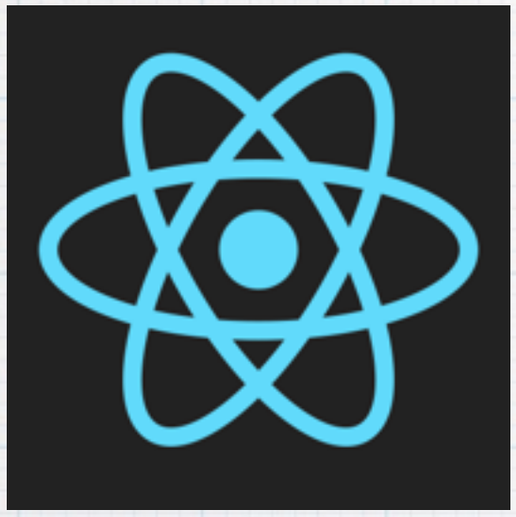


Workshop: React + Flux

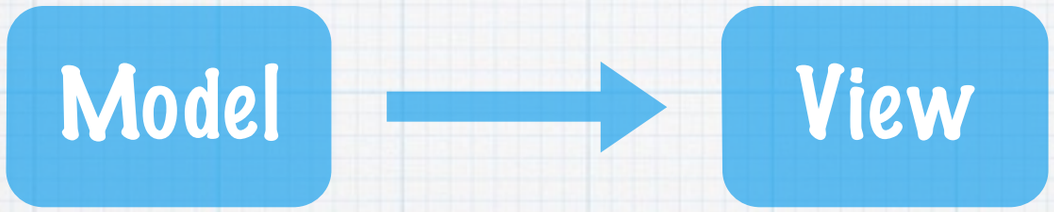
Tim Coppieters

React?

React = JavaScript library that provides one-way data-binding from model to view.

React?

MVC



(one-way!) data-binding

React?

MVC

Model → View

(one-way!) data-binding

React?

MVC

Model → View

(one-way!) data-binding

React?

MVC

Model → View

HTML

(one-way!) data-binding

```
var cat = {
    name: “kitty”,
    color: “pink”
}
```

React?

MVC

Model → View

(one-way!) data-binding

JS

```
var cat = {
    name: “kitty”,
    color: “pink”
}
```

HTML

React?

MVC

Model → View

JS

```
var cat = {
    name: “kitty”,
    color: “blue”
}
```

HTML

React?

MVC

Model → View

JS

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var cat = {
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}
```

HTML

React?

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Model → View

JS

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var cat = {
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}
```

HTML

When?

"Large applications with data that (frequently) changes over time"

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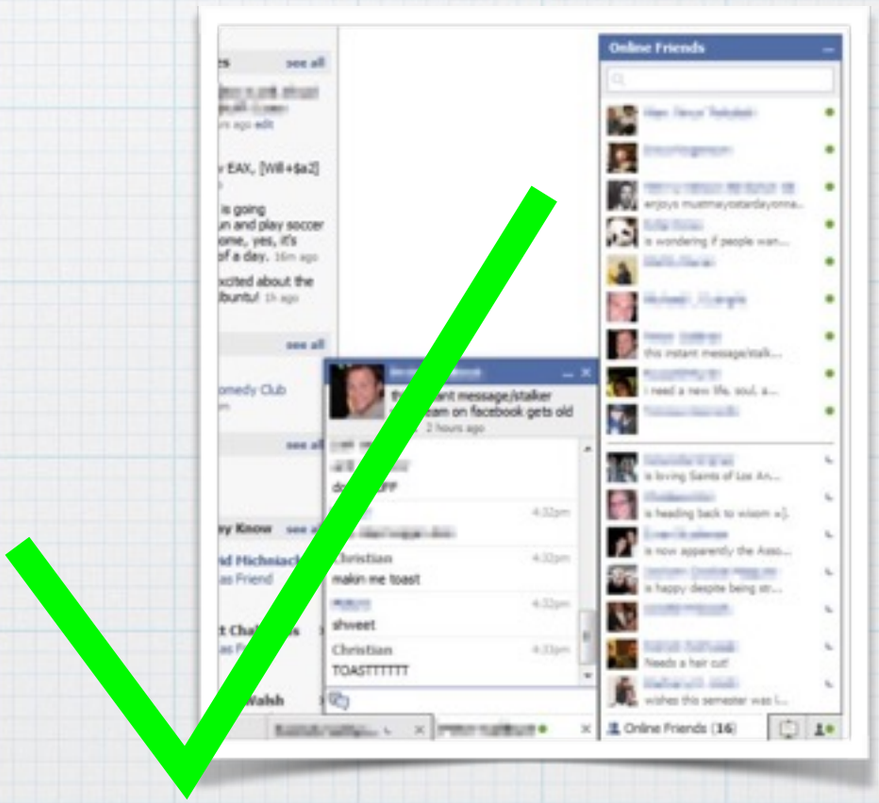

Imperative/Stateful

Imperative/Stateful


```
function createKitten(name, color) {
	var kitten = {name: name, color: color};
	showDOMKitten(kitten);
	return kitten;
}
```

Imperative/Stateful


```
function createKitten(name, color) {
      var kitten = {name: name, color: color};
      showDOMKitten(kitten);
      return kitten;
}
```

```
function showDOMKitten(kitten) {
      var dress = $('<div class="' + kitten.color + '">');
         .append(...)
      $('<div id="' + kitten.name '">')
         .append(dress)
            .appendTo('#kittens');
}
```

Imperative/Stateful


```
function createKitten(name, color) {
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      showDOMKitten(kitten);
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         .append(dress)
            .appendTo('#kittens');
}
```

```
function updateColor(kitten, color) {
      kitten.color = color;
      updateDOMKitten(kitten);
}
```

Imperative/Stateful


```
function createKitten(name, color) {
      var kitten = {name: name, color: color};
      showDOMKitten(kitten);
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```
function showDOMKitten(kitten) {
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         .append(…)
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         .appendTo('#kittens');
}
```

```
function updateColor(kitten, color) {
      kitten.color = color;
      updateDOMKitten(kitten);
}
```

```
function updateDOMKitten(kitten) {
      var $domNode = $('#' + kitten.name + ' .dress');
      $domNode.attr('class', kitten.color');
}
```

Imperative/Stateful


```
function createKitten(name, color) {
      var kitten = {name: name, color: color};
      showDOMKitten(kitten);
      return kitten;
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function showDOMKitten(kitten) {
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Imperative/Stateful

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Fast

Imperative/Stateful

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```

Fast

Terrible to manage

Declarative/Stateless


```
function render(kitten) {
      return $(‘<div id=“‘ + kitten.name ‘“>’)
          .append(
              $(‘<div class=“‘ + kitten.color + ‘“>’);
                  .append(…));
}
```


```
var kitty ={name: ’kitty’, color: ’pink’};
```

Declarative/Stateless


```
function render(kitten) {
      return $(‘<div id=“‘ + kitten.name ‘“>’)
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```
$(‘#kittens’).html(render(kitty))
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Declarative/Stateless


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$(‘#kittens’).html(render(kitty))
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```
kitty.color = ‘blue’;
```

Declarative/Stateless


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function render(kitten) {
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Easy to manage

Declarative/Stateless


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Easy to manage

Slow

React: Virtual DOM

recalculation of layout positioning, style sheets, etc.

Accessing the DOM is slow!

React: Virtual DOM

recalculation of layout positioning, style sheets, etc.

Accessing the DOM is slow!

Keep a JavaScript object representation of the DOM that you entirely re-create when data changes.

React: Virtual DOM

recalculation of layout positioning, style sheets, etc.

Accessing the DOM is slow!

Keep a JavaScript object representation of the DOM that you entirely re-create when data changes.

Calculate minimal differences with previous version and execute necessary DOM operations to reflect changes.

React: Virtual DOM

fast slow

Virtual DOM

Real DOM

```
var KittenComponent = React.createClass({
  render: function() {
    return (
      React.createElement('div', null,
        React.createElement('p', null, this.props.kitten.name),
        React.createElement('p', {className: this.props.kitten.color}))
    );
  }
});
```

React: Virtual DOM

fast | slow

Virtual DOM

Real DOM

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});
```

```
var kitty = {name: 'kitty', color: 'pink'};
var node = document.body;
React.render(KittenComponent, {kitten: kitty}, node);
```

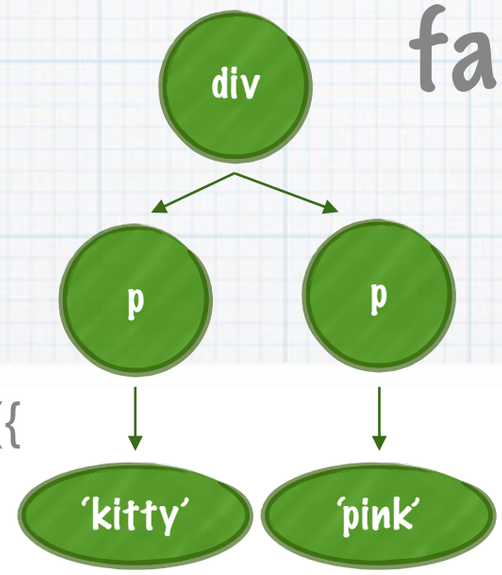
React: Virtual DOM

fast

slow

Virtual DOM

Real DOM

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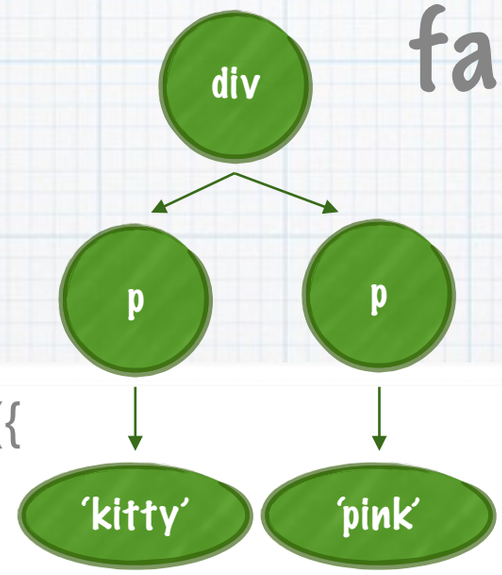
React: Virtual DOM

fast

slow

Virtual DOM



createElements()

Real DOM

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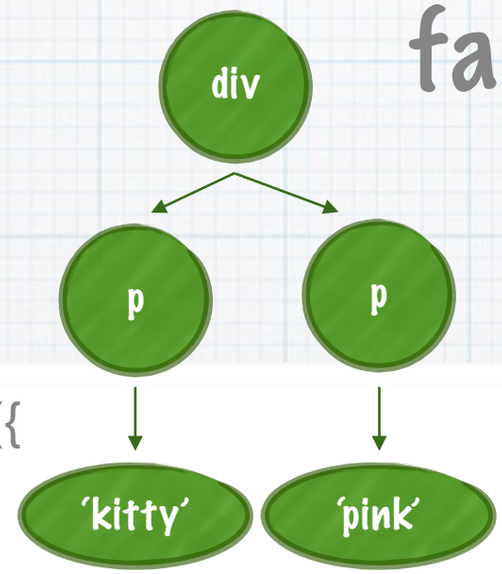
Virtual DOM



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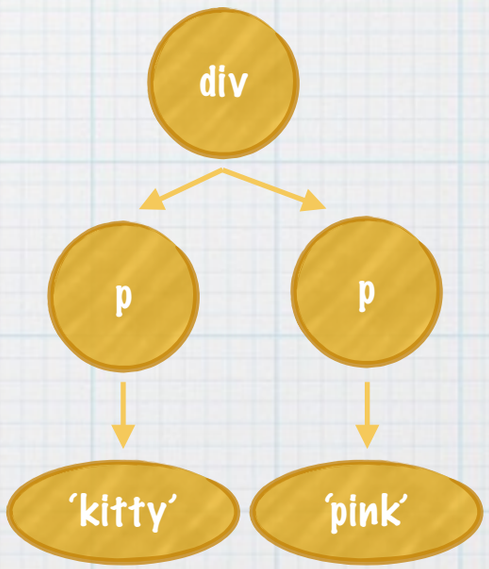
createElements()

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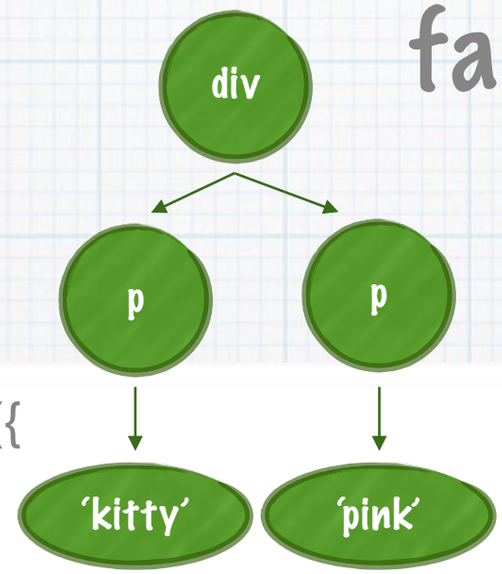
React: Virtual DOM

fast | slow

Virtual DOM



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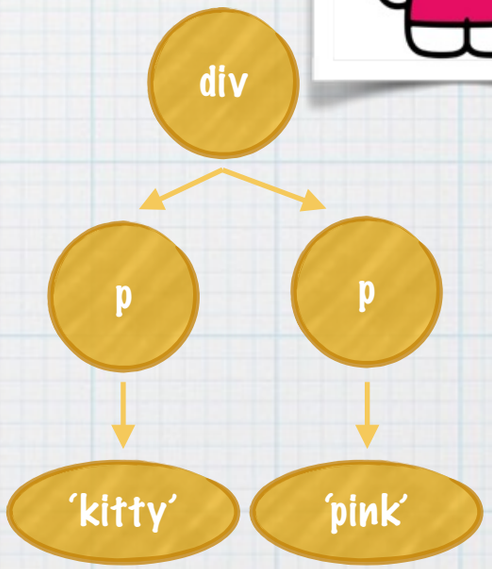
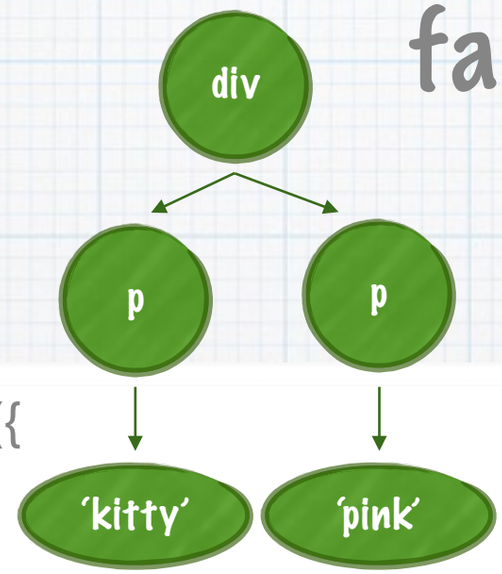


React: Virtual DOM

fast | slow

Virtual DOM

Real DOM

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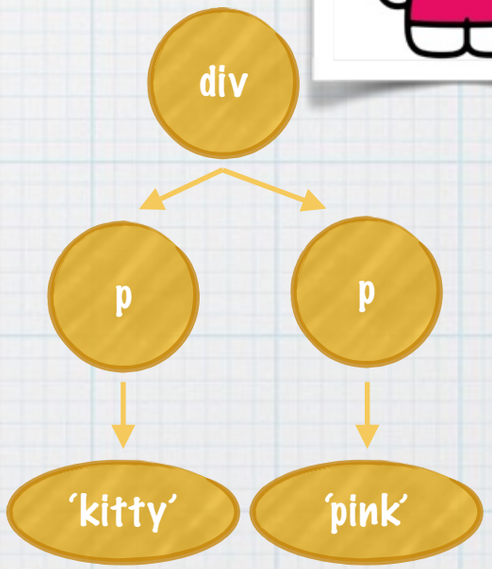
```
var kitty = {name: 'kitty', color: 'pink'};
var node = document.body;
React.render(KittenComponent, {kitten: kitty}, node);
```

```
kitty.color = 'blue';
React.render(KittenComponent, {kitten: kitty}, node);
```

createElements()



React: Virtual DOM

fast

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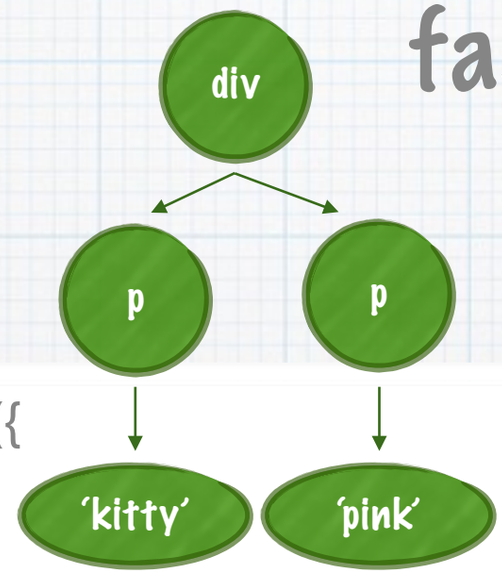
Virtual DOM



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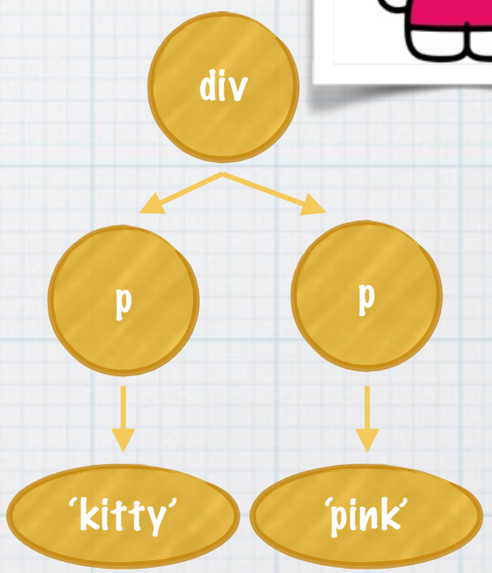
createElements()

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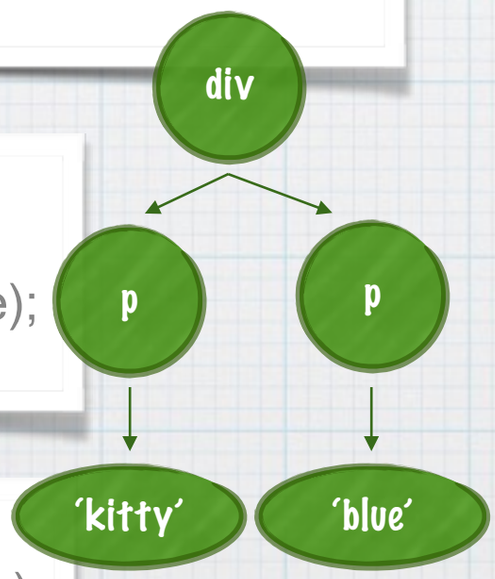


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React: Virtual DOM

fast | slow

Virtual DOM

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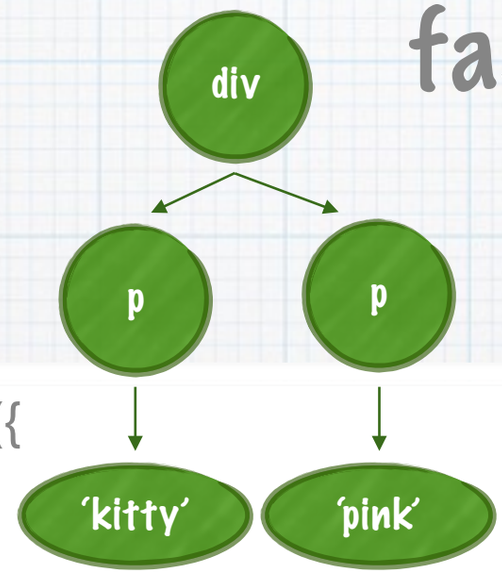

