

# Modern Web Apps with HTML5 Web Components and Polymer, Java EE MVC and JAX-RS

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# Kito D. Mann (@kito99)

- Principal Consultant at Virtua (<http://www.virtua.com>)
- Training, consulting, architecture, mentoring
  - PrimeFaces, JSF, Java EE, Web Components, Polymer, Liferay, etc.
- Official US PrimeFaces partner
- Author, JavaServer Faces in Action
- Founder, JSF Central (<http://www.jsfcentral.com>)

# Kito D. Mann (@kito99)

- Co-host, Enterprise Java Newscast (<http://enterprisejavaneews.com>)
- New site: <http://knowesis.io>
- Internationally recognized speaker
  - JavaOne, JavaZone, Devovx, Devnexus, NFJS, etc.
- JCP Member
  - JSF, MVC, JSF Portlet Bridge, Portlets

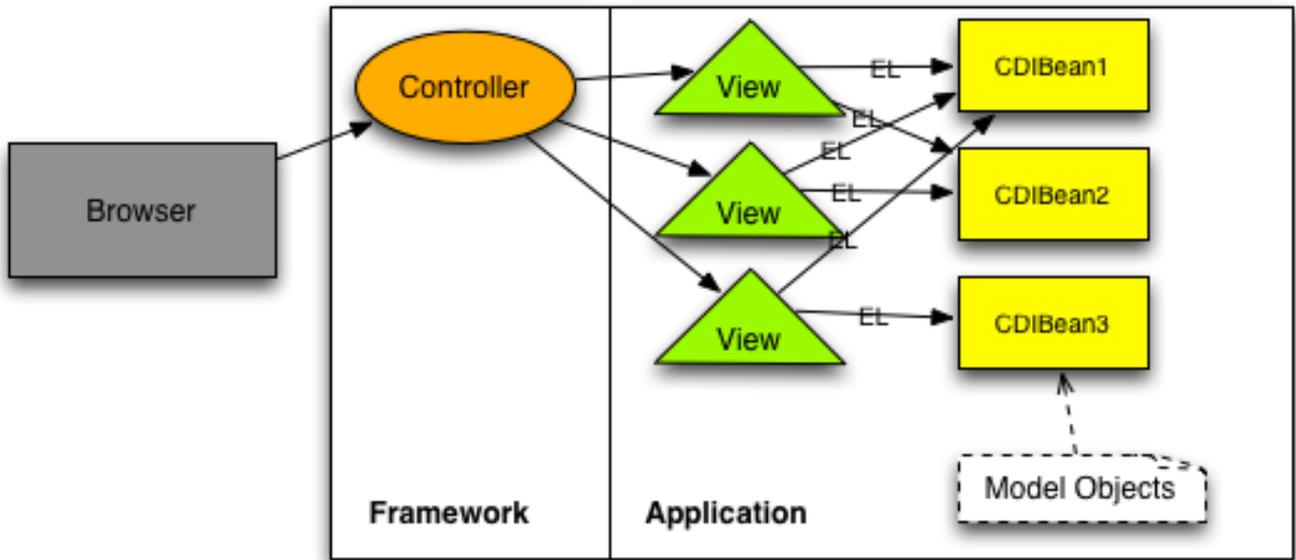
## MVC

- New [JSR \(371\)](#) for Java EE 8
- Action-based server-side framework like Spring MVC
- Based on community feedback
- Current release: EDR2
- MVC will sit alongside with JSF in Java EE (*not* a replacement)

