm from 'react-elm-components';  
import {Chat} from '../dist/elm/chatroom.js';  
  
function render() {  
  return <Elm src={Chat} />;  
}
```

react-elm-components

```
var React = require('react');
```

```
module.exports = React.createClass({  
  initialize: function(node) {  
    if (node === null) return;  
    var app = this.props.src.embed(node, this.props.flags);  
  
    if (typeof this.props.ports !== 'undefined') {  
      this.props.ports(app.ports);  
    }  
  },  
  
  shouldComponentUpdate: function(prevProps) {  
    return false;  
  },  
  
  render: function () {  
    return React.createElement('div', { ref: this.initialize });  
  }  
});
```

JS Wrapper Component

Elm App

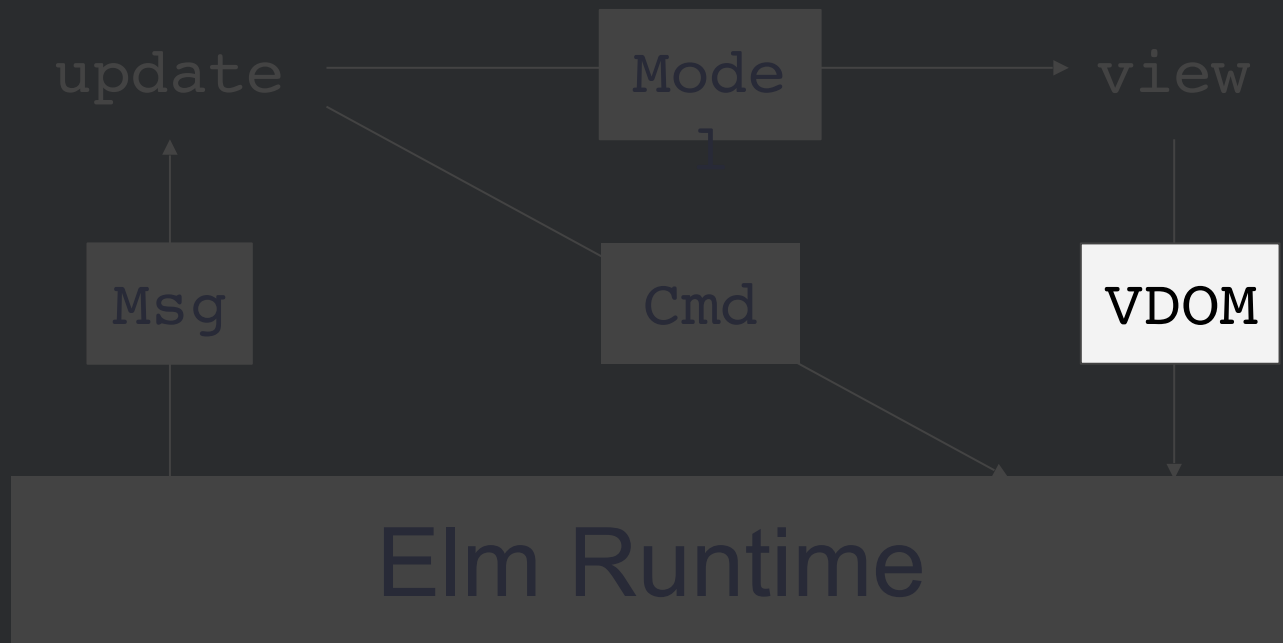


the most

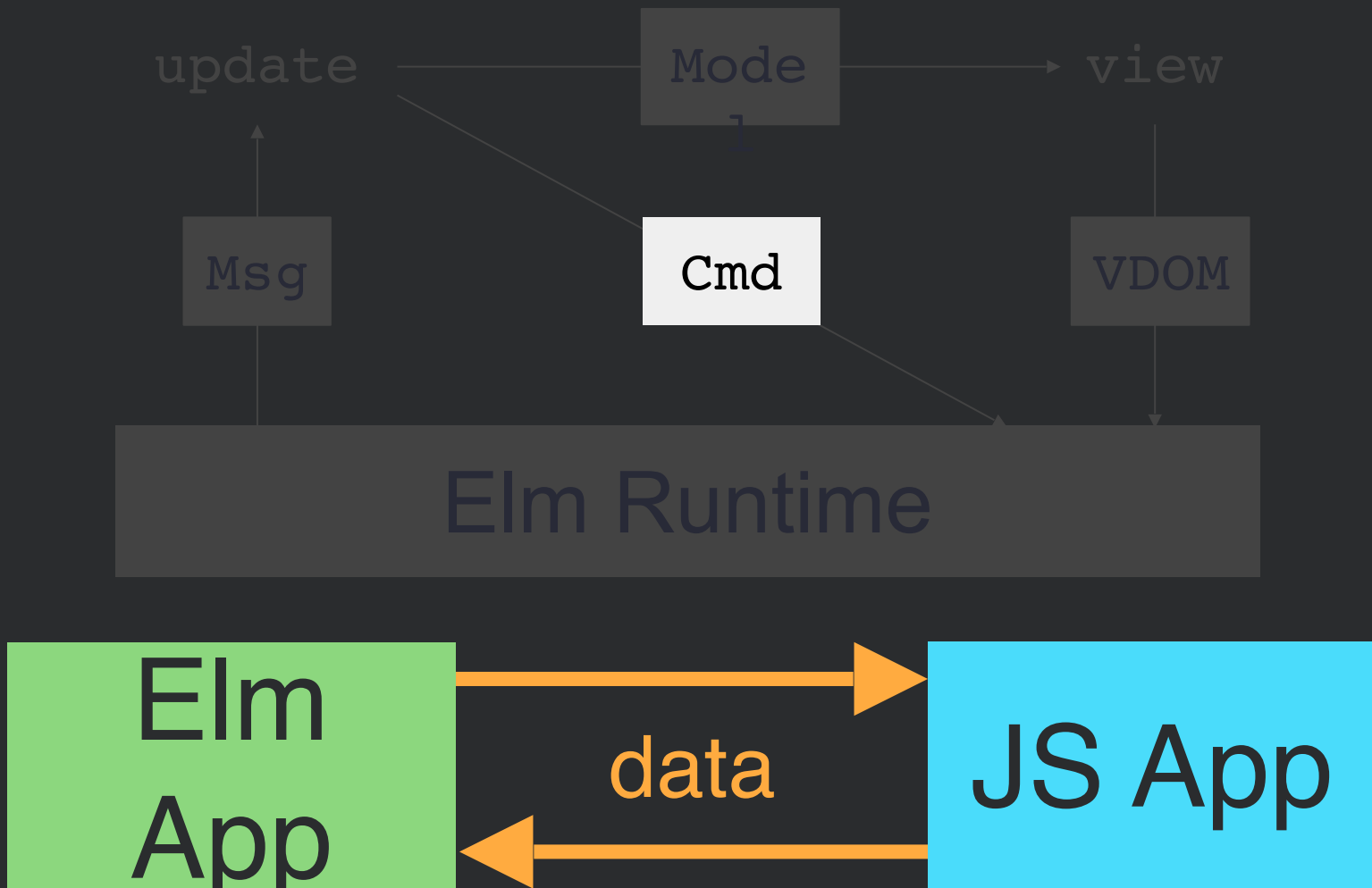
POWERFUL IDEA



how far can we
RUN WITH THIS?



data



~~here's what I want you to~~
know

here's what I want you to *do*