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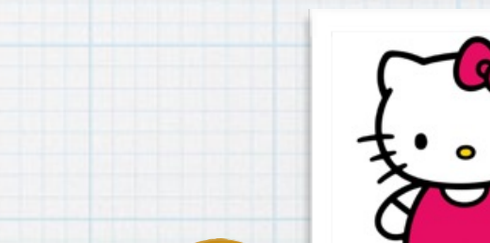


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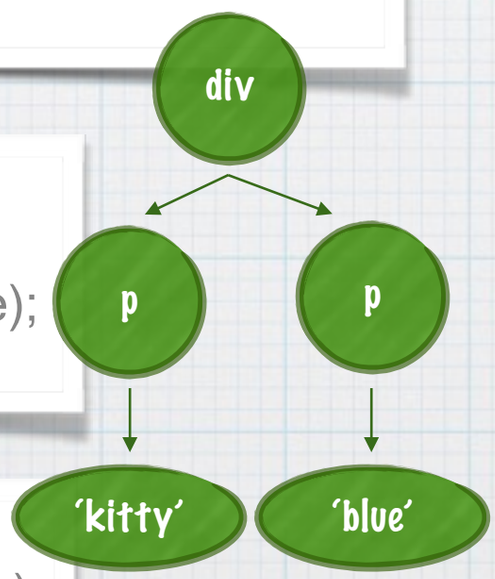


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fast | slow

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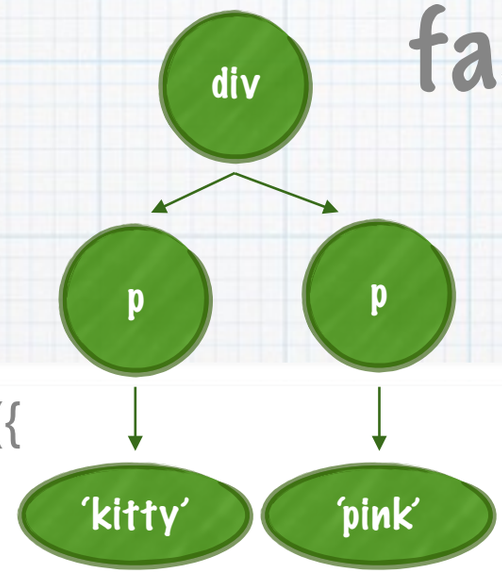

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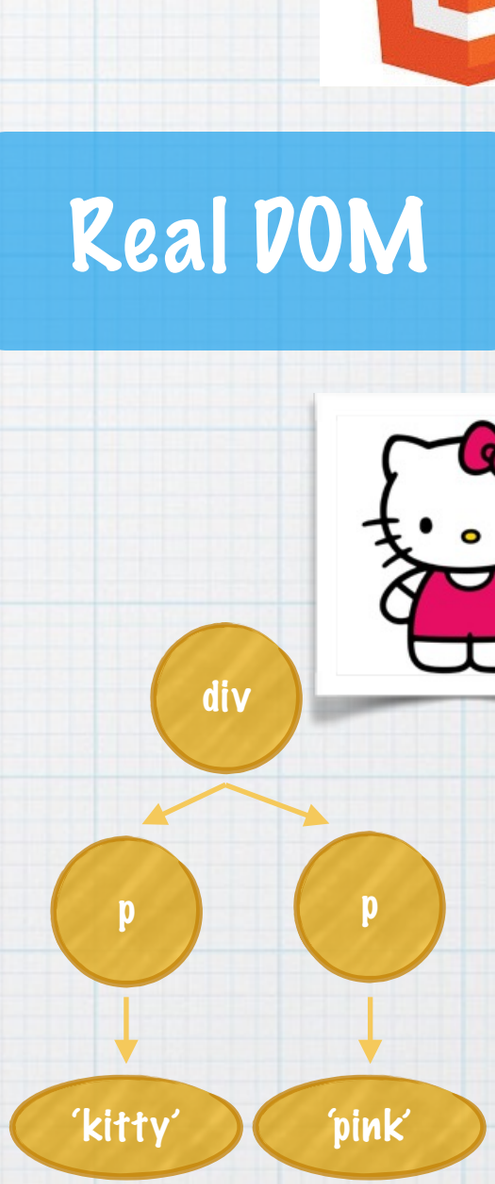


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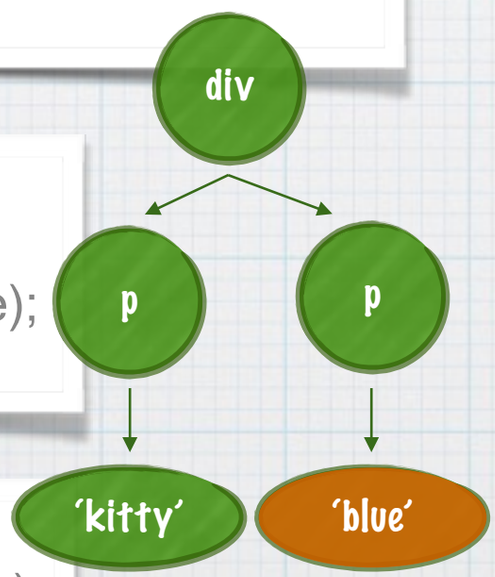


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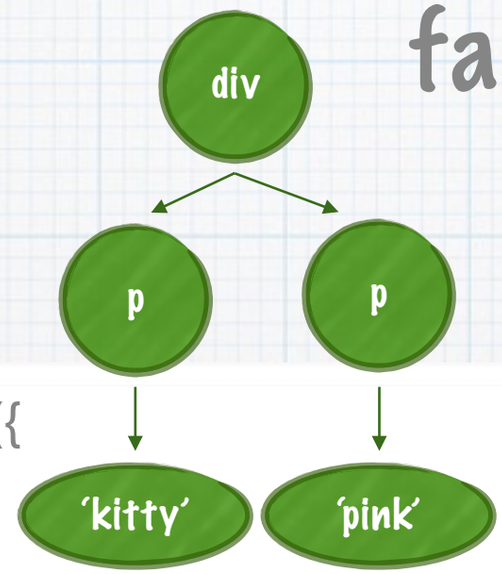
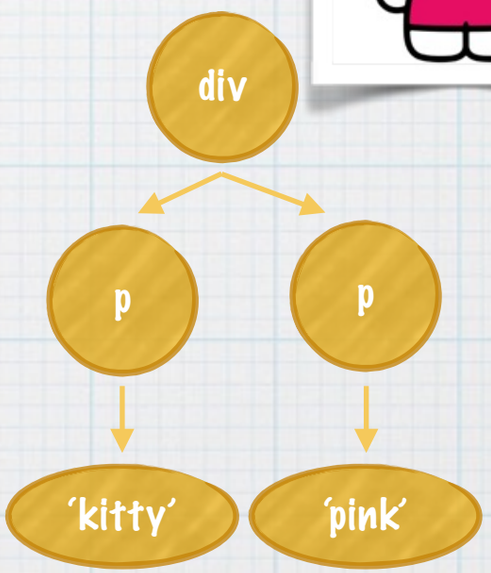
        React.createElement('p', {className: this.props.kitten.color}))
    );
  }
});
```

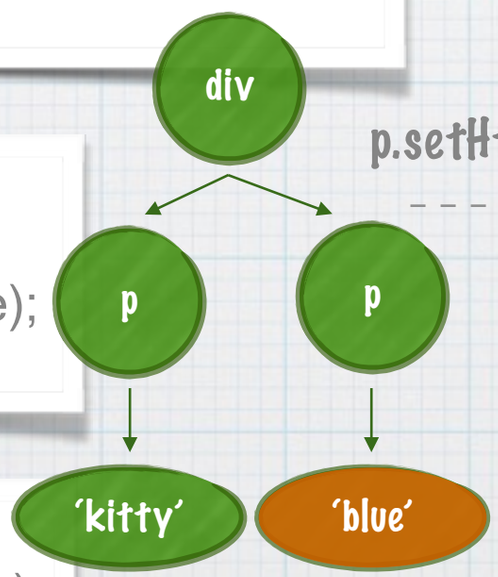


createElements()



p.setHtml('blue')

```
var kitty = {name: 'kitty', color: 'pink'};
var node = document.body;
React.render(KittenComponent, {kitten: kitty}, node);
```




```
kitty.color = 'blue';
React.render(KittenComponent, {kitten: kitty}, node);
```

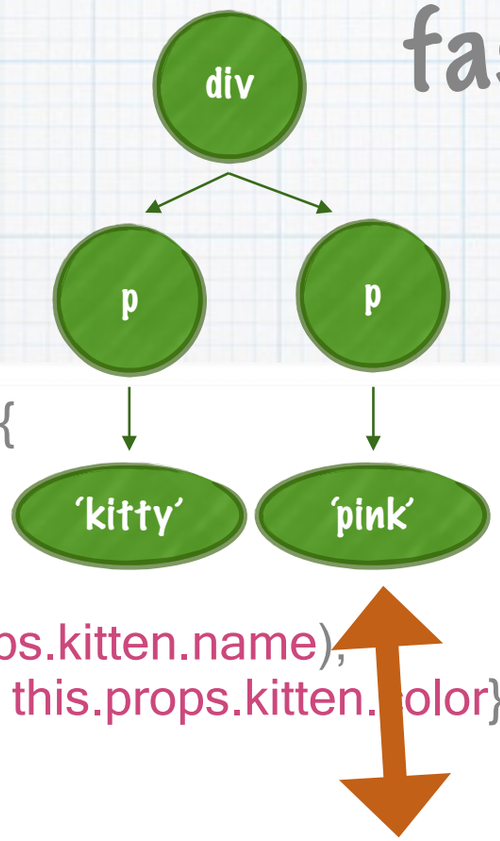
React: Virtual DOM

fast | slow

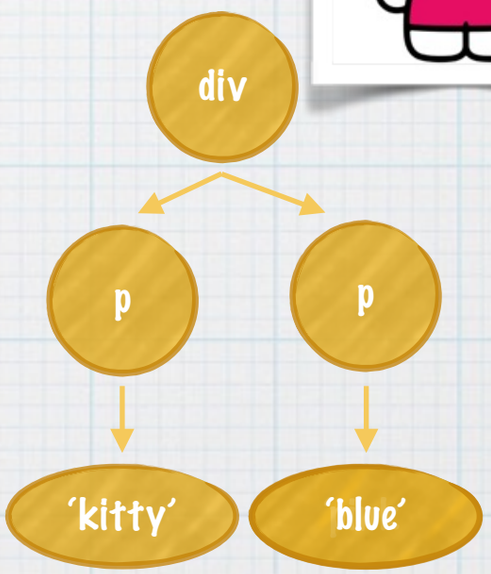
Virtual DOM

Real DOM

```
var KittenComponent = React.createClass({
  render: function() {
    return (
      React.createElement('div', null,
        React.createElement('p', null, this.props.kitten.name),
        React.createElement('p', {className: this.props.kitten.color}))
    );
  }
});
```



createElements()



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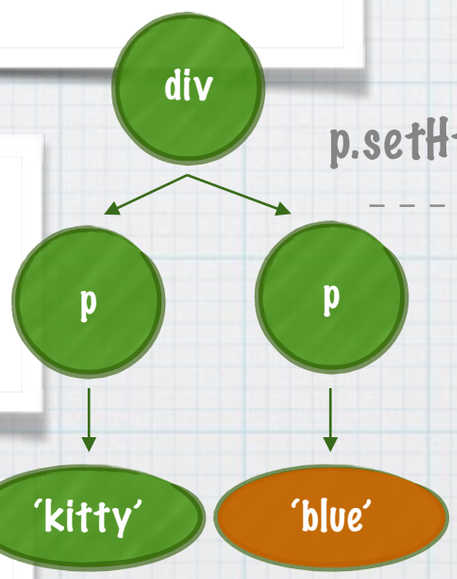



```
kitty.color = 'blue';
React.render(KittenComponent, {kitten: kitty}, node);
```

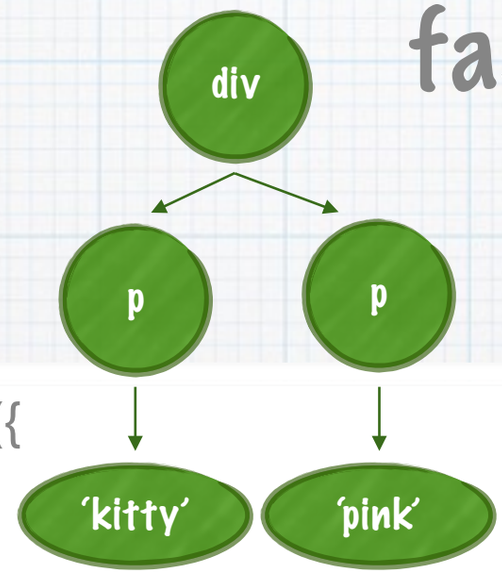
React: Virtual DOM

fast | slow

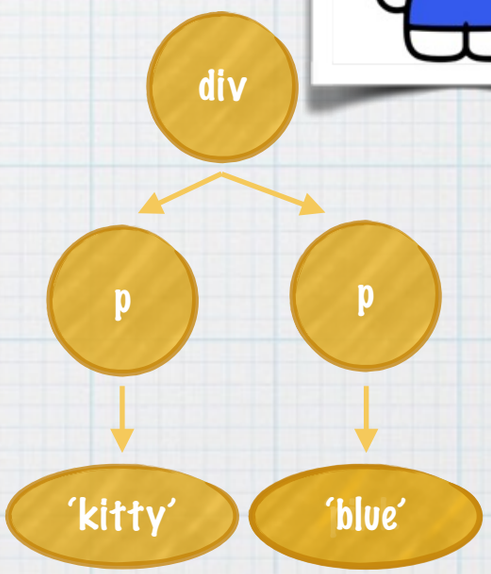
Virtual DOM

Real DOM

```
var KittenComponent = React.createClass({
  render: function() {
    return (
      React.createElement('div', null,
        React.createElement('p', null, this.props.kitten.name),
        React.createElement('p', {className: this.props.kitten.color}))
    );
  }
});
```



createElements()



p.setHtml('blue')

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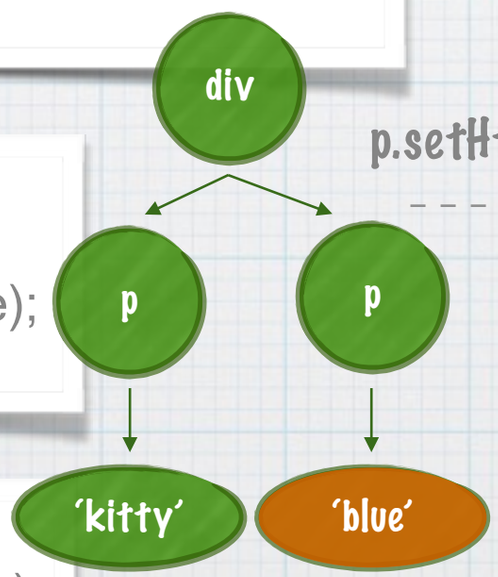
var kitty = {name: 'kitty', color: 'pink'};
var node = document.body;
React.render(KittenComponent, {kitten: kitty}, node);
```




```
kitty.color = 'blue';
React.render(KittenComponent, {kitten: kitty}, node);
```

React: Virtual DOM

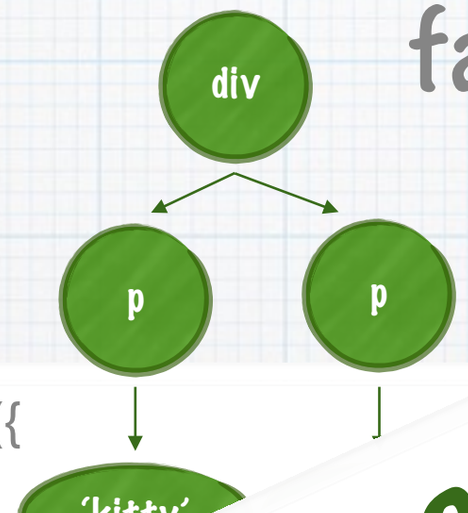
JS

HTML

fast | slow

Virtual DOM

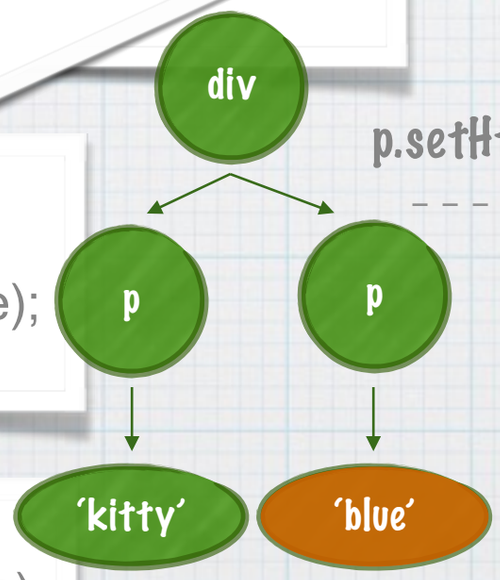
Real DOM



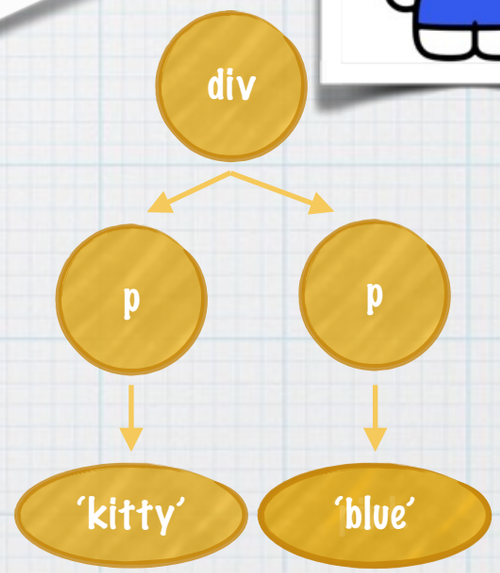

```
var KittenComponent = React.createClass({
  render: function() {
    return (
      React.createElement('div', null,
        React.createElement('p', null, this.
        React.createElement('p', {cla
    );
  }
});
```

Easy to manage + Fast = Win!

```
var kitty = {name: 'kitty', color: 'pi
var node = document.body;
React.render(KittenComponent, {kitten: kitty}, node);
```



p.setHtml('blue')




```
kitty.color = 'blue';
React.render(KittenComponent, {kitten: kitty}, node);
```

JSX Compiler

jsx (js + html)

```
var Kitten = React.createClass({
  render: function() {
    return (
      <div>
        <p> {this.props.name} </p>
        <p className={this.props.color}>
           {this.props.kitten.color}
         </p>
      </div>
    );
  }
});

React.render(<Kitten name="kitty"
                     color={getColor()} />,
             document.body);
```

javascript

JSX Compiler

jsx (js + html)

```
var Kitten = React.createClass({
  render: function() {
    return (
      <div>
        <p> {this.props.name} </p>
        <p className={this.props.color}>
           {this.props.kitten.color}
         </p>
      </div>
    );
  }
});

React.render(<Kitten name="kitty"
                     color={getColor()} />,
             document.body);
```

javascript

```
var Kitten = React.createClass({
  render: function() {
    return (
      React.createElement(
        'div',
        React.createElement(
          'p',
          this.props.kitten.name),
        React.createElement(
          'p',
          {className: this.props.kitten.color},
          this.props.kitten.color));
    );
  }
});

React.render(Kitten({kitten: kitty,
                     color: getColor()}),
             document.body);
```

JSX Compiler*

Client-Side (Development)

```
<script src="http://fb.me/JSXTransformer-0.13.2.js"></script>
```

Server-Side (Production)

```
> jsx src/KittenBox.js lib/KittenBox.js
```

Server-Side++ (Development + Production)

```
> watchify -o lib/bundle.js -v -d src/app.js
```

Rendering

lower-case

HTML elements

```
var myDiv = <div className="kitten" />;
React.render(myDiv, document.body);
```

upper-case

Component

```
var MyComponent = React.createClass({ … });
React.render(<MyComponent property=“foo” />, document.body);
```

Components

React + Flux Workshop

Tim Coppieters

Coppieters, Tim

People | **Questions** | Tasks

Ask your question here if you're really really really shy, but we prefer you just ask us!