## MVC

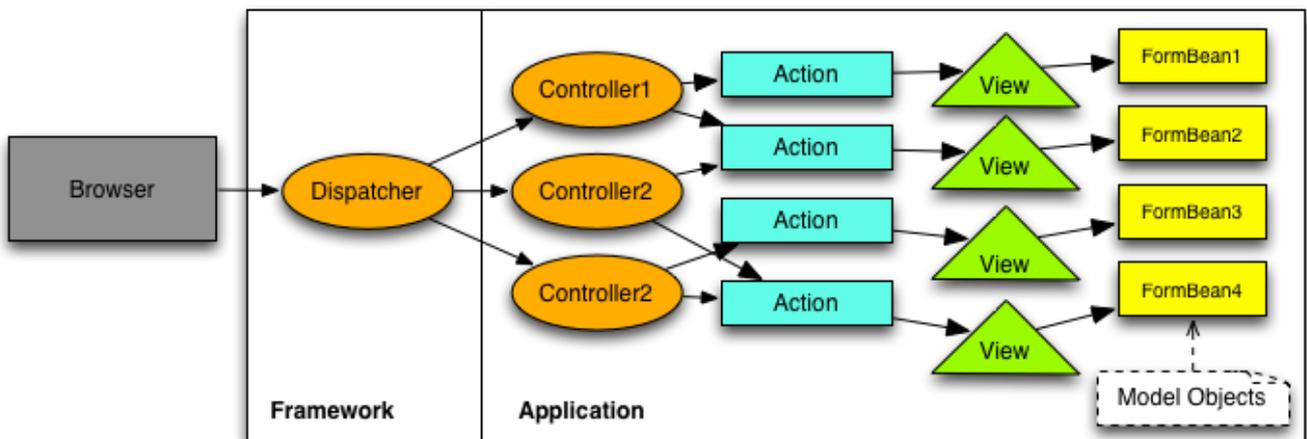
- In the last year, the community has added a couple of additional features (no official release)
- Oracle has proposed dropping MVC from Java EE 8
- If you disagree (or agree), fill out the survey: <http://glassfish.org/survey>

## MVC and JSF?



Component-based frameworks (image from Ed Burns: [Why Another MVC?](#))

## MVC and JSF?



Action-based frameworks (image from Ed Burns: [Why Another MVC?](#))

## MVC

- Built on top of JAX-RS
- Controllers must use CDI
- Controllers can be in request scope
- Allows you to handle errors inside of Controllers instead of globally like JAX-RS

