MODERN JAVASCRIPT IN OPENNMS

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ABOUT ME

- Worked with OpenNMS since almost the beginning
- …for 3 different companies ;)

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IN THE BEGINNING...

- Oh no, is that a JSP!?

- Simple JS for validation

- Most business logic in Java & JSPs

```
32  <%@page language="java"
33    contentType="text/html"
34    session="true"
35  %>
36
37  <jsp:include page="/includes/bootstrap.jsp" flush="false" >
38    <jsp:param name="title" value="Outages" />
39    <jsp:param name="headTitle" value="Outages" />
40    <jsp:param name="location" value="outage" />
41    <jsp:param name="breadcrumb" value="Outages" />
42  </jsp:include>
43
44  <script type="text/javascript">
45  function validateId() {
46    var outageId = document.outageIdForm.id.value;
47    if (outageId.length > 1 && parseInt(outageId).toString() == outageId) {
48      return true;
49    } else {
50      alert("Please enter a valid outage ID.");
51      return false;
52    }
53  }
54  </script>
55
56  <div class="row">
57    <div class="col-md-6">
58      <div class="panel panel-default">
59        <div class="panel-heading">
60          <h3 class="panel-title">Outage Menu</h3>
61        </div>
```

NEXT: JAVASCRIPT "INTEGRATION"

- "better"

- I guess

```
<jsp:param name="script" value='<script type="text/javascript"
src="lib/angular/angular.js"></script>' />
```

```
<%@ page contentType="text/html;charset=UTF-8" language="java" %>

<jsp:include page="/includes/bootstrap.jsp" flush="false">
    <jsp:param name="norequirejs" value="true" />
    <jsp:param name="nobreadcrumbs" value="true" />
    <jsp:param name="ngapp" value="onms-requisitions" />
    <jsp:param name="title" value="Manage Provisioning Requisitions" />
    <jsp:param name="headTitle" value="Provisioning Requisitions" />
    <jsp:param name="headTitle" value="Admin" />
    <jsp:param name="location" value="admin" />

    <jsp:param name="link" value='<link rel="stylesheet" type="text/css" href="lib/angular-loading-bar/build/loading-bar.css" />' />
    <jsp:param name="link" value='<link rel="stylesheet" type="text/css" href="lib/angular-growl-v2/build/angular-growl.css" />' />

    <jsp:param name="script" value='<script type="text/javascript" src="lib/angular/angular.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="lib/angular-resource/angular-resource.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="lib/angular-cookies/angular-cookies.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="lib/angular-sanitize/angular-sanitize.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="lib/angular-route/angular-route.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="lib/angular-animate/angular-animate.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="lib/angular-bootstrap/ui-bootstrap-tpls.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="lib/angular-loading-bar/build/loading-bar.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="lib/angular-growl-v2/build/angular-growl.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="lib/ip-address/dist/ip-address-globals.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="lib/bootbox/bootbox.js"></script>' />

    <jsp:param name="script" value='<script type="text/javascript" src="js/onms-requisitions/app-requisitions.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="js/onms-requisitions/scripts/model/RequisitionInterface.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="js/onms-requisitions/scripts/model/RequisitionNode.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="js/onms-requisitions/scripts/model/Requisition.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="js/onms-requisitions/scripts/model/RequisitionsData.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="js/onms-requisitions/scripts/model/QuickNode.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="js/onms-requisitions/scripts/services/Requisitions.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="js/onms-requisitions/scripts/services/Synchronize.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="js/onms-requisitions/scripts/filters/startFrom.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="js/onms-requisitions/scripts/directives/requisitionConstraints.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="js/onms-requisitions/scripts/controllers/Move.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="js/onms-requisitions/scripts/controllers/QuickAddNode.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="js/onms-requisitions/scripts/controllers/QuickAddNodeModal.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="js/onms-requisitions/scripts/controllers/CloneForeignSource.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="js/onms-requisitions/scripts/controllers/Detector.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="js/onms-requisitions/scripts/controllers/Policy.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="js/onms-requisitions/scripts/controllers/ForeignSource.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="js/onms-requisitions/scripts/controllers/Asset.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="js/onms-requisitions/scripts/controllers/Interface.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="js/onms-requisitions/scripts/controllers/Node.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="js/onms-requisitions/scripts/controllers/Requisition.js"></script>' />
    <jsp:param name="script" value='<script type="text/javascript" src="js/onms-requisitions/scripts/controllers/Requisitions.js"></script>' />
</jsp:include>

<div ng-view></div>
<div growl></div>
```

NOW:

```
<div ng-view></div>
<div growl></div>

<jsp:include page="/assets/load-assets.jsp" flush="false">
  <jsp:param name="asset" value="requisitions" />
</jsp:include>
```

HOW DOES IT FIND THE JAVASCRIPT?