- How do I choose my components? --- Tim Coppieters (task 1)
- When do you use props and when state? --- Tim Coppieters (task 3)
- When do we get cookies? --- Tim Coppieters (task 2)

When do we get cookies?

task 2

Ask!

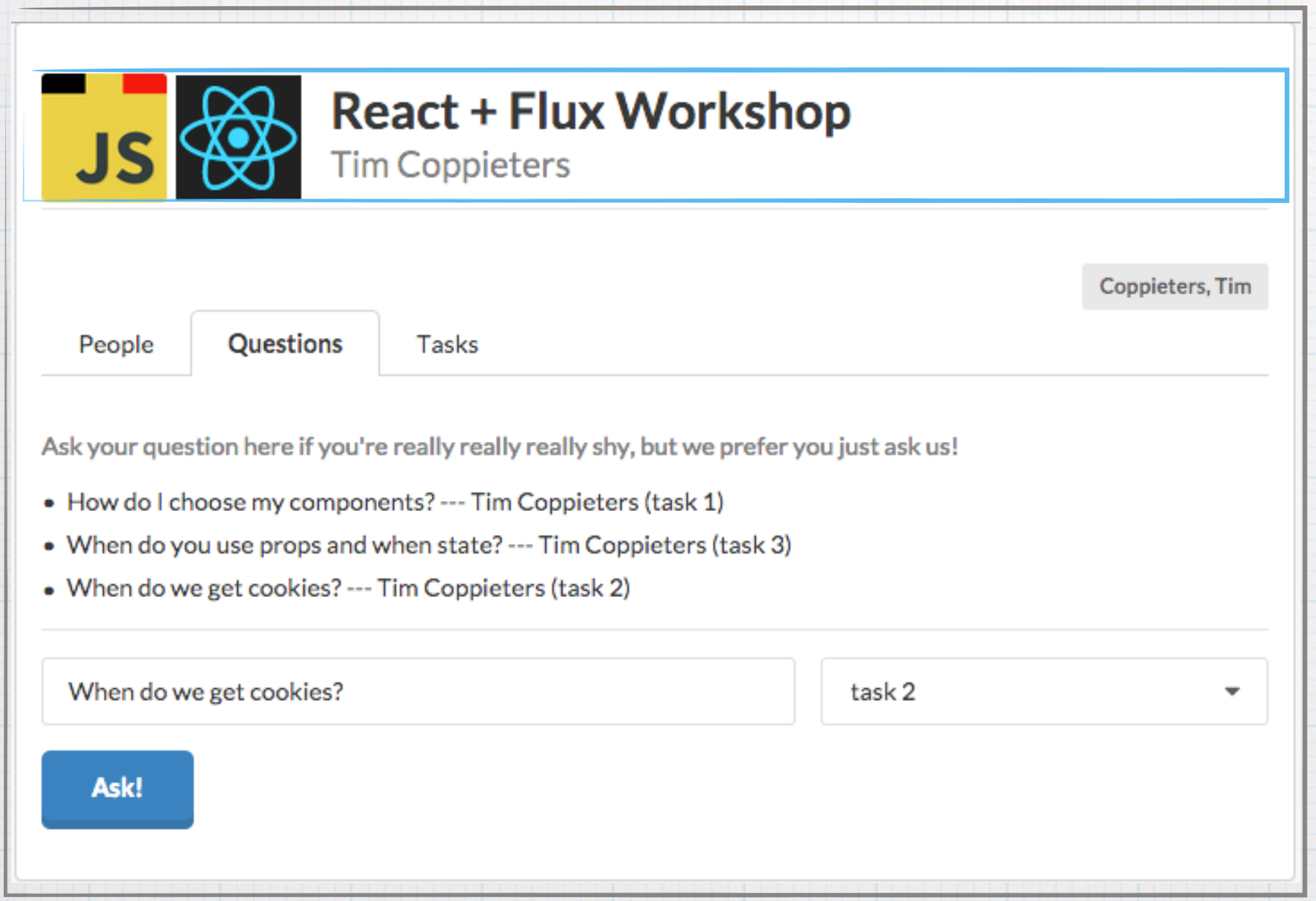
Components


React + Flux Workshop
Tim Coppieters
Coppieters, Tim
People
Questions
Tasks
Ask your question here if you're really really really shy, but we prefer you just ask us!
How do I choose my components? --- Tim Coppieters (task 1)
When do you use props and when state? --- Tim Coppieters (task 3)
When do we get cookies? --- Tim Coppieters (task 2)
When do we get cookies?
task 2
Ask!