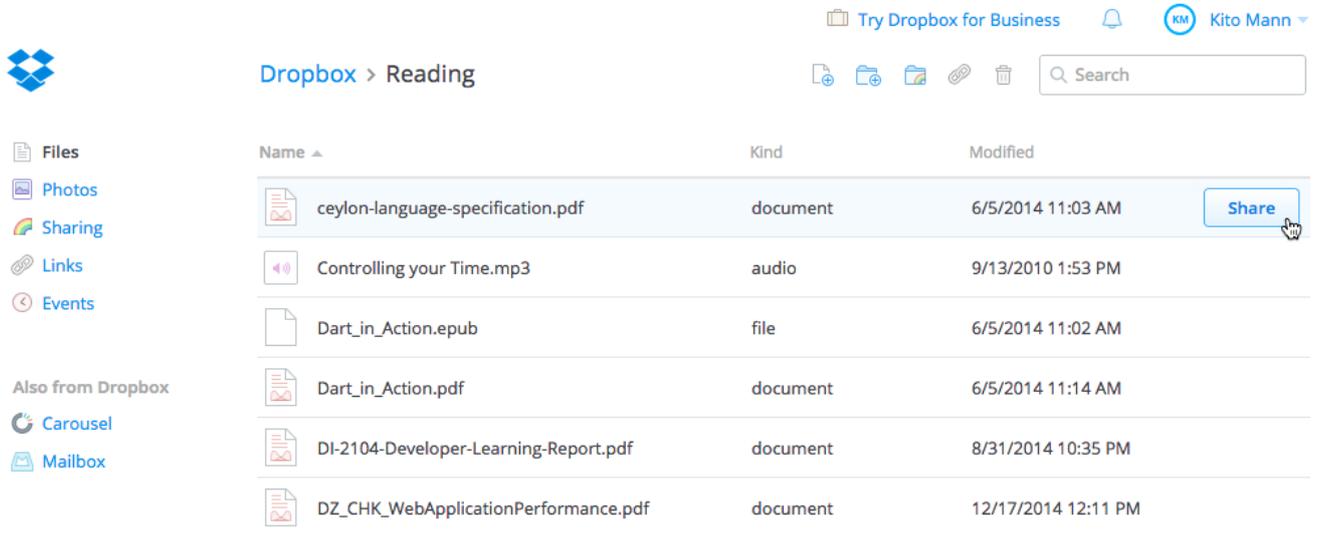
## MVC

- Bring your own [template engine!](#)
- Built-in support for CSRF protection

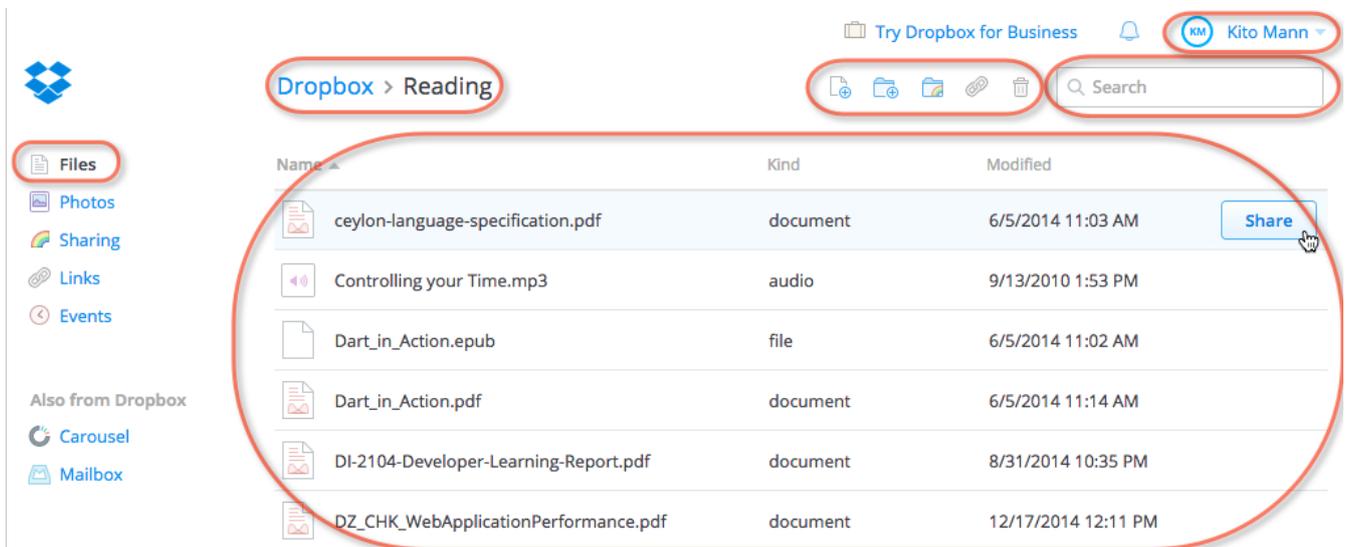
- Support for encoding to avoid XSS attacks

# What about UI Components?

## UI Components are Everywhere



## UI Components are Everywhere



## UI Components are Everywhere

- Component models have been popular since the early nineties
  - Visual Basic
  - Delphi
  - PowerBuilder
  - WinForms

- Windows Presentation Framework
- ASP.NET
- Swing
- JavaFX
- JavaServer Faces
- Tapestry

## UI Components are Everywhere

- In the browser, component suites must invent their own models:
  - YUI
  - KendoUI
  - Bootstrap
  - jQuery UI
  - Wijmo
  - PrimeUI
  - Infragistics

## Why do We Build Components?

- Reusable UI functionality
  - Within a single application
  - Across multiple applications
- You can focus on the core application functionality

## HTML Markup Doesn't Support Non-Native Components

Name ▲	Kind	Modified
 ceylon-language-specification.pdf	document	6/5/2014 11:0
 Controlling your Time.mp3	audio	9/13/2010 1:5
 Help Privacy <span>ooo</span> _Action.epub	file	6/5/2014 11:0

🔍 📱 Elements Network Sources Timeline Profiles Resources Audits Console ✖ 4 ⌵ ⚙️ 🖨 ✕

```

      ><div style="display:none" id="browse-root-quick-send"
      class="collapsed">...</div>
      ><div id="browse-root-actions" style>...</div>
      ▼<div id="browse-sort" class="clearfix">
        ::before
        ><a id="name-sorter" data-sort="FILES_BY_NAME" data-
        ascending="true" class="sortable-column-header bolded"
        style="cursor: pointer;">...</a>
        ><a id="kind-sorter" data-sort="FILES_BY_KIND" data-
        ascending="false" class="sortable-column-header
        noarrow" style="cursor: pointer;">...</a>
        ><a id="location-sorter" data-sort="FILES_BY_LOCATION"
        data-ascending="false" class="sortable-column-header"
        style="cursor: pointer;">...</a>
        ><a id="modified-sorter" data-sort="FILES_BY_MODIFIED"
        data-ascending="false" class="sortable-column-header"
        style="cursor: pointer;">...</a>
      
```