~~Magic!~~

HOW DOES IT FIND THE JAVASCRIPT?

Web assets!

WHAT IS AN ASSET?

- Compiled with Webpack
- CSS & JavaScript
- ES6, TypeScript, SASS

```
$ yarn run webpack
$ webpack --colors --display-error-details --env=development
=== running development build of OpenNMS 22.0.4-SNAPSHOT assets ===
Stylesheets:
* bootstrap
* dashboard
...

JavaScript entry points:
* add-to-ksc
* angular-status
* forecast
* geomap-js
...

JavaScript vendor/aggregate scripts:
* angular-js
* backshift-js
* bootbox-js
...

Building variant: production=false
```

LOCATING ASSETS

- **AssetLocator API in Java**
- JSP include

```java
public interface AssetLocator extends ResourceResolver {
    public void reload();
    public long lastModified();
    public Collection<String> getAssets(final boolean minified);
    public Optional<Collection<AssetResource>> getResources(final String asset, final boolean minified);
    public Optional<AssetResource> getResource(final String asset, final String type, final boolean minified);
    public Optional<InputStream> open(final String asset, final String type, final boolean minified) throws IOException;
}
```

LOCATING ASSETS

- AssetLocator API in Java
- **JSP include**

```
<jsp:include page="/assets/load-assets.jsp" flush="false">
  <jsp:param name="asset" value="requisitions" />
</jsp:include>
```

LOCATING ASSETS

- AssetLocator API in Java
- **JSP include**

```
<jsp:include page="/assets/load-assets.jsp" flush="false">
  <jsp:param name="asset" value="requisitions" />
</jsp:include>
```

⬇

```
<script src="assets/requisitions.min.js?v=1537361993000"></script>
```

LOCATING ASSETS: CSS

- AssetLocator API in Java
- **JSP include**

```
<jsp:include page="/assets/load-assets.jsp" flush="false">
  <jsp:param name="asset" value="opennms-theme" />
  <jsp:param name="asset-type" value="css" />
  <jsp:param name="asset-media" value="screen" />
</jsp:include>
```

LOCATING ASSETS: CSS

- AssetLocator API in Java
- **JSP include**

```jsp
<jsp:include page="/assets/load-assets.jsp" flush="false">
  <jsp:param name="asset" value="opennms-theme" />
  <jsp:param name="asset-type" value="css" />
  <jsp:param name="asset-media" value="screen" />
</jsp:include>
```

⬇

```html
<link rel="stylesheet" href="assets/opennms-theme.css?v=1537361993000" media="screen">
```

PARAMETERS

- **asset**: the asset's name
- **asset-type**: "css", "js"
- **asset-media**: the "media" property for style links
- **asset-defer**: adds "defer" to **<script>** tag
- **asset-async**: adds "async" to **<script>** tag

MINIFIED ASSETS

```
<jsp:include page="/assets/load-assets.jsp" flush="false">
  <jsp:param name="asset" value="requisitions" />
</jsp:include>
```

⬇

```
<script src="assets/requisitions.min.js?v=1537361993000"></script>
```

MINIFIED ASSETS

localhost:8980/opennms/login.jsp

Name	Status	Type	Initiator
login.jsp	200	document	Other
manifest.min.js?v=1537361993000	200	script	login.jsp
vendor.min.js?v=1537361993000	200	script	login.jsp
global.min.js?v=1537361993000	200	script	login.jsp
horizon_logo.svg	200	svg+xml	login.jsp
bootstrap.css?v=1537361993000	200	stylesheet	login.jsp
opennms-theme.css?v=1537361993000	200	stylesheet	login.jsp
font-awesome.css?v=1537361993000	200	stylesheet	login.jsp
vendor.css?v=1537361993000	200	stylesheet	login.jsp

MINIFIED ASSETS: `?minified=false`

localhost:8980/opennms/login.jsp?minified=false

Name	Status	Type	Initiator
login.jsp?minified=false	200	document	Other
manifest.js?v=1537361993000	200	script	login.jsp?minified=false
font-awesome.css?v=1537361993000	200	stylesheet	login.jsp?minified=false
vendor.css?v=1537361993000	200	stylesheet	login.jsp?minified=false
vendor.js?v=1537361993000	200	script	login.jsp?minified=false
bootstrap.css?v=1537361993000	200	stylesheet	login.jsp?minified=false
global.js?v=1537361993000	200	script	login.jsp?minified=false
horizon_logo.svg	200	svg+xml	login.jsp?minified=false
opennms-theme.css?v=1537361993000	200	stylesheet	login.jsp?minified=false