Components

WorkshopComponent

TitleComponent

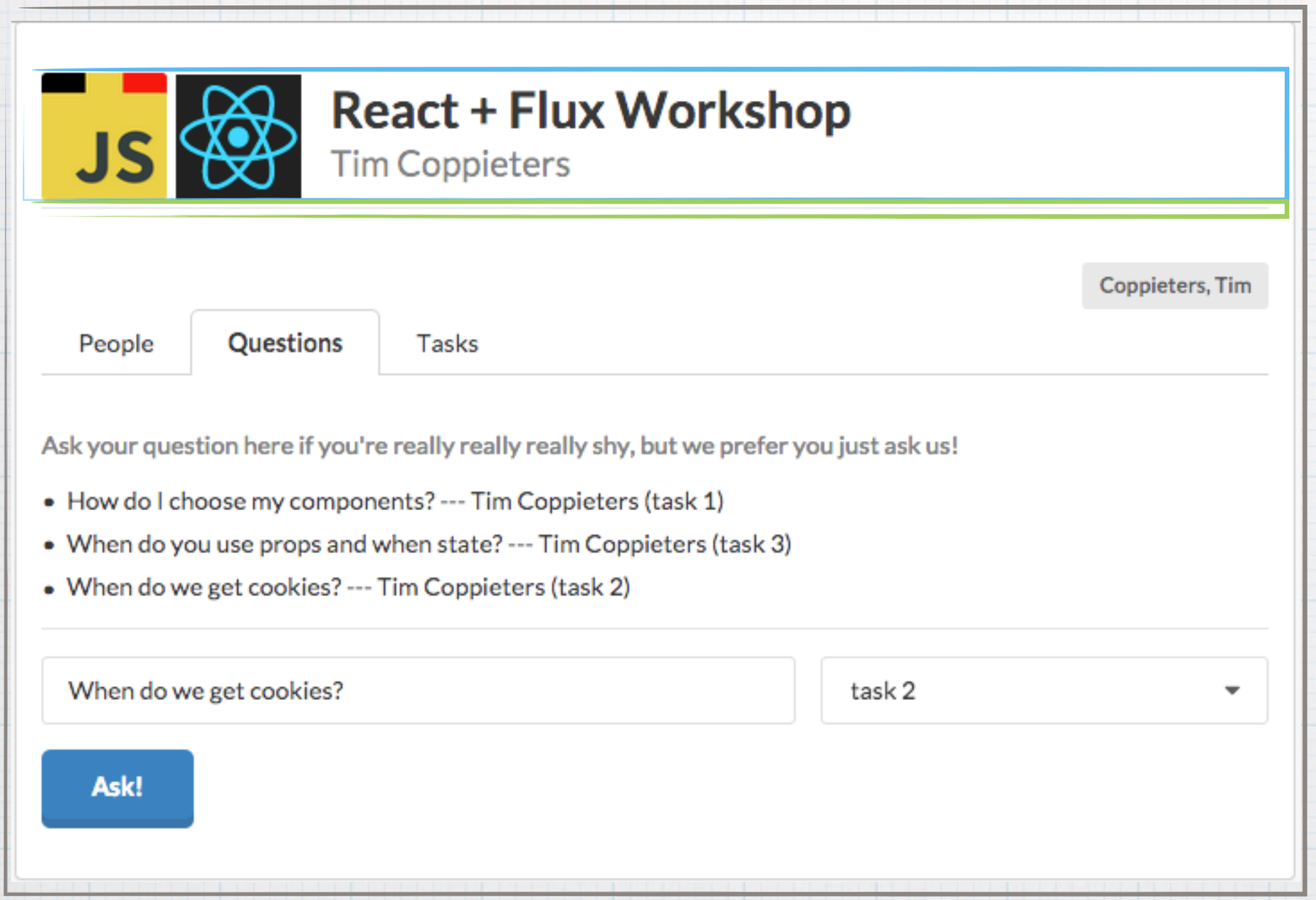


Components

WorkshopComponent

TitleComponent

DividerComponent



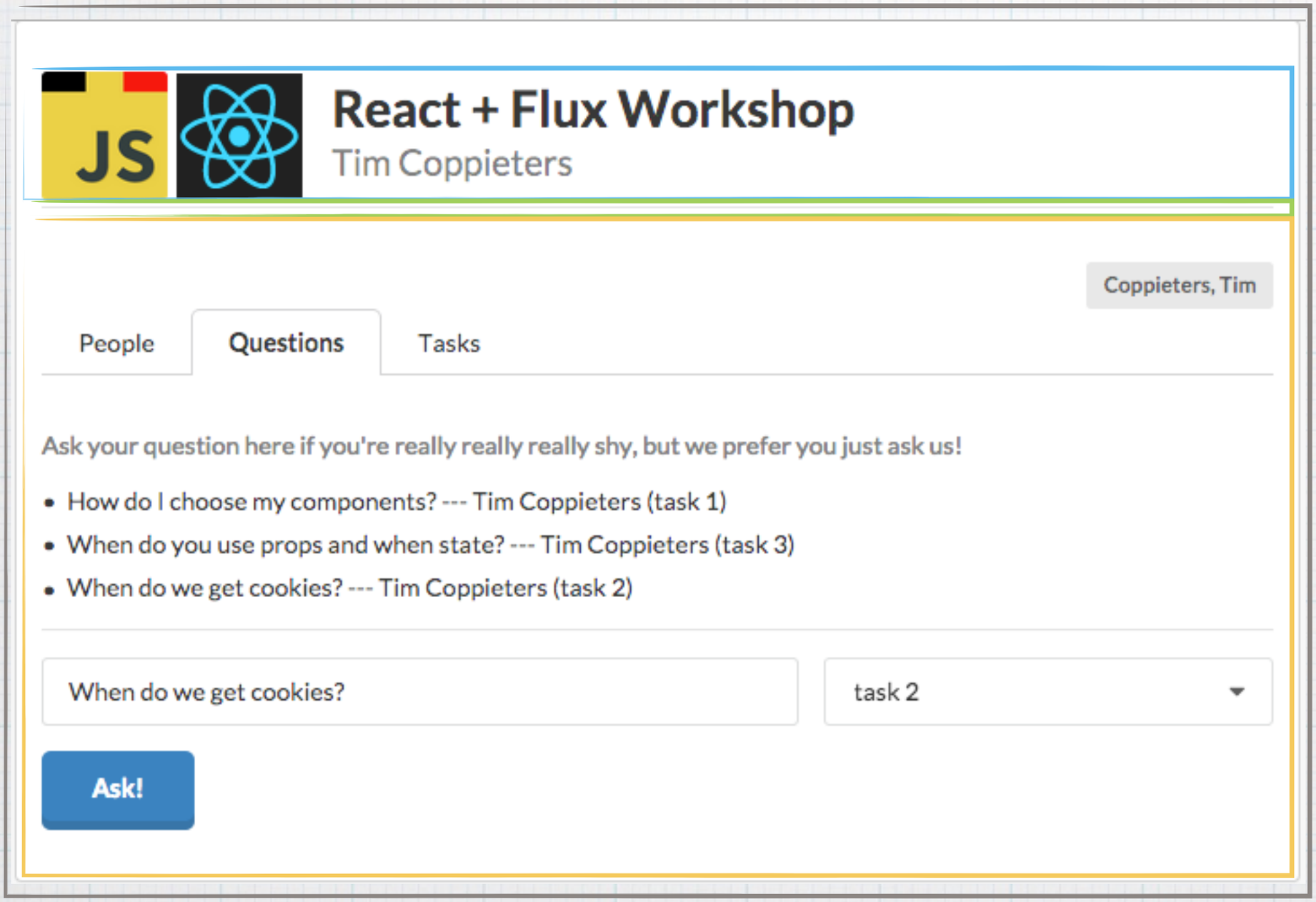
Components

WorkshopComponent

TitleComponent

DividerComponent

MainComponent



Components

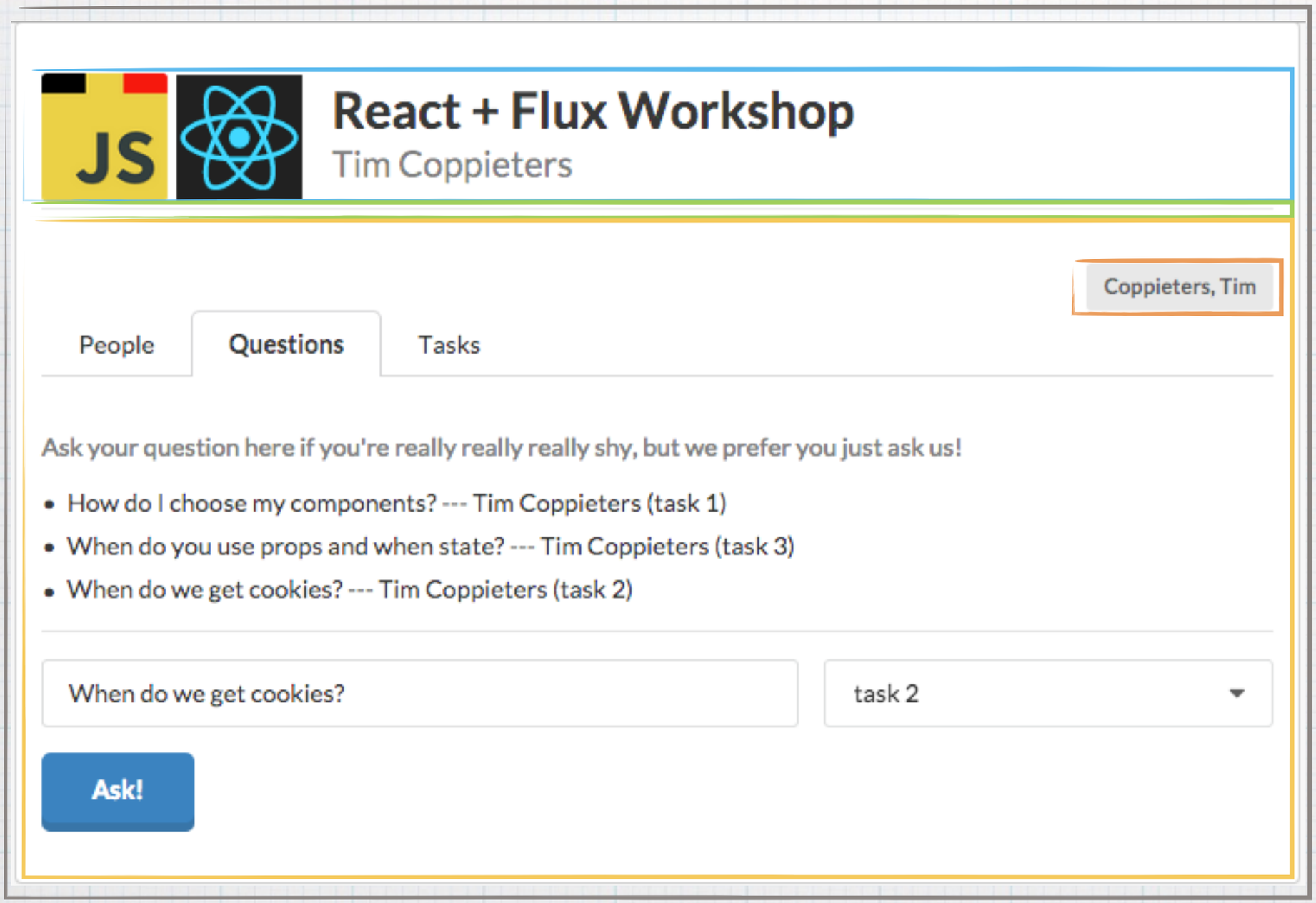
WorkshopComponent

TitleComponent

DividerComponent

MainComponent

ProfileComponent



Components

WorkshopComponent

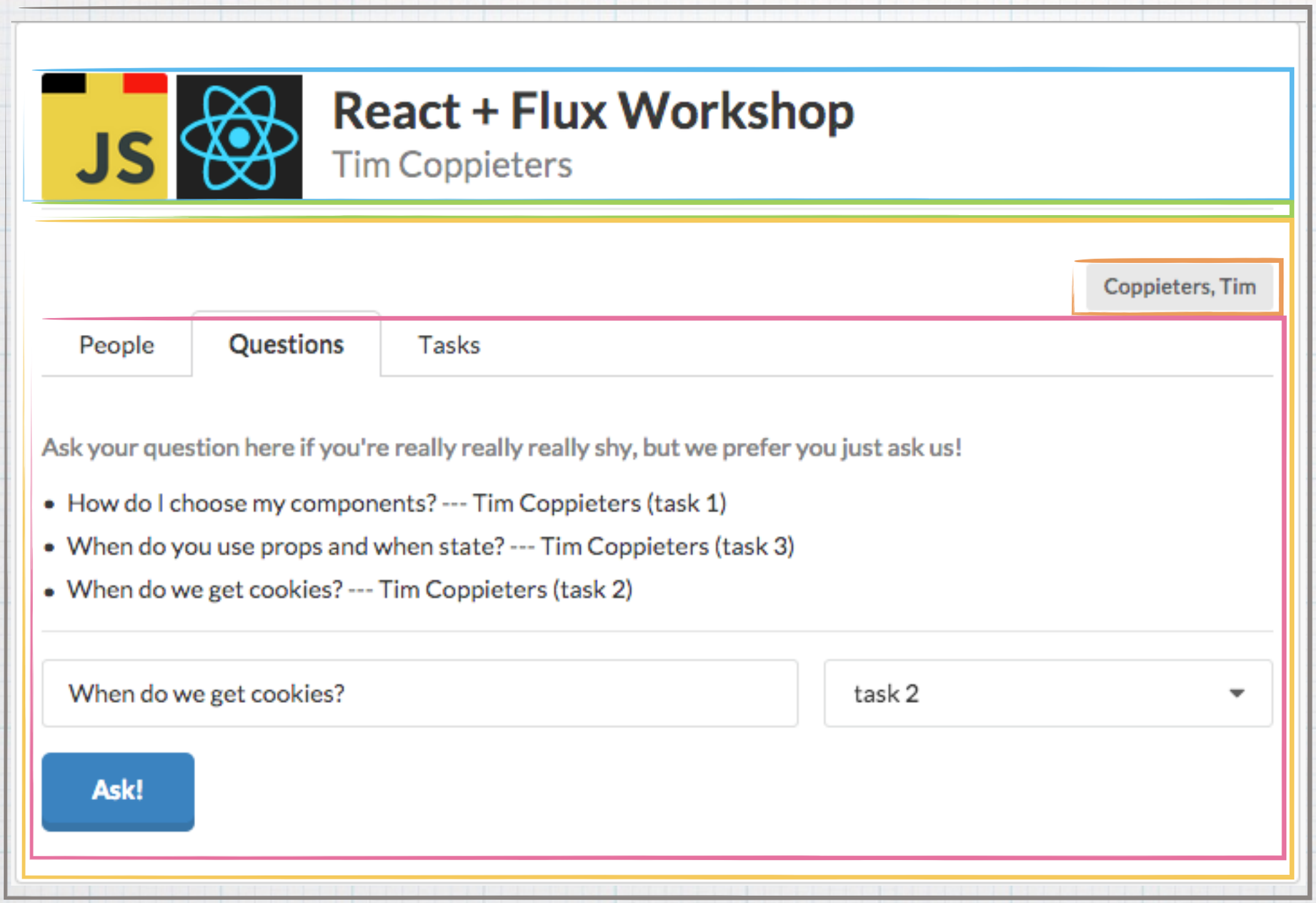
TitleComponent

DividerComponent

MainComponent

ProfileComponent

MainContentComp



Components

WorkshopComponent

TitleComponent

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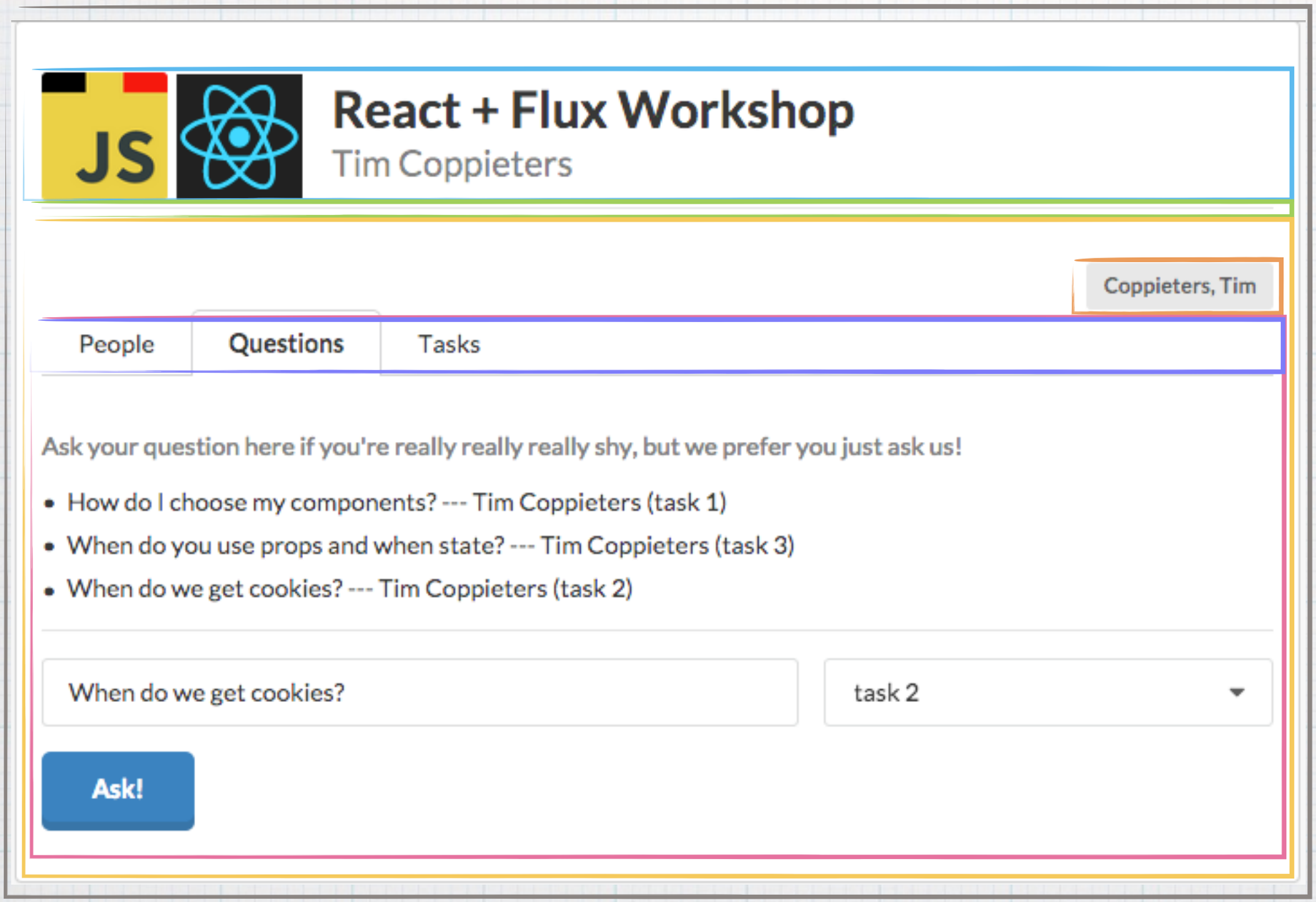
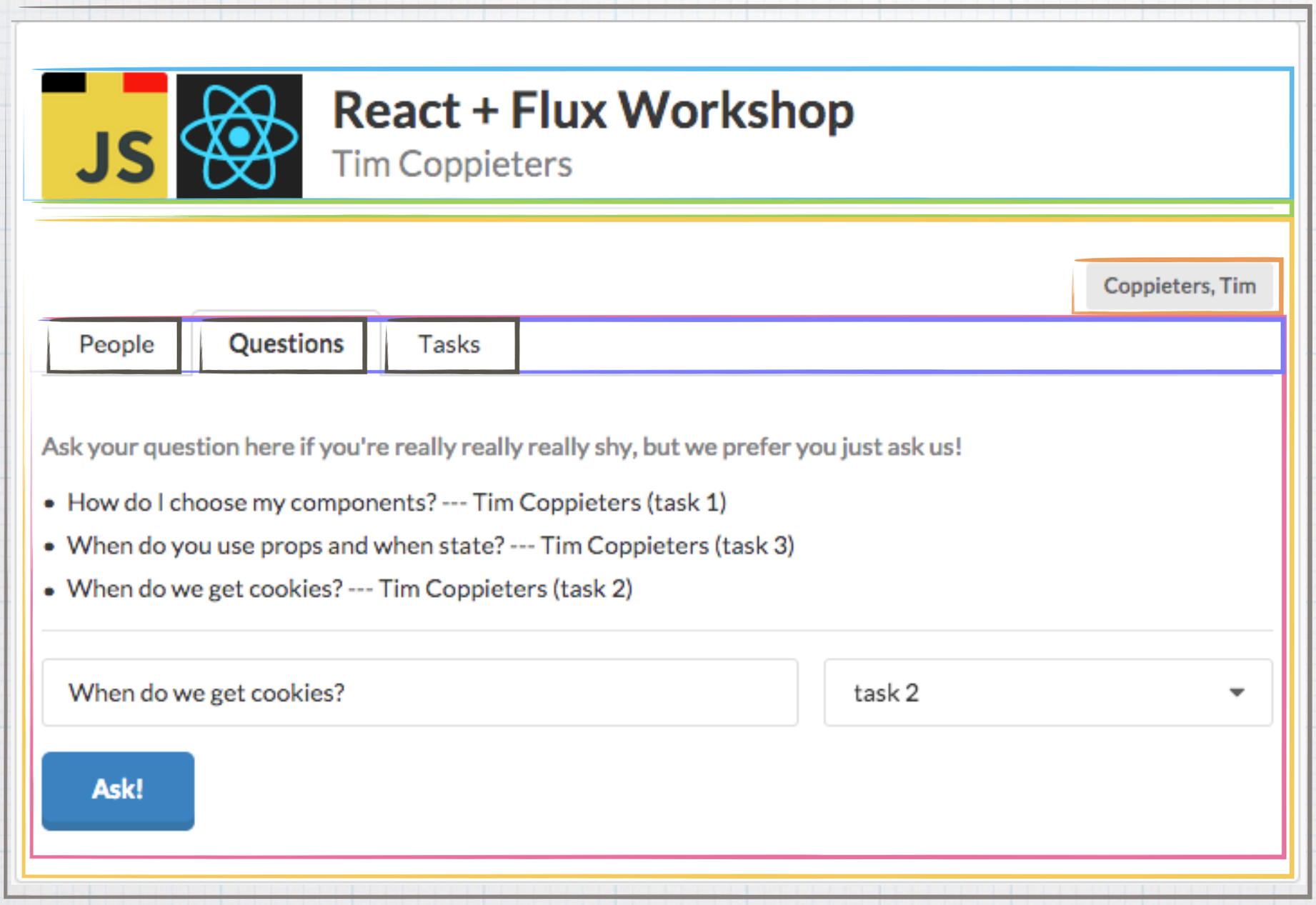
MainContentComp

TabMenuComponent



Components



WorkshopComponent

TitleComponent

DividerComponent

MainComponent

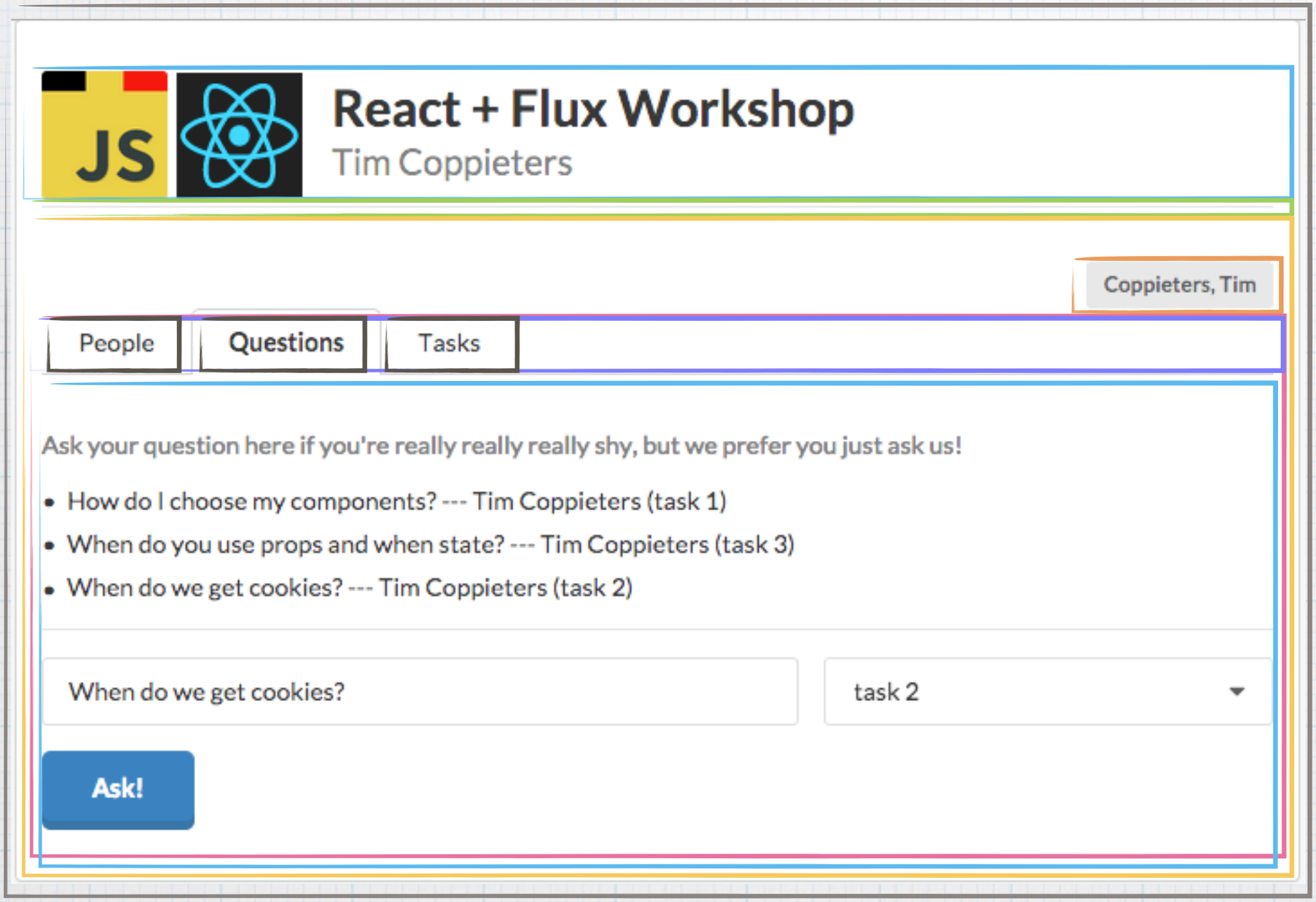
ProfileComponent

MainContentComp

TabMenuComponent

TabMenuItemComp

Components



WorkshopComponent

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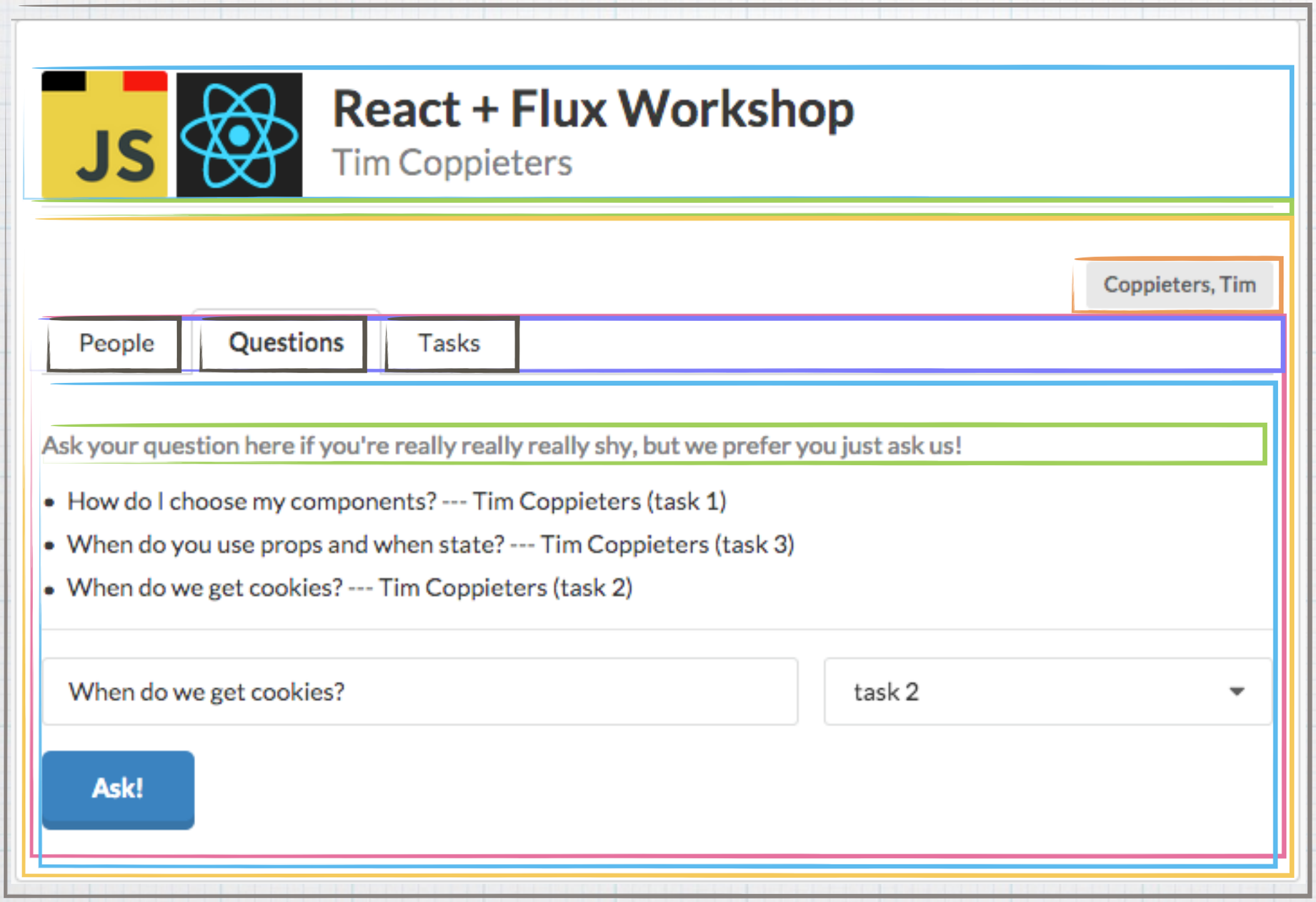
TabMenuComponent