```
{  
  "type": "FOLLOW_USER",  
  "payload": "rtfeldman"  
}
```



GUARANTEES INTACT



RESOURCES

guide.elm-lang.org

*How to Use Elm at
Work*

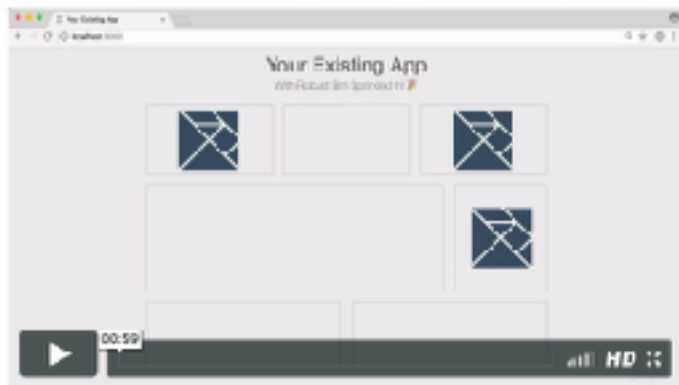
elm-lang.org/blog

pragmaticstudio.com

Integrating Elm

A free video course to help you integrate (sneak!) Elm into existing web apps

Elm 0.18



Watch Course Intro

"How do I introduce Elm into my application?"

We get asked that question all the time! And who could blame new Elm developers for asking. Once they discover how delightful it is to program in Elm, they're eager to use it in earnest.

But not everyone has the luxury of working on a greenfield Elm project. And a big rewrite is impractical and loaded with risk. So here's a crazy (flame we say, pragmatic) idea: you incrementally and strategically convert a small part of your app to Elm.

Learn how in this free course!

GET THE COURSE | \$0

Elm

IN ACTION

Richard Feldman

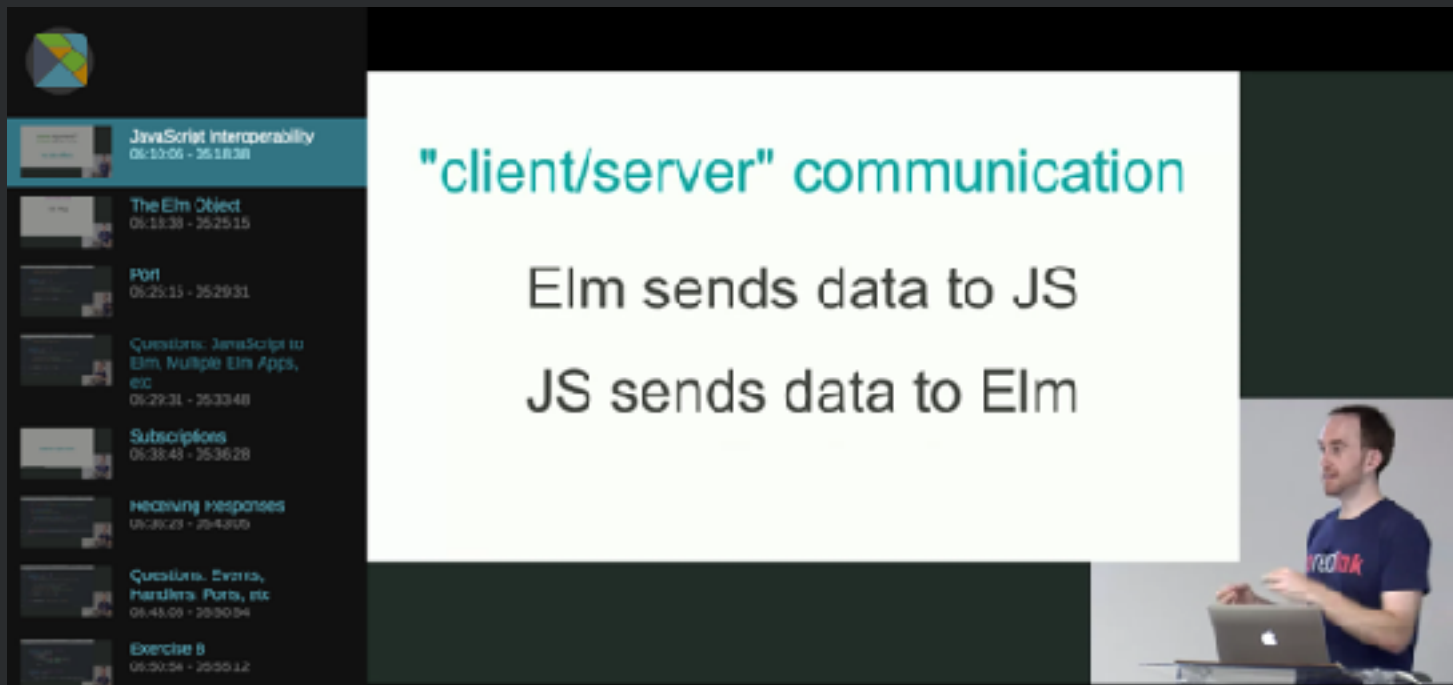
MEAP



MANNING



frontendmasters.com



The screenshot shows a video player interface for a Frontend Masters course. On the left is a dark sidebar with a list of topics, each with a small thumbnail. The main area is a large white rectangle containing text. To the right of the text is a smaller video inset showing a man at a laptop.

JavaScript Interoperability
08:13:06 - 36:18:38

The Elm Object
08:18:38 - 35:25:15

Port
08:25:15 - 35:29:31

Questions: JavaScript to Elm, Multiple Elm Apps, etc
08:29:31 - 35:33:48

Subscriptions
08:38:48 - 35:36:28

Receiving Responses
08:40:28 - 35:43:05

Questions, Events, Handlers, Ports, etc
08:43:05 - 35:50:34

Exercise 8
08:50:34 - 35:55:12

"client/server" communication

Elm sends data to JS

JS sends data to Elm

humblespark.com



Elm Training

Luke Westby
creator of *Ellie*

lots of JS in production



elm in production


```
<div id="elm-app">
```

```
</div>
```

```
<script>
```

```
  var elem = document.getElementById( "elm-app" );
```

```
  var app = Elm.Main.embed(elem);
```

```
</script>
```

PLANT A SEED



WATCH IT **GROW**





@rtfeldman