Styles Computed »

```

element.style {
}

#browse- main-vfly17mol.css:2
sort, #browse-root-actions,
#browse-header-wrapper {
  background: #fff;
  border-bottom: 1px solid
    #e5e5e5;
}

#browse- main-vfly17mol.css:2
sort, #browse-root-actions,
#browse-global-actions-bar,
#browse-header-status {
  line-height: 20px;
}

```

... div#browse-sort.clearfix a#name-sorter.sortable-column-header.bolded

## We Work with Abstractions

- Programming model may be componentized, but native markup is not

## We Work with Abstractions

PrimeFaces (JavaServer Faces) DataTable

```

<p:dataTable var="car" value="#{dtPaginatorView.cars}" rows="10"
            paginator="true"
            paginatorTemplate="{CurrentPageReport} {FirstPageLink}
{PreviousPageLink} {PageLinks} {NextPageLink} {LastPageLink} {RowsPerPageDropdown}"
            rowsPerPageTemplate="5,10,15">
    <p:column headerText="Id">
        <h:outputText value="#{car.id}" />
    </p:column>

    <p:column headerText="Year">
        <h:outputText value="#{car.year}" />
    </p:column>

    <p:column headerText="Brand">
        <h:outputText value="#{car.brand}" />
    </p:column>

    <p:column headerText="Color">
        <h:outputText value="#{car.color}" />
    </p:column>
</p:dataTable>

```

## We Work with Abstractions

### Bootstrap Dropdowns

```

<div class="dropdown">
    <button class="btn btn-default dropdown-toggle" type="button" id="dropdownMenu1"
data-toggle="dropdown" aria-expanded="true">
        Dropdown
        <span class="caret"></span>
    </button>
    <ul class="dropdown-menu" role="menu" aria-labelledby="dropdownMenu1">
        <li role="presentation"><a role="menuitem" tabindex="-1" href="#">Action</a></li>
        <li role="presentation"><a role="menuitem" tabindex="-1" href="#">Another
action</a></li>
        <li role="presentation"><a role="menuitem" tabindex="-1" href="#">Something else
here</a></li>
        <li role="presentation"><a role="menuitem" tabindex="-1" href="#">Separated
link</a></li>
    </ul>
</div>

```

## We Work with Abstractions

### jQuery UI Tabs

```
<div id="tabs">
  <ul>
    <li><a href="#tabs-1">Nunc tincidunt</a></li>
    <li><a href="#tabs-2">Proin dolor</a></li>
    <li><a href="#tabs-3">Aenean lacinia</a></li>
  </ul>
  <div id="tabs-1">
    ...
  </div>
  <div id="tabs-2">
    ...
  </div>
  <div id="tabs-3">
    ...
  </div>
</div>
```

## What is a Web Component?

- *Web components bring a native component model to HTML*

## What is a Web Component?

### Scrolling

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.

[TAP ME TO CLOSE](#)

## What is a Web Component?

```
<paper-action-dialog backdrop autoCloseDisabled layered="false">
  <p>Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor
  incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud
  exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.</p>

  <paper-button affirmative autofocus>Tap me to close</paper-button>
</paper-action-dialog>
```

## Web Components == Collection of HTML5 Standards

- Custom Elements
- HTML Templates
- HTML Imports
- Shadow DOM
  - (Custom CSS Properties)

## Demo

**NOTE** | Show counter and source and inspect element in DOM

[demo](#)

## Closing the Browser Gap

**NOTE** | Some features must be enabled with developer `dom.webcomponents.enabled` preference in `about:config` HTML Imports are supported that way, but may not be in the future (they may use JavaScript 6 modules instead)

- Chrome/Android and Opera support everything
- IE doesn't support anything
- All other browsers support HTML Templates
- Shadow DOM and Custom Elements in development for Firefox and Safari
  - "Under consideration" for Edge; likely to be added later
- HTML Imports not supported in other browsers
  - "Under consideration" for Edge; not planned in Firefox and Safari

# Closing the Browser Gap

polyfill

[pol-ee-fil]

*noun*

In web development, a polyfill (or polyfiller) is downloadable code which provides facilities that are not built into a web browser. It implements technology that a developer expects the browser to provide natively, providing a more uniform API landscape. For example, many features of HTML5 are not supported by versions of Internet Explorer older than version 8 or 9, but can be used by web pages if those pages install a polyfill. Web shims and HTML5 Shivs are related concepts.