TabMenuItemComp

TabPageComponent

Components



WorkshopComponent

TitleComponent

DividerComponent

MainComponent

ProfileComponent

MainContentComp

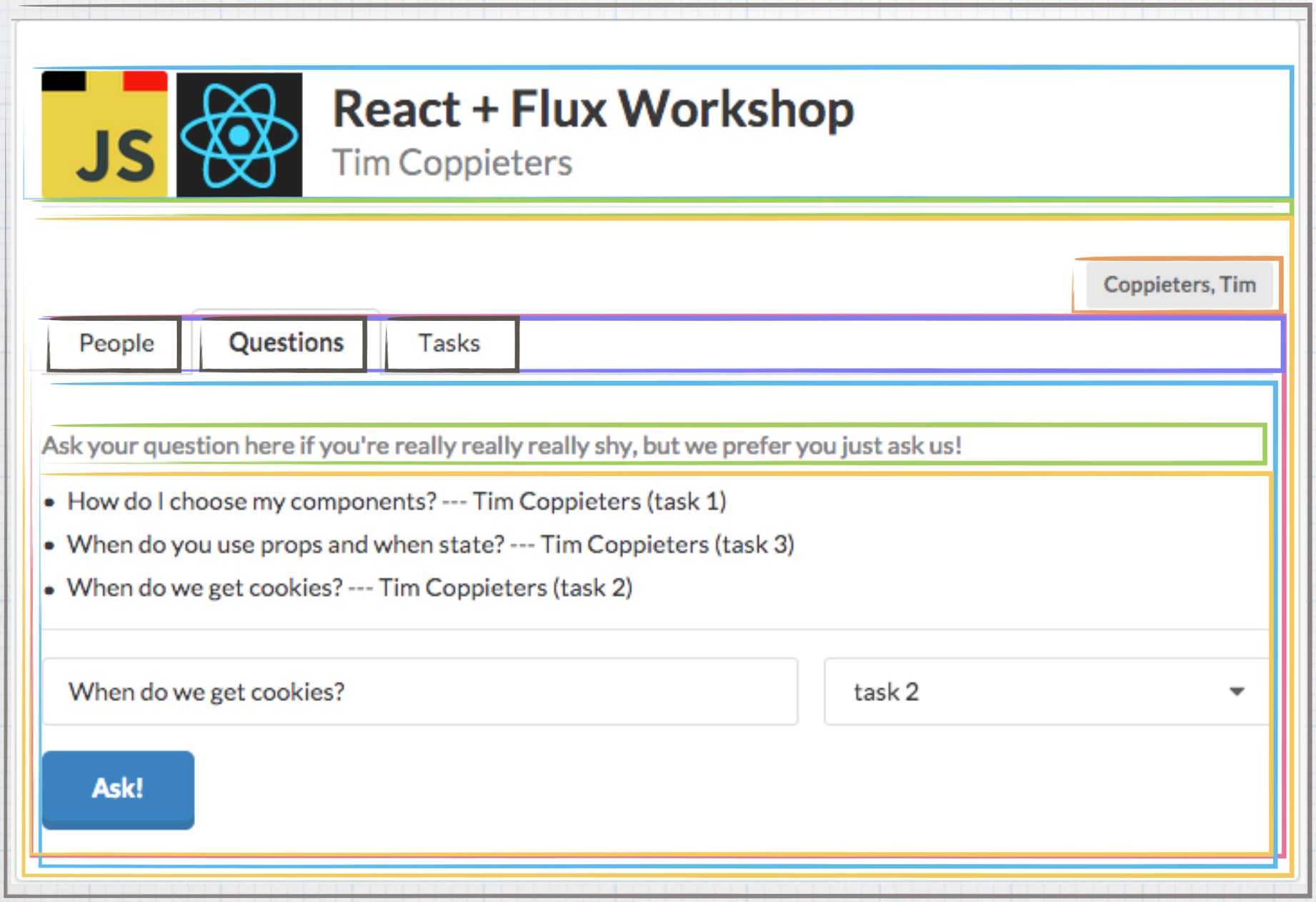
TabMenuComponent

TabMenuItemComp

TabPageComponent

ExplanationComp

Components



WorkshopComponent

TitleComponent

DividerComponent

MainComponent

ProfileComponent

MainContentComp

TabMenuComponent

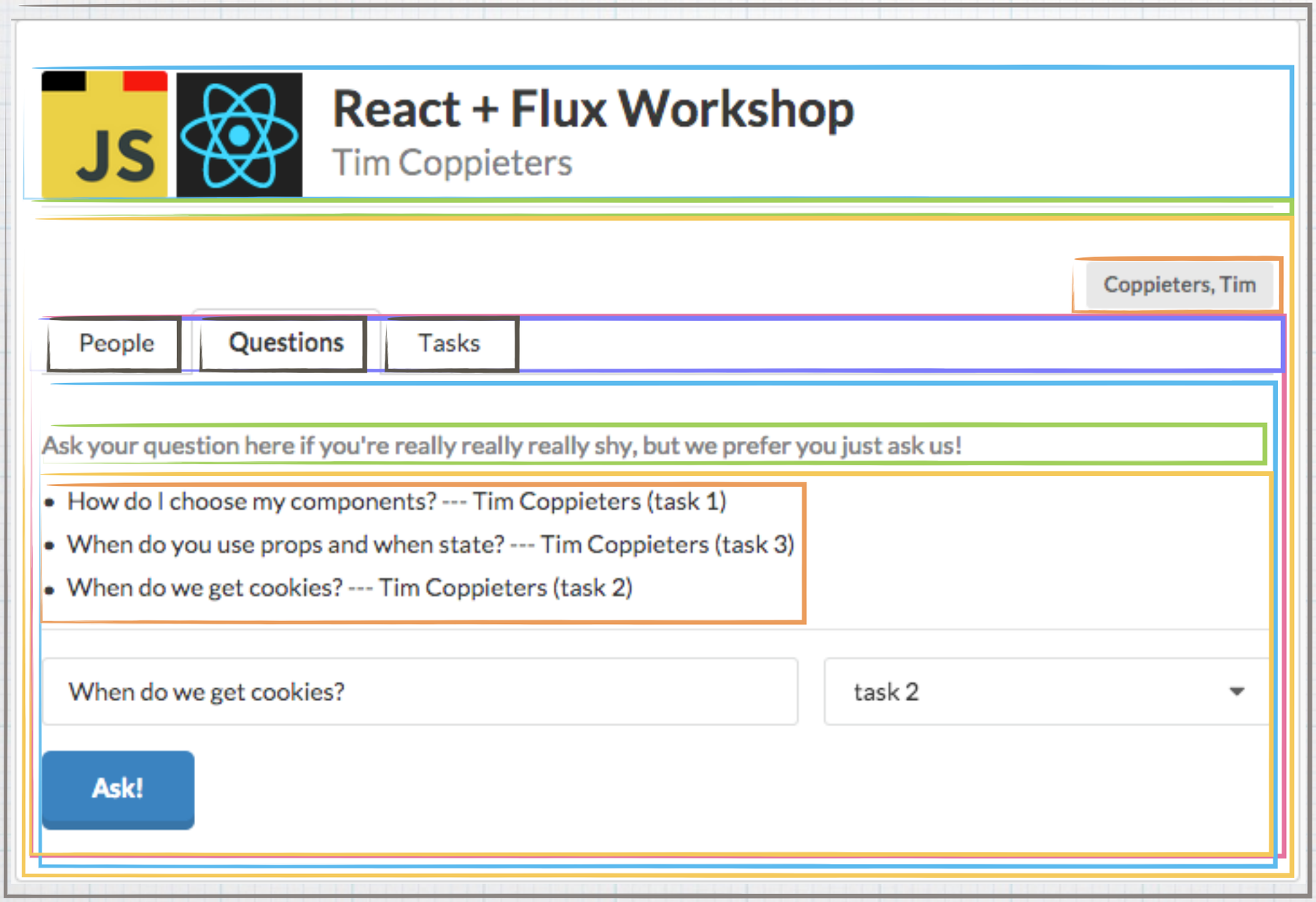
TabMenuItemComp

TabPageComponent

ExplanationComp

QuestionsBox

Components



WorkshopComponent

TitleComponent

DividerComponent

MainComponent

ProfileComponent

MainContentComp

TabMenuComponent

TabMenuItemComp

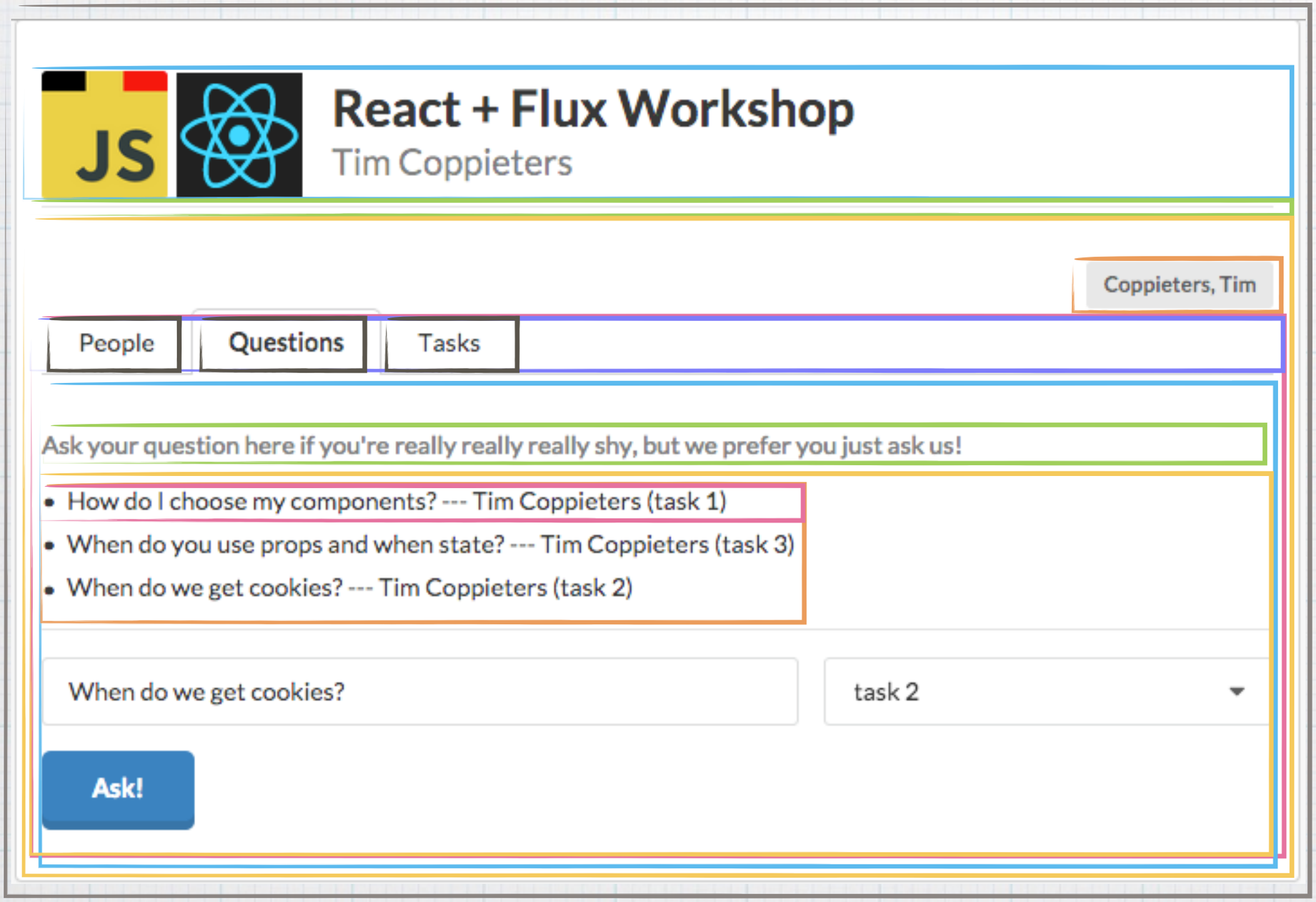
TabPageComponent

ExplanationComp

QuestionsBox

QuestionsList

Components



WorkshopComponent

TitleComponent

DividerComponent

MainComponent

ProfileComponent

MainContentComp

TabMenuComponent

TabMenuItemComp

TabPageComponent

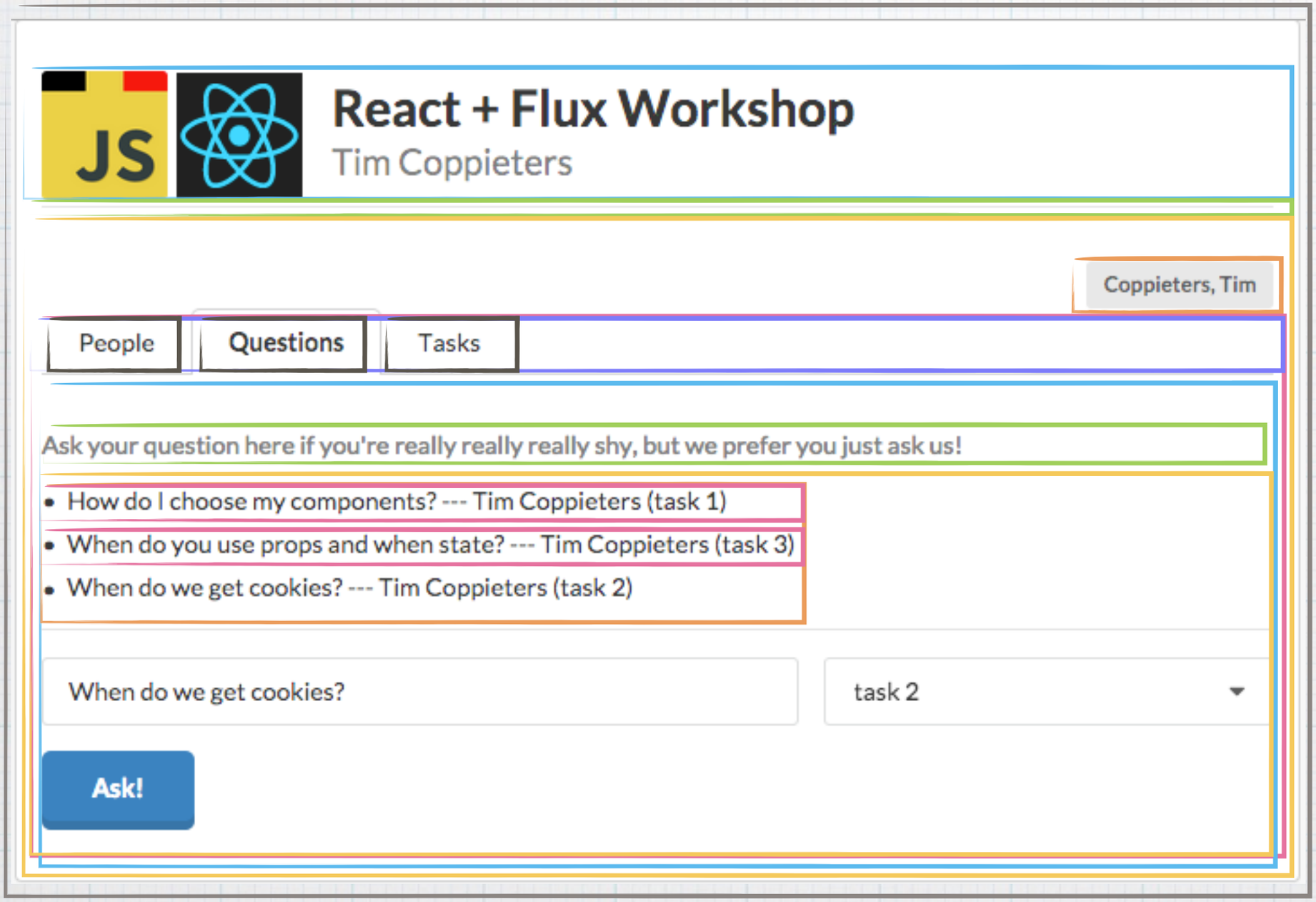
ExplanationComp

QuestionsBox

QuestionsList

QuestionItem

Components



WorkshopComponent

TitleComponent

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MainComponent

ProfileComponent

MainContentComp

TabMenuComponent

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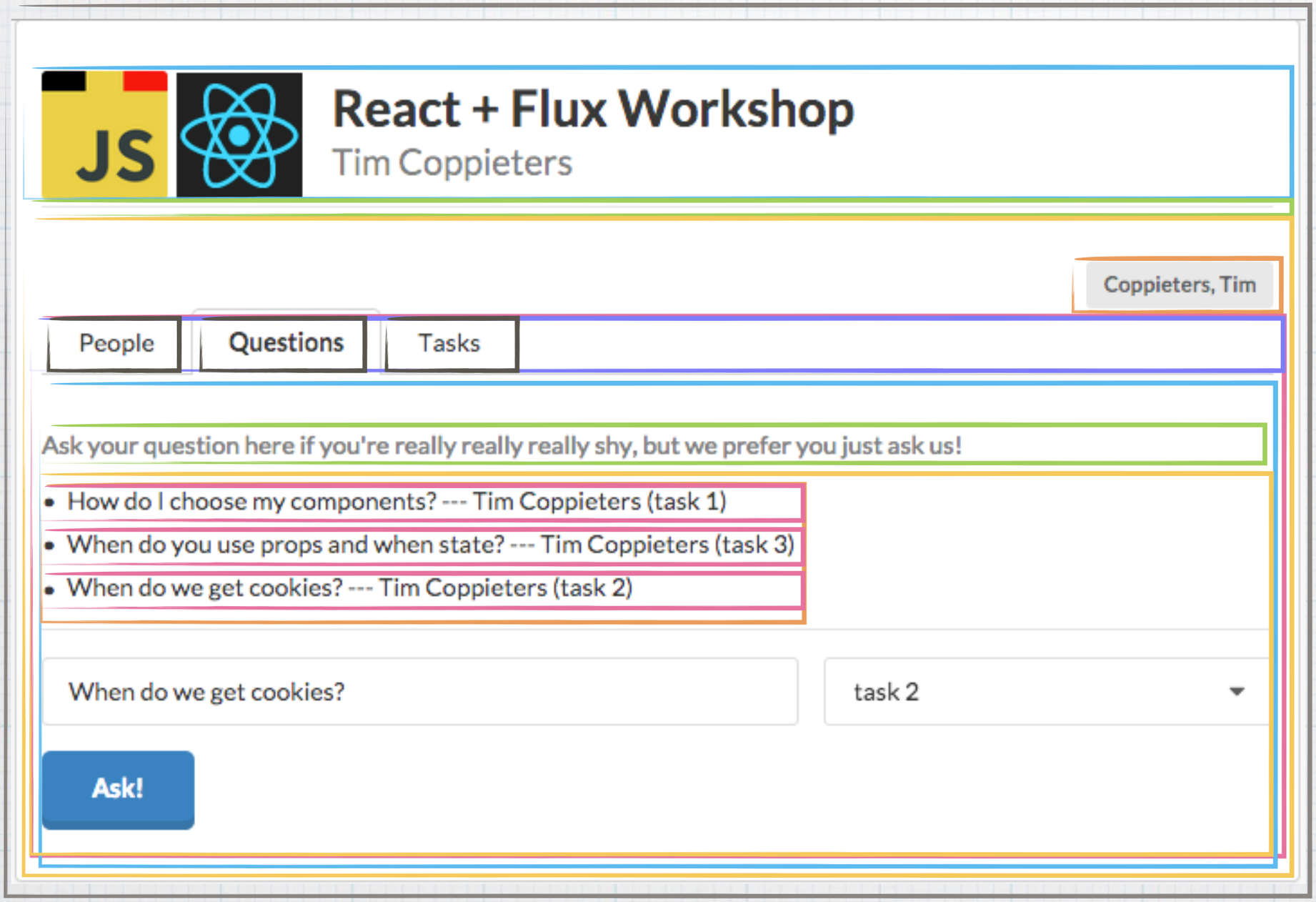
ExplanationComp

QuestionsBox

QuestionsList

QuestionItem

Components



WorkshopComponent

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MainComponent

ProfileComponent

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TabMenuComponent

TabMenuItemComp

TabPageComponent

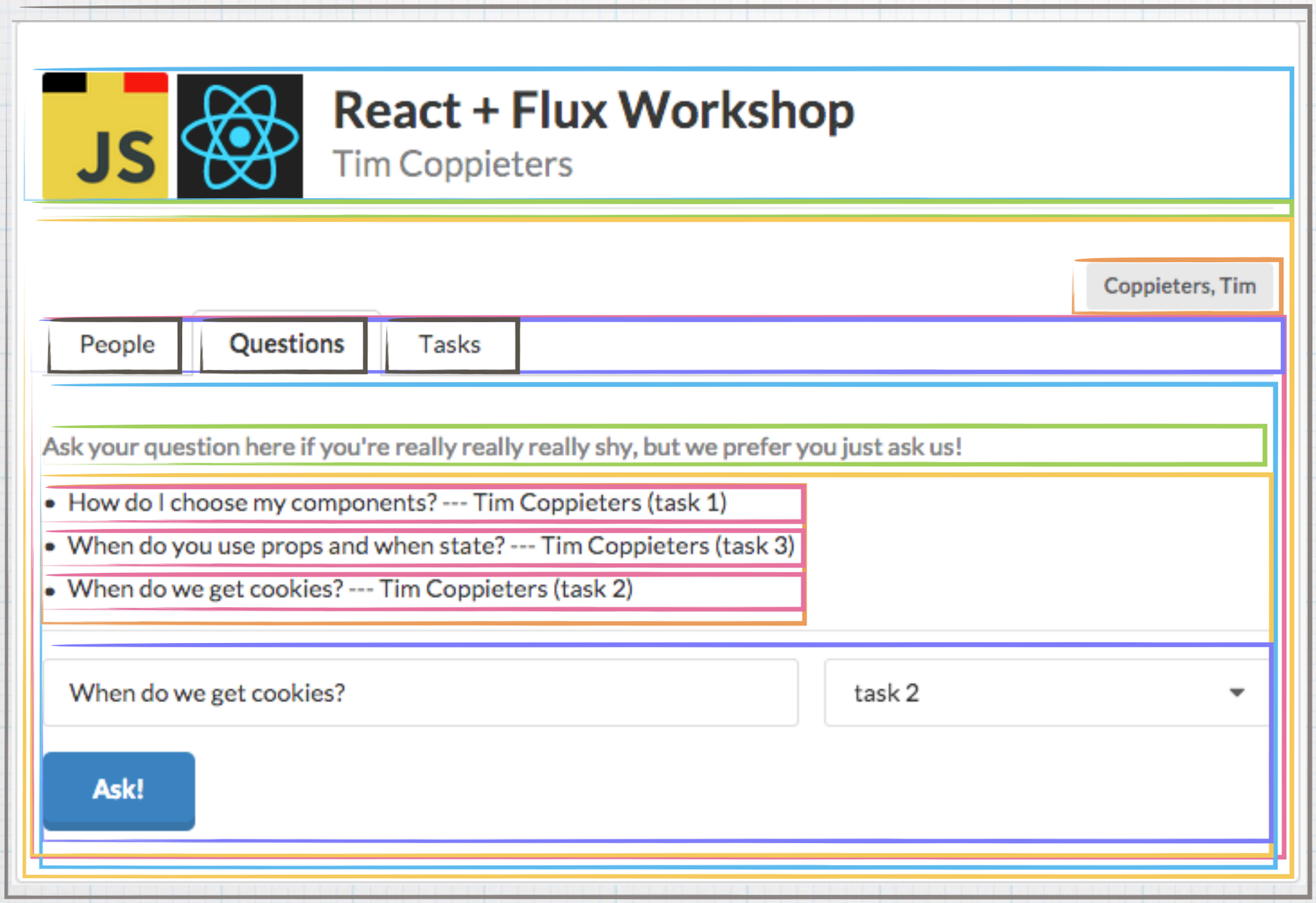
ExplanationComp

QuestionsBox

QuestionsList

QuestionItem

Components



WorkshopComponent

TitleComponent

DividerComponent

MainComponent

ProfileComponent

MainContentComp

TabMenuComponent

TabMenuItemComp

TabPageComponent

ExplanationComp

QuestionsBox

QuestionsList

QuestionItem

QuestionForm

WorkshopComponent

TitleComponent DividerComponent MainComponent

ProfileComponent MainContentComp

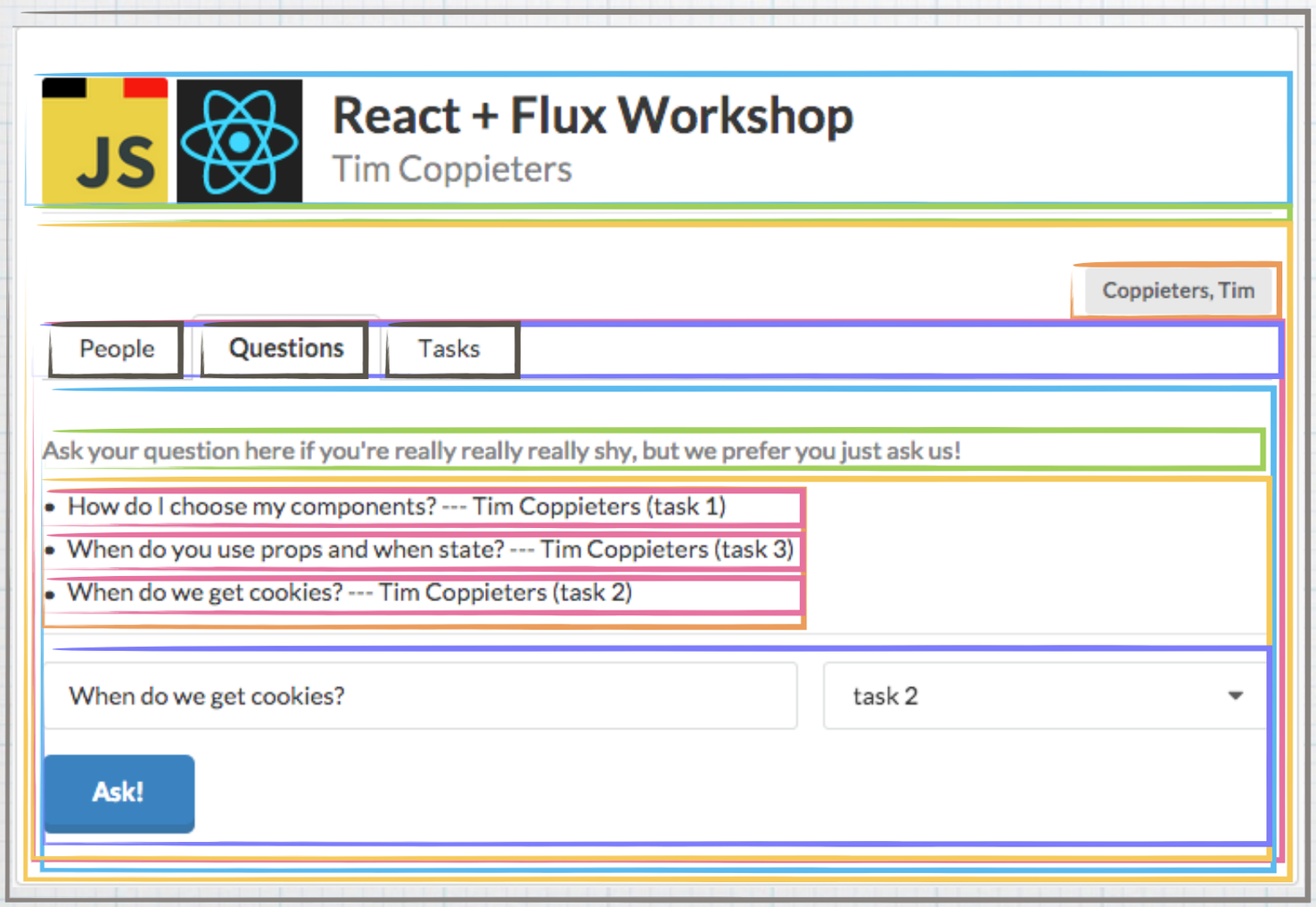
TabMenuComponent TabPageComponent

TabMenuItemComp

ExplanationComp QuestionsBox

QuestionsList QuestionForm

QuestionItem



Components = Composing

```
var WorkshopComponent = React.createClass({
  render: function() {
    return (
      <div id="workshop">
        <TitleComponent title="Workshop" subtitle="JSConfBE" />
        <DividerComponent />
        <MainComponent />
      </div>
    );
  }
});

React.render(<WorkshopComponent />,
                    document.body);
```

```
var TitleComponent = React.createClass({
  render: function() {
    return (
      <div class="title">
        <h1> { this.props.title } </h1>
        <h2> { this.props.subtitle } </h2>
      </div>
    );
  }
});
```

Components = Composing

```
var QuestionsList = React.createClass({
    render: function() {
        var questions = this.props.questions.map(function (question) {
            return <QuestionItem question={question} />;
        };
         return (
            <ul id="questions">
                {questions}
            </ul>
        );
    }
});

React.render(<QuestionsList />, node);
```

```
var QuestionItem = React.createClass({
    render: function() {
        return (
         <li class="question">
             <p> {this.props.question.text} </p>
             <p> {this.props.question.author} </p>
         </li>
        );
    }
});
```

Component Data

props

immutable within the component

use as much as possible

```
var TitleComponent = React.createClass({
  render: function() {
    return (
      <div class="title">
        <h1> { this.props.title } </h1>
        <h2> { this.props.subtitle } </h2>
      </div>
    );
  }
});

React.render(<TitleComponent
                title="foo"
                subtitle={getSubTitle()} />,
              node);
```

Component Data

props

immutable within the component

use as much as possible

state

if you need to respond to changes from user input, server responses...

```
var TitleComponent = React.createClass({
  render: function() {
    return (
      <div class="title">
        <h1> { this.props.title } </h1>
        <h2> { this.props.subtitle } </h2>
      </div>
    );
  }
});

React.render(<TitleComponent
                title="foo"
                subtitle={getSubTitle()} />,
              node);
```

Component Data

props

immutable within the component

use as much as possible

```
var TitleComponent = React.createClass({
  render: function() {
    return (
      <div class=“title”>
        <h1> { this.props.title } </h1>
        <h2> { this.props.subtitle } </h2>
      </div>
    );
  }
});

React.render(<TitleComponent
                title=“foo”
                subtitle={getSubTitle()} />,
              node);
```

state

if you need to respond to changes from user input, server responses...

```
var SwitchButton = React.createClass({
  getInitialState: function () {
     return {on: false}
  },
  handleClick: function () {
    this.setState({on: !this.state.on});
  },
  render: function() {
      var text = this.state.on ? ‘off’ : ‘on’;
      return (
         <button onClick={this.handleClick}>
           turn { text }!
         </button>
      );
  }
});
```

Component Data

props

immutable within the component

use as much as possible

```
var TitleComponent = React.createClass({
  render: function() {
    return (
      <div class=“title”>
        <h1> { this.props.title } </h1>
        <h2> { this.props.subtitle } </h2>
      </div>
    );
  }
});

React.render(<TitleComponent
                title=“foo”
                subtitle={getSubTitle()} />,
              node);
```

state

if you need to respond to changes from user input, server responses...

```
var SwitchButton = React.createClass({
  getInitialState: function () {
     return {on: false}
  },
  handleClick: function () {
     this.setState({on: !this.state.on});
  },
  render: function() {
      var text = this.state.on ? ‘off’ : ‘on’;
      return (
         <button onClick={this.handleClick}>
           turn { text }!
         </button>
      );
  }
});
```

Component Data

props

immutable within the component

use as much as possible

```
var TitleComponent = React.createClass({
  render: function() {
    return (
      <div class="title">
        <h1> { this.props.title } </h1>
        <h2> { this.props.subtitle } </h2>
      </div>
    );
  }
});

React.render(<TitleComponent
                title="foo"
                subtitle={getSubTitle()} />,
              node);
```

state

if you need to respond to changes from user input, server responses...

```
var SwitchButton = React.createClass({
  getInitialState: function () {
     return {on: false}
  },
  handleClick: function () {
     this.setState({on: !this.state.on});
  },
  render: function() {
      var text = this.state.on ? 'off' : 'on';
      return (
         <button onClick={this.handleClick}>
           turn { text }!
         </button>
      );
  }
});
```

Use State

* It is not passed in from a parent via props.
* It can change over time.
* You cannot compute it based on any other state or props in your component.

Using State

* Data that a component's event handlers may change to trigger a UI update.
* Small and JSON-serializable.
* Minimal possible representation

Using State ✓

* Data that a component's event handlers may change to trigger a UI update.
* Small and JSON-serializable.
* Minimal possible representation

Using State 

* Computed data
* React Components
* Data from props

State in Component

* As many components as possible stateless (props)

* Common pattern: lots of stateless components with a stateful component above that passes state through props

* Put state that is shared between components in a common ancestor

Reconciliation Strategy

* = how react updates the DOM with a new render pass
* Children according to order

Reconciliating State

```
var Kitten = React.createClass({
   getInitialState: function() {
         return {color: ‘pink’};
   },
   handleClick: function () {
         this.setState({color: this.state.color == ‘pink’ ? ‘blue’ : ‘pink’});
   },
   render: function() {
     return (
        <div onClick={this.handleClick}>
            <p> {this.props.kitten.name} </p>
            <p className={this.state.color} />
        </div>
     );
   }
});
```


```
<ul>
      <Kitten kitten={kitten1} />
      <Kitten kitten={kitten2} />
</ul
```

```
<ul>
      <Kitten kitten={kitten2} />
</ul
```

- - - ▸

```
ul.removeChild(1);
ul.children(0).setHtml(“kitten 2”);
```

Reconciliating State

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var Kitten = React.createClass({
   getInitialState: function() {
         return {color: ‘pink’};
   },
   handleClick: function () {
         this.setState({color: this.state.color == ‘pink’ ? ‘blue’ : ‘pink’});
   },
   render: function() {
     return (
        <div onClick={this.handleClick}>
            <p> {this.props.kitten.name} </p>
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        </div>
     );
   }
});
```


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- - - ▸

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        <div onClick={this.handleClick}>
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        </div>
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        <div onClick={this.handleClick}>
            <p> {this.props.kitten.name} </p>
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        </div>
     );
   }
});
```


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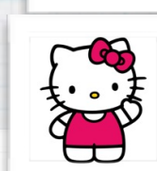
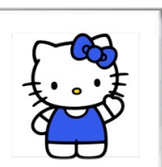
  },
  render: function() {
    return (
      <div onClick={this.handleClick}>
          <p> {this.props.kitten.name} </p>
          <p className={this.state.color} />
      </div>
    );
  }
});
```





```
<ul>
    <Kitten key={kitten1.name} kitten={kitten1} />
    <Kitten key={kitten2.name} kitten={kitten2} />
</ul
```

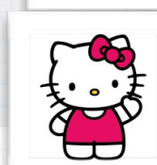
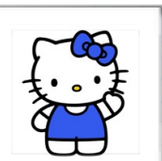
```
<ul>
    <Kitten key={kitten2.name} kitten={kitten2} />
</ul
```

- - - ▸

```
ul.removeChild(0);
```

Reconciliating State

```
var Kitten = React.createClass({
   getInitialState: function() {
         return {color: ‘pink’};
   },
   handleClick: function () {
         this.setState({color: this.state.color == ‘pink’ ? ‘blue’ : ‘pink’});
   },
   render: function() {
     return (
        <div onClick={this.handleClick}>
            <p> {this.props.kitten.name} </p>
            <p className={this.state.color} />
        </div>
     );
   }
});
```

```
<ul>
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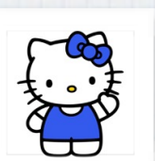
</ul
```

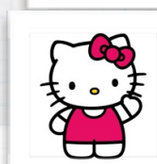


```
<ul>
      <Kitten key={kitten2.name} kitten={kitten2} />
</ul
```

- - - ▸ `ul.removeChild(0);`

Reconciliating State

```
var Kitten = React.createClass({
   getInitialState: function() {
         return {color: ‘pink’};
   },
   handleClick: function () {
         this.setState({color: this.state.color == ‘pink’ ? ‘blue’ : ‘pink’});
   },
   render: function() {
     return (
        <div onClick={this.handleClick}>
            <p> {this.props.kitten.name} </p>
            <p className={this.state.color} />
        </div>
     );
   }
});
```

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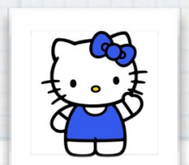

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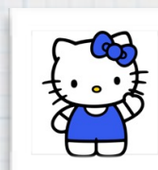
```

ul.removeChild(0);



Reconciliating State

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   },
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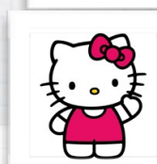
     return (
        <div onClick={this.handleClick}>
            <p> {this.props.kitten.name} </p>
            <p className={this.state.color} />
        </div>
     );
   }
});
```

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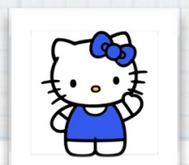

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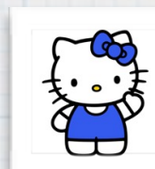


ul.removeChild(0);

Component API

```
var Box = React.createClass({
   getInitialState: function() {
         return {foo: 1, bar: 2};
   },
   doSomething: function () {
         this.setState({foo: 10});
   }
});
```

```
var Box = React.createClass({
   getInitialState: function() {
         return {...};
   },
   getDefaultProps: function() {
         return {...};
   },
   componentDidMount: function () {
   },
   componentWillUnmount: function () {
   },
   render: function() {
        return ( ... );
   }
});
```

Merges with provided props

After DOM is removed

After DOM is generated

e.g. when this Component is owned
by another component
and it no longer generates this component.

Component & DOM

```
var Box = React.createClass({
  componentDidMount: function () {
        var node = this.getDOMNode();
        React.findDOMNode(this);
  },
  submitForm: function () {
        var name = React.findDOMNode(this.refs.name).value;
        var color = React.findDOMNode(this.refs.color).value;
  },
  render: function() {
      return (
          <form onSubmit={this.submitForm}>
            <input ref="name" />
            <input ref="color" />
            <input type="submit" value="submit"/>
          </form>
        );
  }
});
```

Prop Validation

```
var KittenBox = React.createClass({
   propTypes: {
         name: React.PropTypes.string.isRequired,
         color: React.PropTypes.string
   },
   getDefaultProps: {
         return {color: ‘pink’};
   },
   render: function() {
       return (
           <div>
               <div> {this.props.name} </div>
               <div> {this.props.color} </div>
           </div>
       );
   }
});
```

optional

provide default

Prop Validation

```
function Kitten(name, color) {
      this.name = name;
      this.color = color;
}
```

```
var KittenBox = React.createClass({
   propTypes: {
         kitten: React.PropTypes.instanceOf(Kitten).isRequired
   },
   render: function() {
        return (
            <div>
                 <div> {this.props.kitten.name} </div>
                 <div> {this.props.kitten.color} </div>
            </div>
         );
   }
});
```

And many more

http://facebook.github.io/react/docs/reusable-components.html

More...

two-way data binding

className manipulation

* Addons

* Server-Side Rendering

```
var body = React.renderToString(WorkshopComponent(props));
```

http://facebook.github.io/react/docs/addons.html

React vs other MV(C)s

* Just a rendering library
  vs Full-fledged frameworks
* Full JavaScript expressiveness for rendering
  vs Restrictive GUI Constructs (e.g. ng-repeat)
* Virtual DOM Comparison
  vs Explicit Linking
* Overall Relatively Fast and memory efficient.
* Server-Side Rendering

Enough React already, what about Flux?

Flux = Design pattern that eschews MVC over a uni-directional data flow.

Case: KittenModel

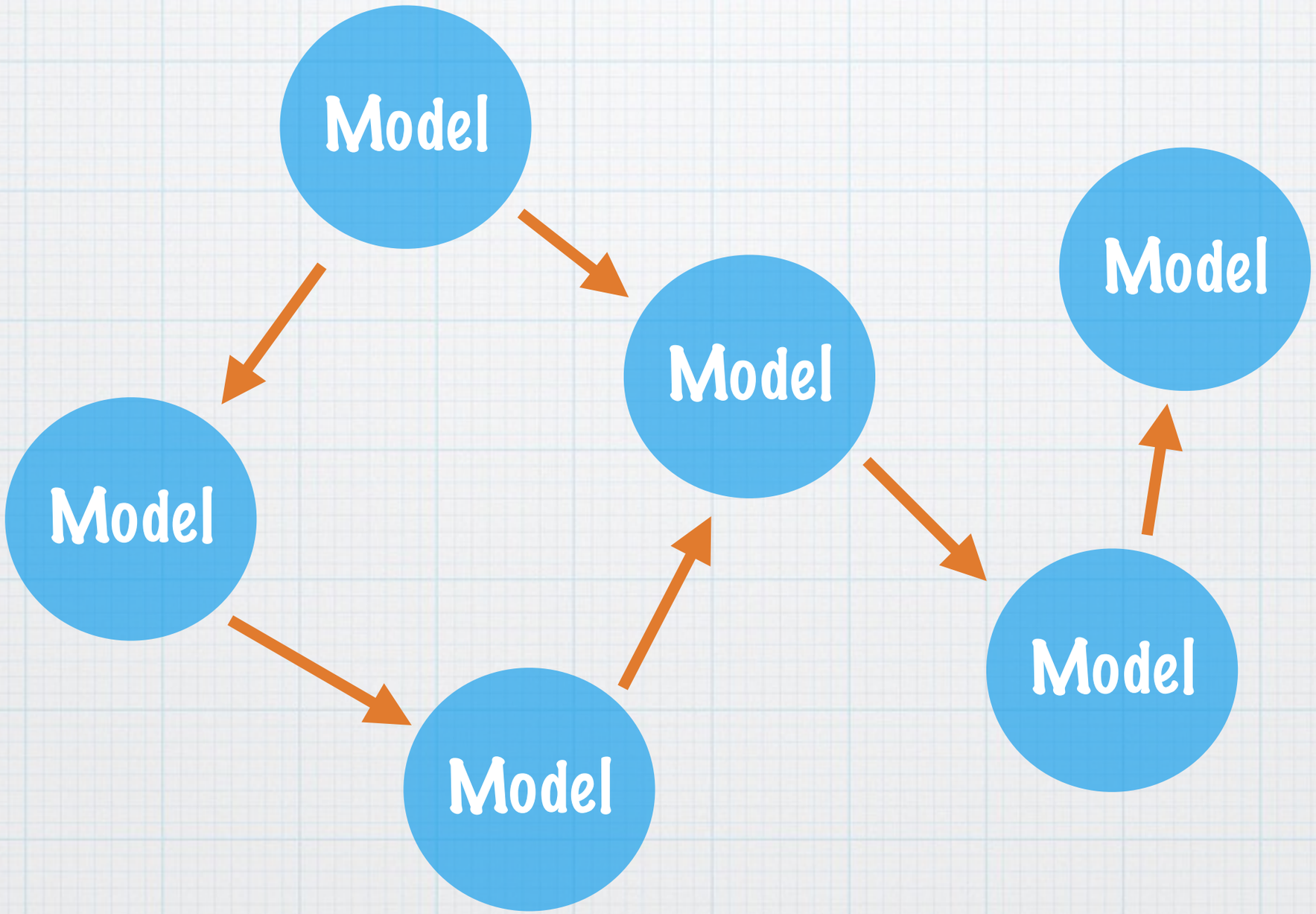
which user actions can change my kitten's color?