— Wikipedia

# Closing the Browser Gap

- webcomponents.js
  - Polyfill for all specs created by Polymer group at Google
  - webcomponents-lite.js excludes shadow DOM

# Closing the Browser Gap

webcomponents.js browser support

Polyfill	IE10	IE11+	Chrome*	Firefox*	Safari 7+*	Chrome Android*	Mobile Safari*
Custom Elements	~	✓	✓	✓	✓	✓	✓
HTML Imports	~	✓	✓	✓	✓	✓	✓
Shadow DOM	✓	✓	✓	✓	✓	✓	✓
Templates	✓	✓	✓	✓	✓	✓	✓

~ Indicates support may be flaky.

# Web Components in the Wild

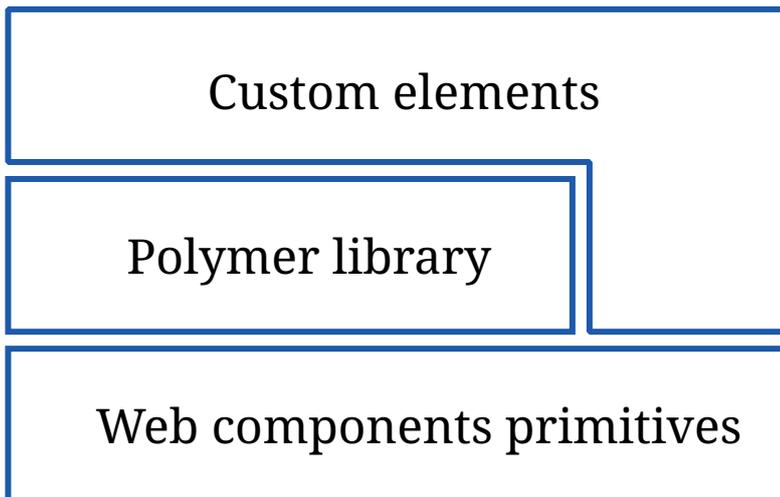
- Component Suites
  - [Polymer Element Catalog](#)
  - [Bosonic](#)
  - [GE Predix UI](#)
  - [Strand Web Components](#)

- Directory
  - <http://customelements.io>
- Applications (other than Google)
  - [simpla.io](http://simpla.io)
  - [USA Today Rio Olympics Site](#)
  - [Red Pill DIG](#)

## Writing Web Components

- VanillaJS
- X-Tag
- Polymer
- Yeomen generator, starter projects, etc: <https://github.com/webcomponents>

## What is Poylmer?



## Polymer

- Library for building web components
- Extensive feature set
  - Simplified programming model
  - Two-way data binding
  - Declarative event handling
  - Behaviors (mixins)
  - Property observation
- Also hosts extensive sets of web components

- Extensive set of tools
  - Build, testing, designer, etc.
- Used in over 4 million web pages

# Polymer

- Developed by and used internally by Google
- Used in over 400 Google projects
  - Over 1 billion users
  - Over 4,000 custom web components
  - Examples: Chrome, Play, Fi, [YouTube Gaming](#), and Translate
- Heavily promoted ([Polymer Summit](#), [Polycasts](#), etc.)