```
function KittenModel(name, color) {
	this.name = name;
	this.color = color;
}
KittenModel.prototype.updateColor = function (color) {
	this.color = color;
}
```

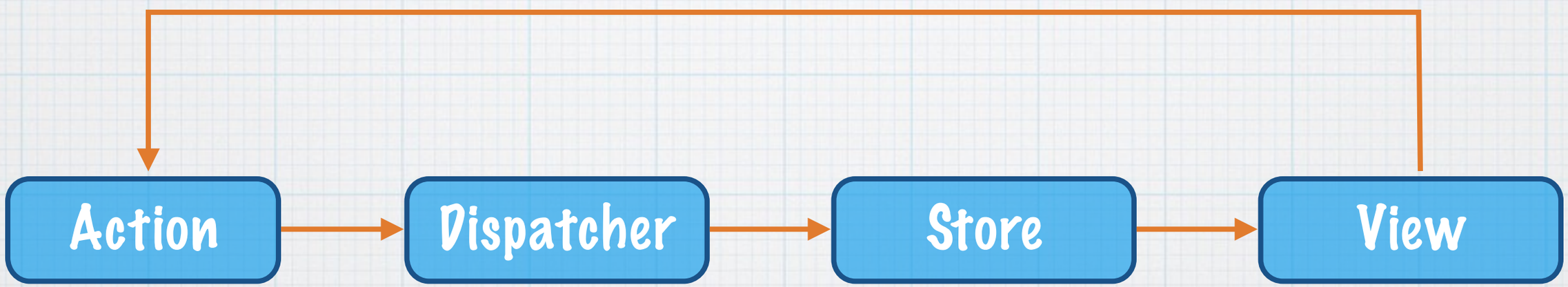
In MVC, you have to go and look at all of your controllers

The M in MVC is not self-contained

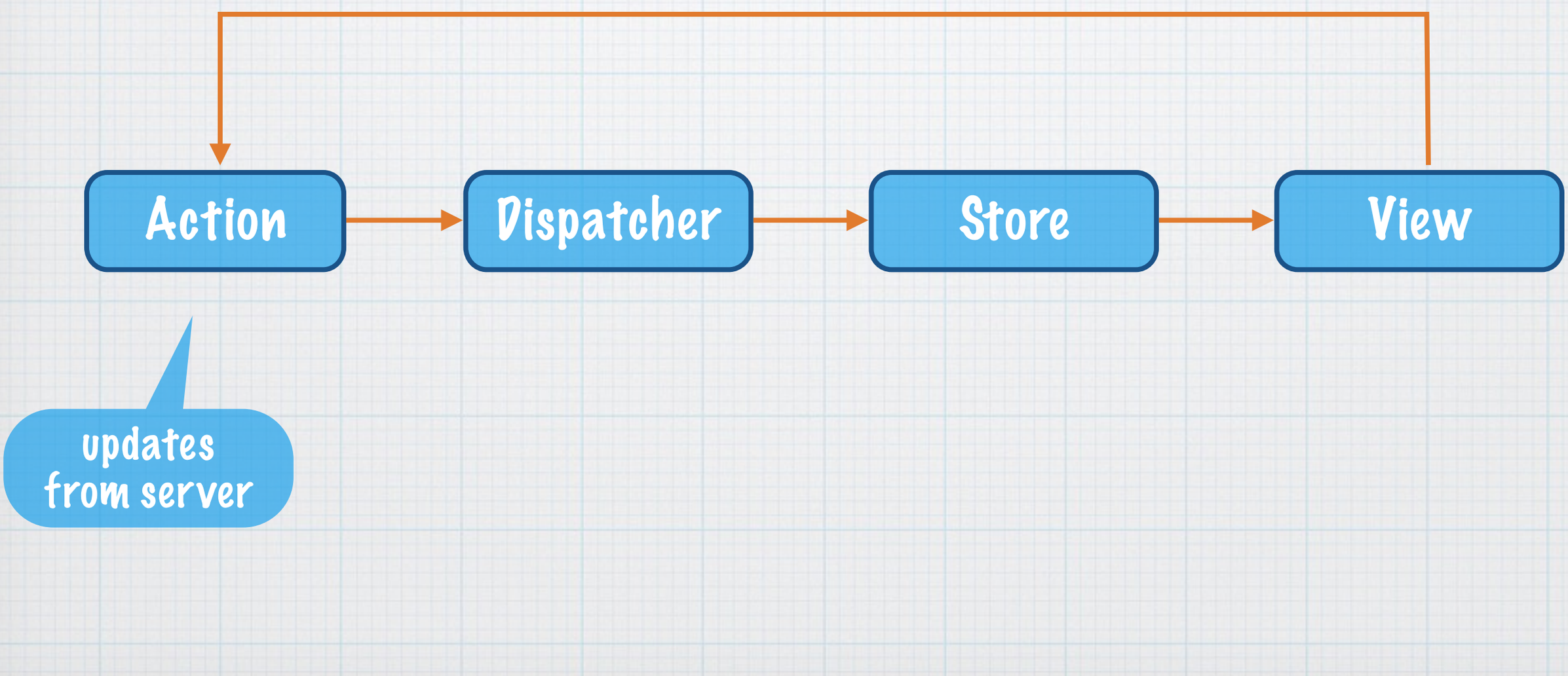
Dependencies of Models



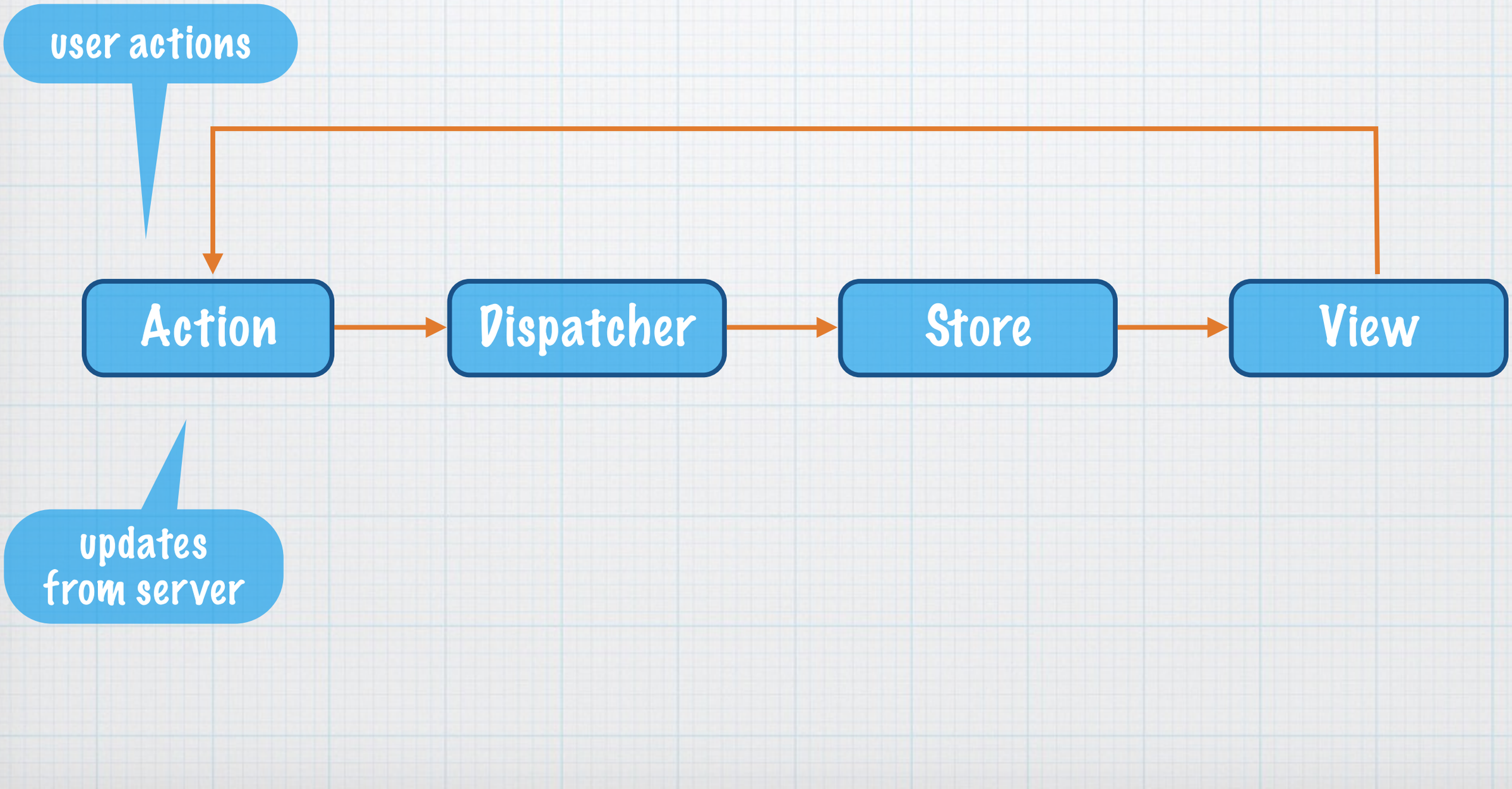
Flux: uni-directional data flow



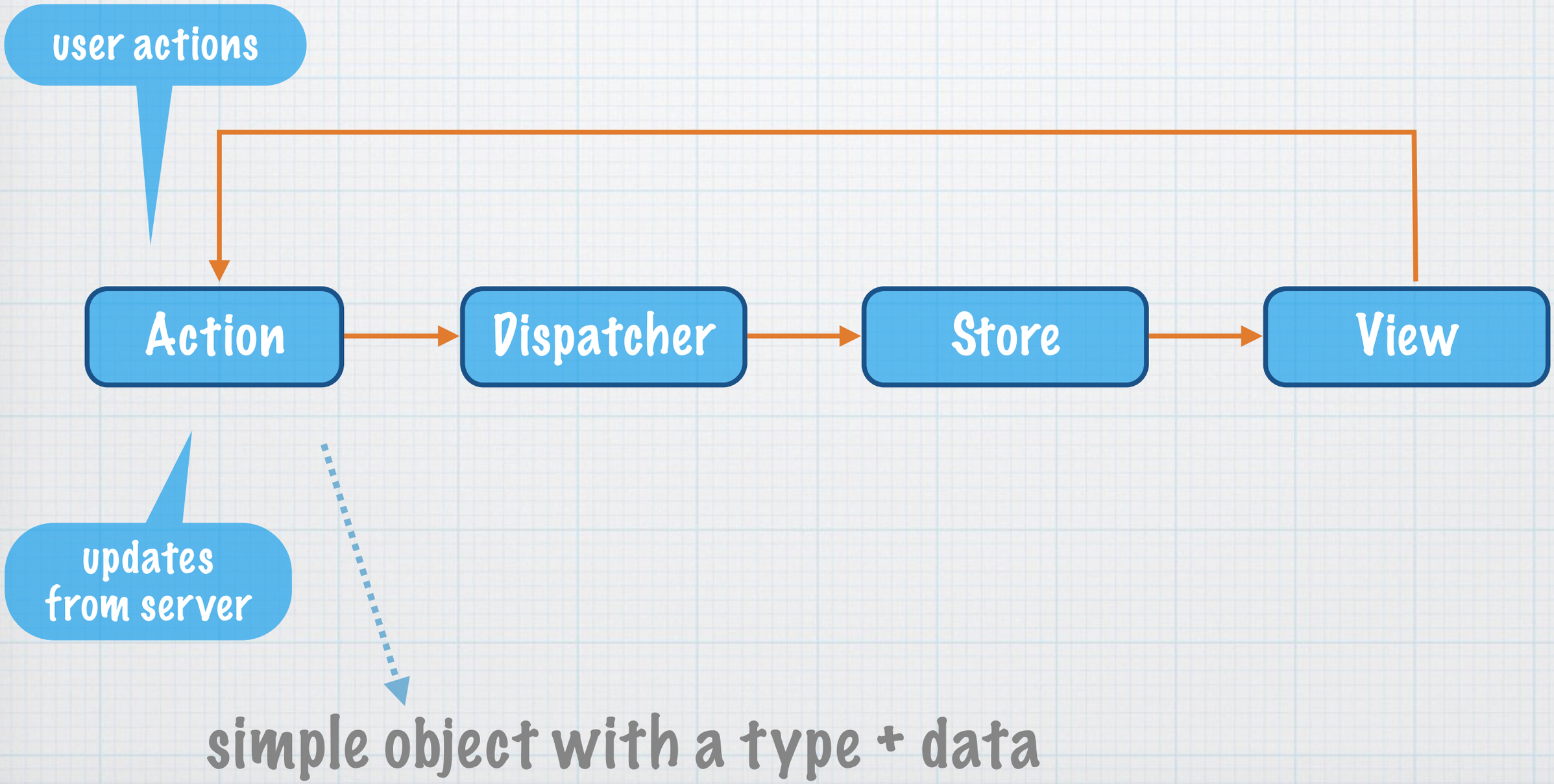
Flux: uni-directional data flow



Flux: uni-directional data flow

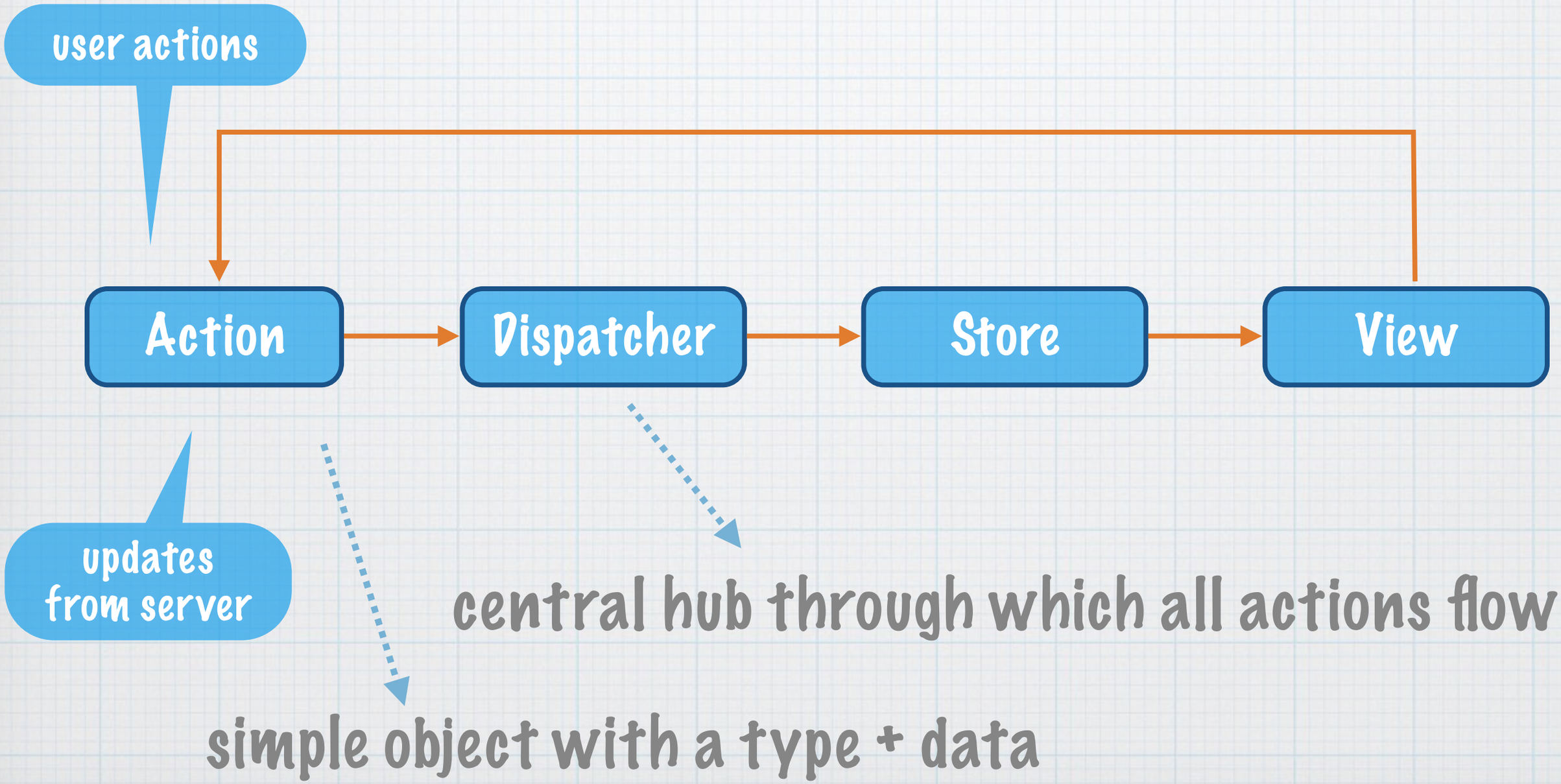


Flux: uni-directional data flow



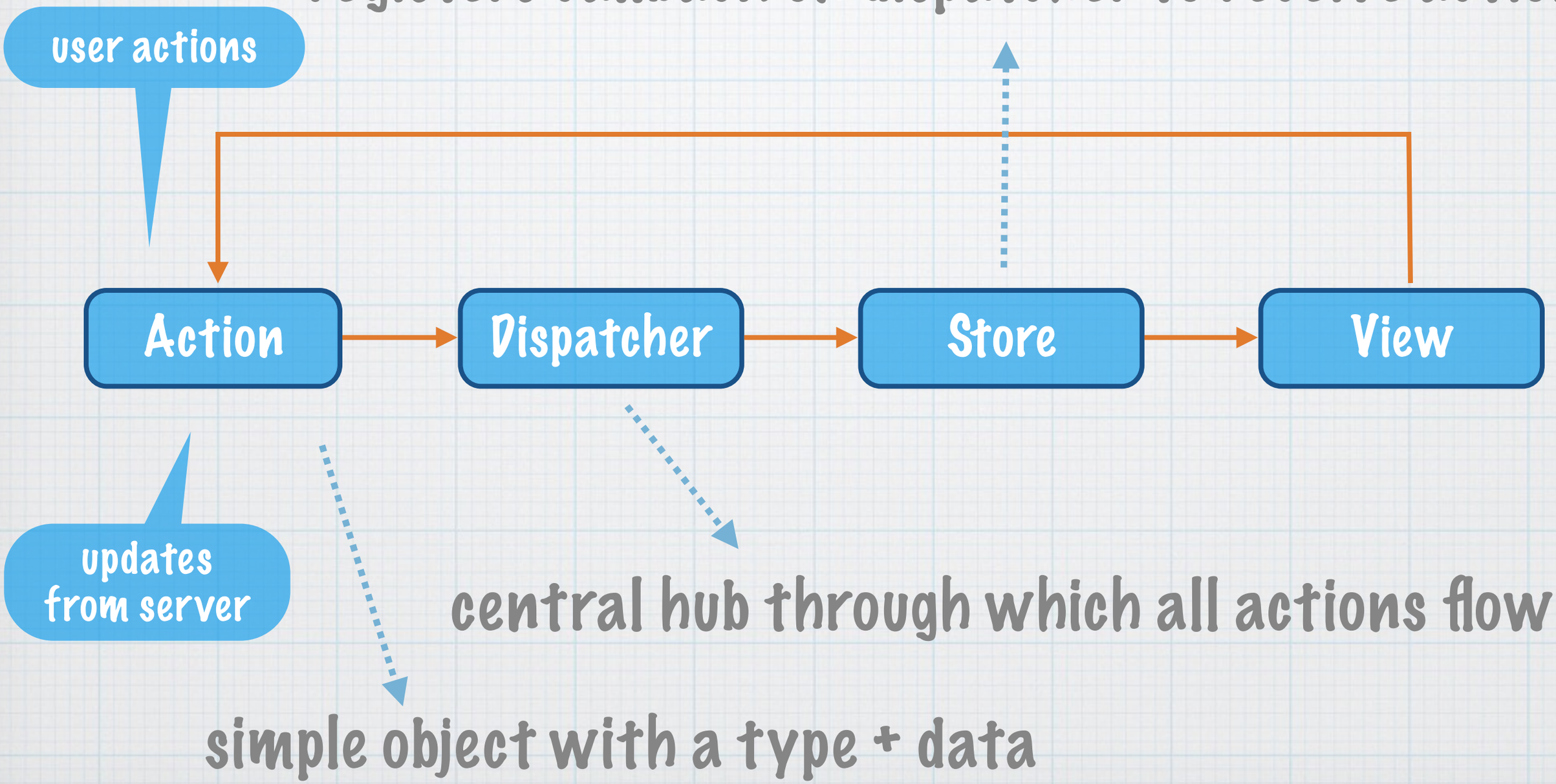
simple object with a type + data

Flux: uni-directional data flow



Flux: uni-directional data flow

registers callback on dispatcher to receive actions

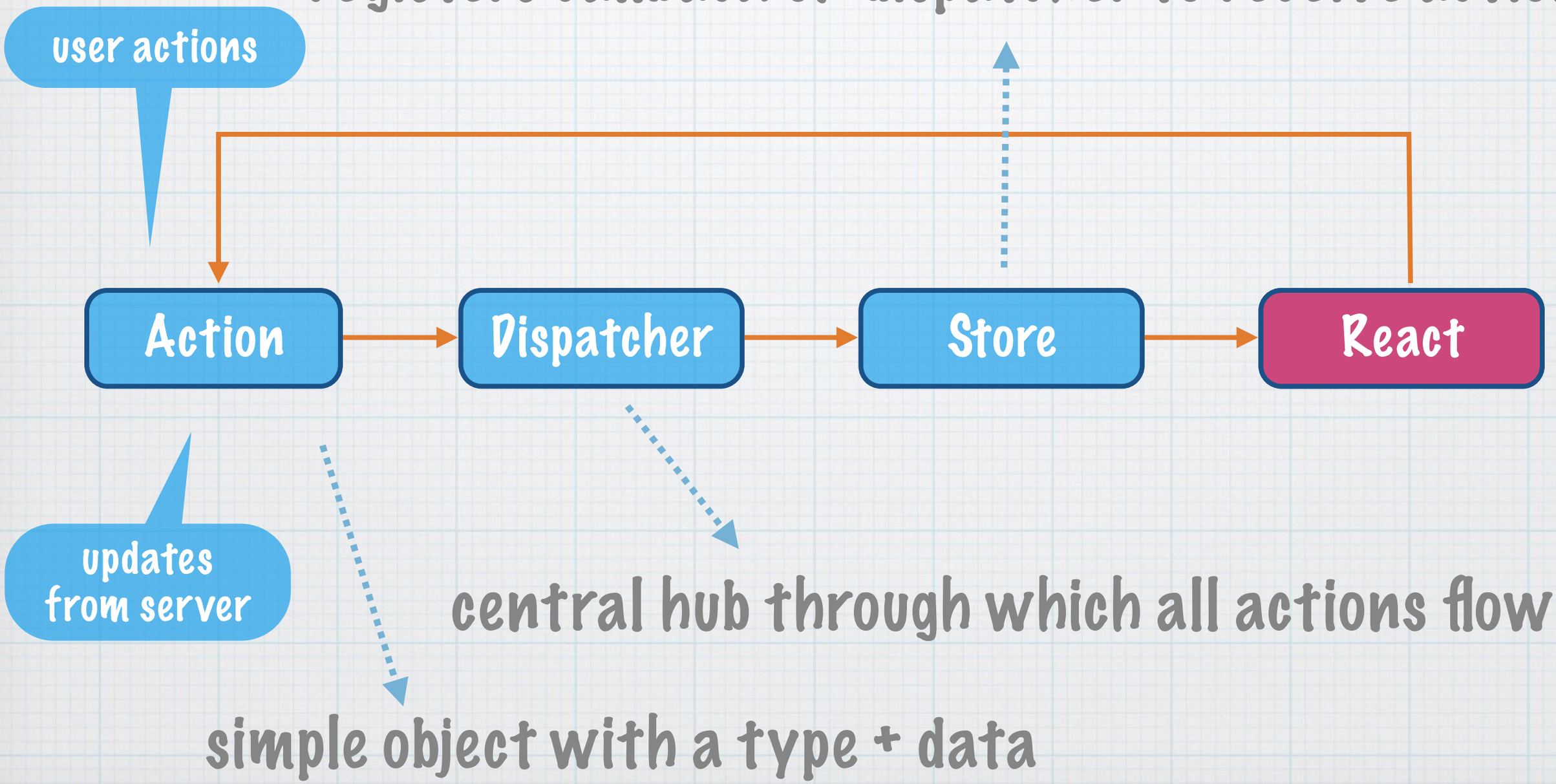


central hub through which all actions flow

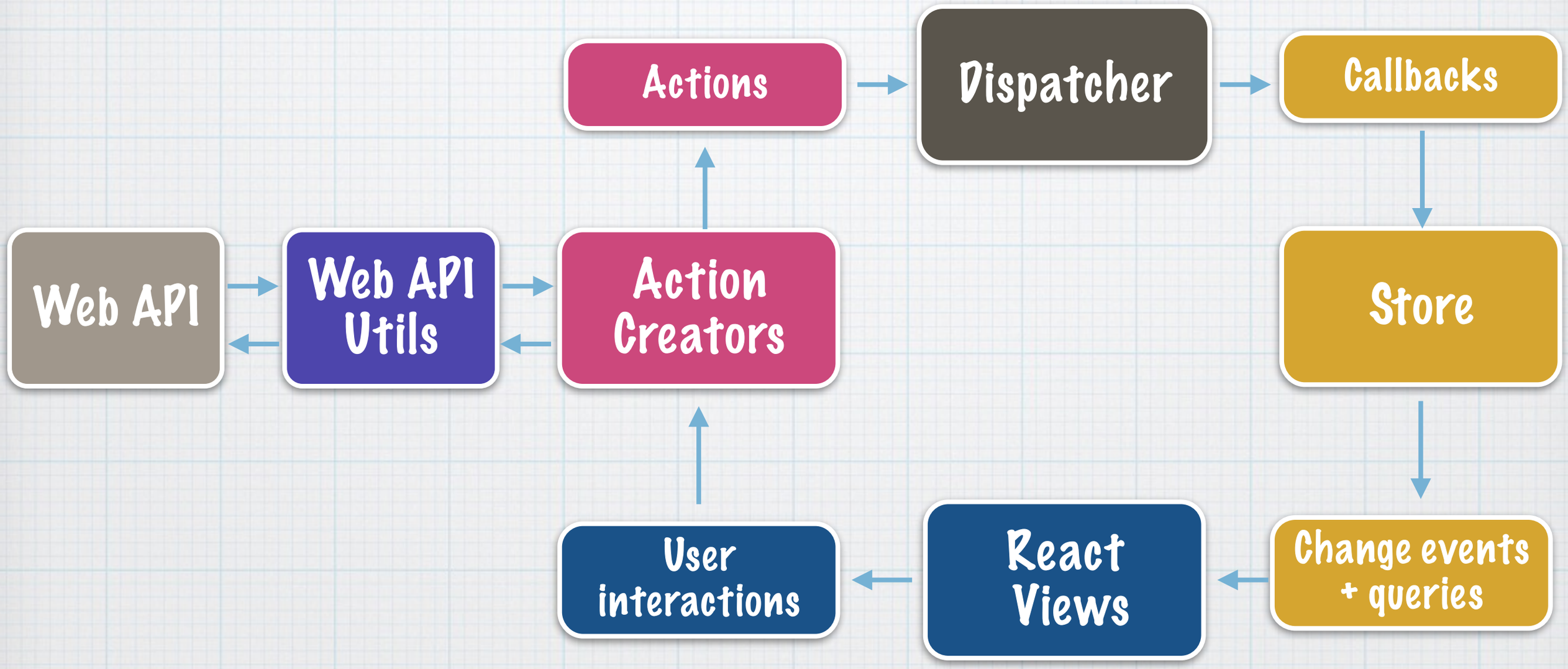
simple object with a type + data

Flux: uni-directional data flow

registers callback on dispatcher to receive actions

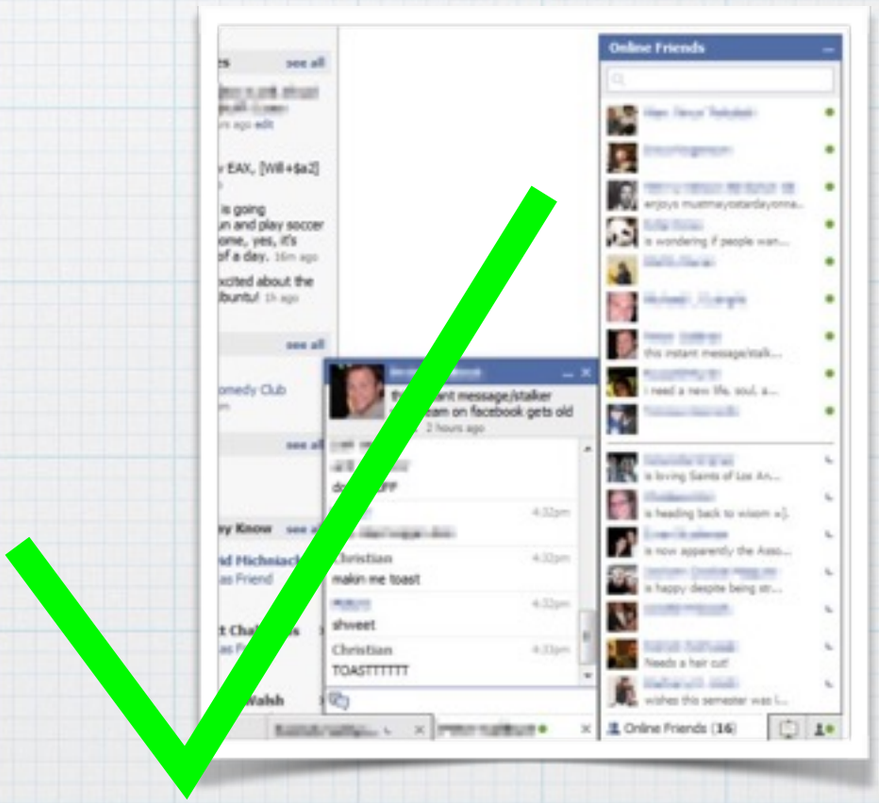


Flux: uni-directional data flow



When?

"Large applications with data that (frequently) changes over time"



Stores

in MVC the controller does the correct propagation

* Store contains data + logic about a certain **domain**. They can manage multiple "records", so not always like models.
* Accepts updates and appropriately reconciles them = **inversion of control**
* All **update patterns are internal** to the store, nobody knows about it.
* **No external update methods** like "setColor(color)", only the callback registered to dispatcher.

Flux Pattern Implementation

* Stores -> EventEmitter
* Views -> React
* Action -> just an object
* Action Creators -> Lib of functions
* Web API (utils) -> Lib of functions
* Dispatcher -> require('flux').Dispatcher

File Structure

- actions
  - KittenActionCreators.js
- components
  - KittenApp.js
  - Header.js
  - Footer.js
  - KittenList.js
- constants
  - AppConstants.js
- dispatcher
  - AppDispatcher.js
- stores
  - KittenStore.js
- utils
  - KittenWebAPI.js
  - KittenWebUtils.js
- app.js

Intermezzo

foo.js

```
var private = 42;
function privateFunction() { … }
module.exports = {
        exportedFunction: function () { privateFunction(); }
};
```

bar.js

```
var foo = require('./foo.js');
foo.exportedFunction()
```

* node.js require module system
* browserify

```
> browserify src/app.js public/bundle.js
```

utils/KittenWebAPIUtils.js

```
socket.on('kitten:new', function (kitten) {
    KittenActionCreators.receiveKitten(kitten);
});
```

AppDispatcher.js

```
var Dispatcher = require('flux').Dispatcher;

module.exports = new Dispatcher();
```

actions/KittenActionCreators.js

```
module.exports = {
    receiveKitten: function (kitten) {
        AppDispatcher.dispatch({
            type: ActionTypes.RECEIVE_RAW_KITTEN,
            rawKitten: kitten
        });
    }
};
```

utils/KittenWebUtils.js

```
module.exports = {
    convertRawKitten: function (rawKitten) {
        return {
            name: rawKitten.name,
            color : rawKitten.color,
            DateOfBirth: new Date(rawKitten.DateOfBirth)
        };
    };
};
```

constants/AppConstants.js

```
module.exports = {
    ActionTypes: {
        RECEIVE_RAW_KITTEN: "RECEIVE_RAW_KITTEN"
    }
};
```

stores/KittenStore.js

```
var assign          = require('object-assign');
var EventEmitter    = require('events').EventEmitter;
var utils           = require('../utils/KittenWebUtils');
var AppDispatcher = require('../dispatcher/AppDispatcher');
var ActionTypes     = require('../constants/AppConstants').ActionTypes;

var kittens = [];
var CHANGE_EVENT = 'change';

function _addRawKitten(rawKitten) {
    kittens.push(utils.convertRawKitten(kitten));
}

var KittenStore = assign({}, EventEmitter.prototype, {
    ...
    getAll: function () {
        return kittens;
    },
    getSortedByDateOfBirth: function () {
        return kittens.sortBy(function (kitten) { return kitten.DateOfBirth; });
    }
});

KittenStore.dispatchToken = AppDispatcher.register(function (action) {
    switch(action.type) {
        case ActionTypes.RECEIVE_RAW_KITTEN:
            _addRawKitten(action.rawKitten);
            KittenStore.emitChange();
            break;
    }
});
module.exports = KittenStore;
```

```
var KittenStore = ... {
    emitChange: function () {
        this.emit(CHANGE_EVENT);
    },
    addChangeListener: function (cb) {
        this.on(CHANGE_EVENT, cb);
    },
    removeChangeListener: function (cb) {
        this.remove(CHANGE_EVENT, cb);
    }
}
```

components/KittenList.js

```
var KittensBox = React.create({
    getInitialState: function () {
        return {kittens: KittenStore.getSortedByDateOfBirth()};
    },
    componentDidMount: function () {
        KittenStore.addChangeListener(this._onChange);
    },
    componentDidUnmount: function () {
        KittenStore.removeChangeListener(this._onChange);
    },
    _onChange: function () {
        this.setState({kittens: KittenStore.getSortedByDateOfBirth()});
    },
    render: function () {
        return (
            <div id="kittens">
                <h1> These are my kittens </h1>
                <KittenList kittens={this.state.kittens} />
            </div>
        );
    }
});
```

Dispatch: WaitFor*

```
KittenStore.dispatchToken = AppDispatcher.register(function (action) {
    switch(action.type) {
        case ActionTypes.RECEIVE_RAW_KITTEN:
            AppDispatcher.waitFor(PawStore.dispatchToken);
            _addRawKitten(action.rawKitten);
            KittenStore.emitChange();
            break;
    }
});
module.exports = KittenStore;
```

To work!

* https://github.com/ticup/jsconfbe2015

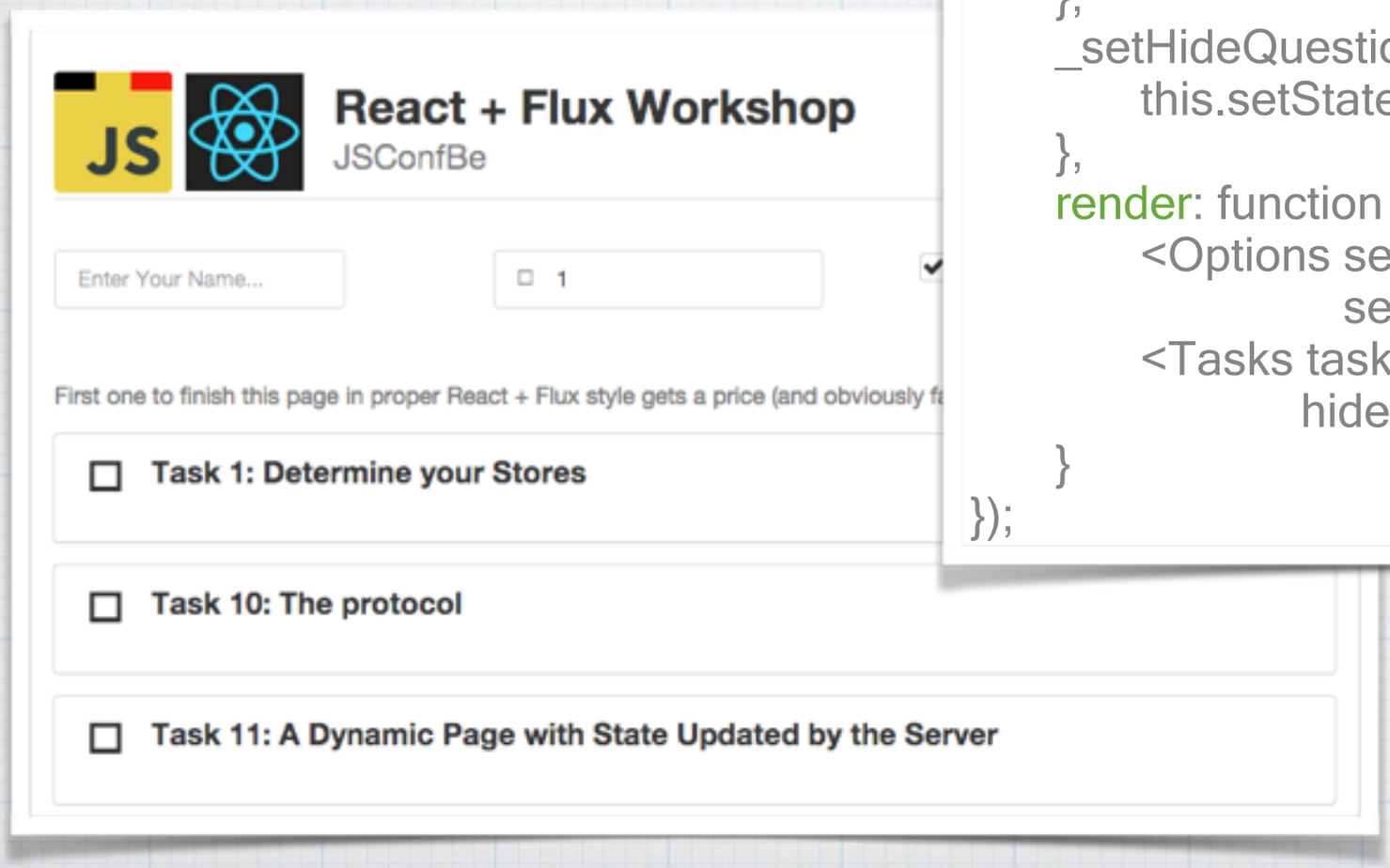
Common Component Problems

* attributes: "class" -> "className"
* Uncaught TypeError: type.toUpperCase is not a function
  -> One of your component files isn't exporting a Component
* is render returning something? (one element)

https://facebook.github.io/react/html-jsx.html

State Update: Inversion Of Control

```
var MainComponent = React.createClass({
    getInitialState: function () {
        return {taskFilter: “”, hideQuestions: false};
    },
    _setTaskFilter: function (val) {
        this.setState({taskFilter: val});
    },
    _setHideQuestions: function (val) {
        this.setState({hideQuestions: val});
    },
    render: function () {
        <Options setTaskFilter={this._setTaskFilter}
                 setHideQuestion={this._setHideQuestions} />
        <Tasks taskFilter={this.state.taskFilter}
               hideQuestions={this.state.hideQuestions} />
    }
});
```



State Update: Inversion Of Control++

```
var MainComponent = React.createClass({
    getInitialState: function () {
        return {taskFilter: OptionStore.getTaskFilter(),
                hideQuestions: OptionStore.getHideQuestions()};
    },
    componentDidMount: function () {
        OptionStore.addChangeListener(this._onChange);
    },
    _onChange: function () {
        this.setState({OptionStore.getTaskFilter(), OptionStore.getHideQuestions()});
    },
    render: function() {
        <Options />
        <Tasks taskFilter={this.state.taskFilter}
                hideQuestions={this.state.hideQuestions} />
    }
});
```