# Polymer

```
<dom-module id="seed-element">

  <template>
    <style>
      :host {
        display: block;
        box-sizing: border-box;
      }
    </style>
    <content></content>
    <p class="author">
      
      Cheers, {{author.name}}!
    </p>
  </template>

</dom-module>

<script>

  Polymer({

    is: 'seed-element',

    properties: {
      fancy: Boolean,

      author: {
        type: Object,
        value: function() {
```

```

        return {
            name: 'Dimitri Glazkov',
            image: 'http://addyosmani.com/blog/wp-
content/uploads/2013/04/unicorn.jpg',
        };
    }
},

// Element Lifecycle

ready: function() {
    // `ready` is called after all elements have been configured, but
    // propagates bottom-up. This element's children are ready, but parents
    // are not.
},

attached: function() {
    // `attached` fires once the element and its parents have been inserted
    // into a document.
},

detached: function() {
    // The analog to `attached`, `detached` fires when the element has been
    // removed from a document.
},

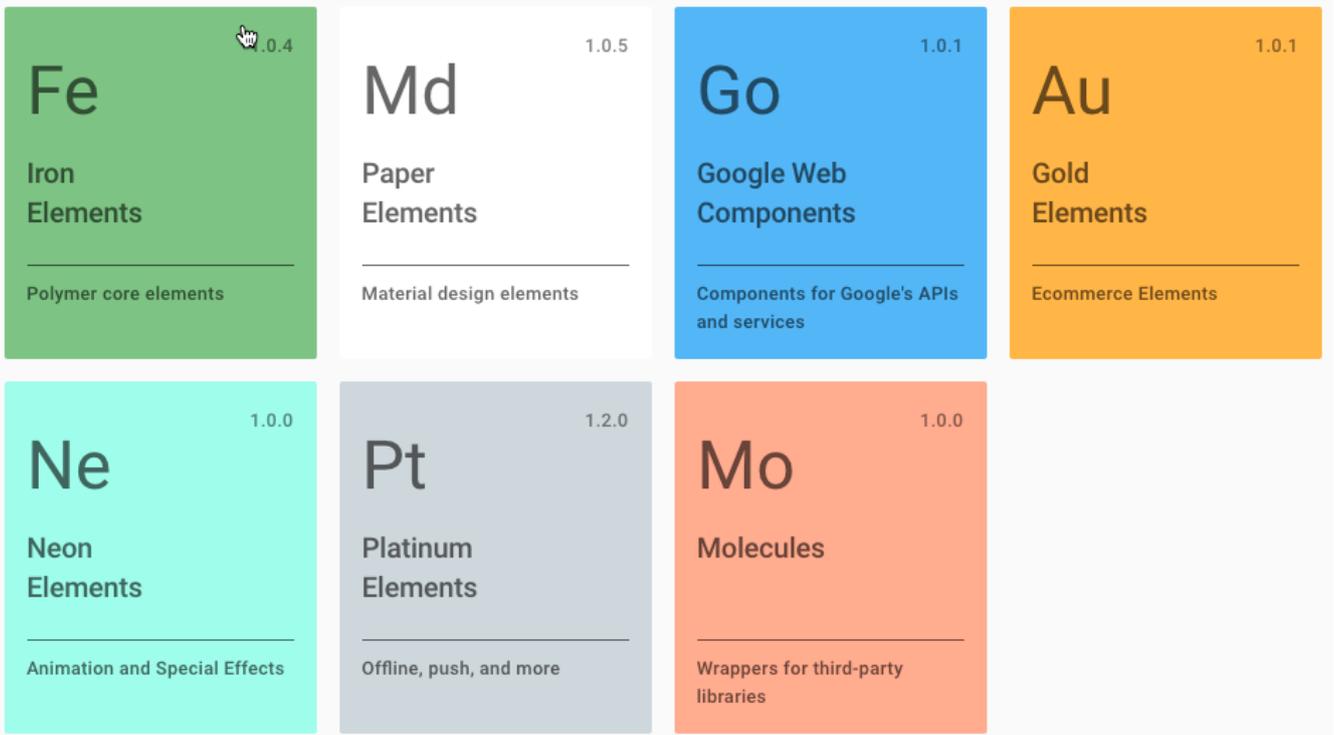
// Element Behavior

sayHello: function(greeting) {
    var response = greeting || 'Hello World!';
    return 'seed-element says, ' + response;
}

});
</script>

```

## Polymer Element Catalog



## Polymer Element Catalog

[demo](#)

**NOTE** | Show polymer starter kit too

## Sample Application: Polymer with Java EE MVC

[demo \(github\)](#)

**NOTE**

- Show overall application structure
- TodoApplication class
- LoginController - overall class
- LoginController - login-no-validation and logout
- login.jsp
- LoginController - login-validation, including LoginForm
- TaskController - make direct requests to show JSON responses
- TaskController - show getTaskPage()
- todo.html
- mvc-tasks.xhtml

# Questions?

- Slides and sample app: <https://github.com/kito99/polymer-javaee-mvc-todo>
- MVC spec on github: <https://github.com/mvc-spec>
- Polymer project: <https://www.polymer-project.org/1.0/>
- Webcomponents.org: <http://webcomponents.org/>
- Knowesis.info: <http://knowesis.io/web/webcomponents>
- Virtua (training, consulting, development): <http://virtua.tech>