BUILD SYSTEM

- Integrated with maven (`` `cd core/web-assets; ../../compile.pl install` ``)
- On the CLI, you can use **yarn** while developing:
  - `yarn build`: "development" mode (no `.min.js` files)
  - `yarn release`: "production" mode
  - `yarn watch`: continuous "development" mode
  - `yarn watch-release`: continuous "production" mode
  - `yarn lint`: check for errors or warnings in code
  - `yarn test`: run unit tests (run after build or release)

BUILD SYSTEM: WEBPACK & BABEL

- Webpack 4: "bundler"

- Babel: "transpiler"

  - Transpiles JavaScript to older versions

  - Transpiles TypeScript to JavaScript

  - Adds backwards-compatibility shims: `[ "last 2 versions", "safari >= 7", "> 5%" ]`

    - "last 2 versions" of major browsers

    - At least Safari 7 (for reasonable iOS and Android compatibility)

    - Any browser with greater than 5% real-world usage

    - Uses caniuse.com for up-to-date browser statistics

  - Automatically converts AngularJS dependency-injection annotations

    `function($foo) {}  ->  ['$foo', function($foo) {}]`

  - Generates UMD JavaScript modules (usable in browsers or node)

SO YOU WANT TO CREATE AN ASSET

- Live in **core/web-assets/** — structure documented in **README.md**
- Supports SASS, TypeScript, ES6 modules, node modules
- Asset types:
  - **fonts**
  - **images**
  - **js**: "older" (node.js) style JavaScript ("require")
  - **modules:** ES6+ JavaScript/TypeScript ("import")
  - **style:** CSS and/or SASS
- Asset folders:
  - **app**: node-style directory structure with `index.js` or `index.ts` at root
  - **vaadin**: individual scripts compiled specially for inclusion in Vaadin
  - **vendor**: convenient "roll-up" of commonly used vendor scripts (like Angular)
  - **lib**: everything else

CREATING ASSETS: DEV ENVIRONMENT

- First, build OpenNMS

- **cd target/opennms-*/jetty-webapps/opennms/**
  rm -rf assets
  ln -s ../../../../core/web-assets/target/dist/assets .

- **echo org.opennms.web.assets.minified=false **
  > $OPENNMS_HOME/etc/opennms.properties.d/assets.properties

- **echo org.opennms.web.assets.reload=1 **
  >> $OPENNMS_HOME/etc/opennms.properties.d/assets.properties

HELLO JAVASCRIPT WORLD

(Live Coding: JavaScript)

GOING FORWARD: OPENNMS.JS

- Single JavaScript/TypeScript codebase for interacting with OpenNMS ReST APIs

- Supports pretty much any OpenNMS that has a ReST interface (even 1.8!)

- Version-aware; supports features of newer OpenNMS

  - API for asking whether the remote OpenNMS supports various features

  - Throws exceptions if you attempt to use a feature that's not supported

- API docs using TypeDoc: http://docs.opennms.org/opennms-js/

- CLI tool for interacting with OpenNMS

OPENNMS.JS API

```
import {Client} from 'opennms/src/API';

new Client().connect('Demo', 'https://demo.opennms.org/opennms', 'demo', 'demo').then((client) => {
  // list this OpenNMS's capabilities
  console.log(client.server.metadata.capabilities());
});
```

OPENNMS.JS CLI

```
  ranger@With-Teeth   ~/git/opennms-develop   develop +  npm install -g opennms
/Users/ranger/.nvm/versions/node/v8.11.2/bin/opennms -> /Users/ranger/.nvm/versions/node/v8.11.2/lib/node_modules/opennms/dist/cli.node.js
+ opennms@1.2.2
updated 1 package in 1.639s
  ranger@With-Teeth   ~/git/opennms-develop   develop +  opennms connect -u demo -p demo https://demo.opennms.org/opennms/
WARNING: This command saves your login information to ~/.opennms-cli.config.json in clear text.
Connection succeeded.
  ranger@With-Teeth   ~/git/opennms-develop   develop +  opennms capabilities
OpenNMS Horizon 22.0.3 Capabilities:

Ack Alarms:          true
Api Version:         2
Graphs:              true
Outage Summaries:    true
Set Node Location:   true
Ticketer:            true
```

OPENNMS.JS INTEGRATION

- Currently used in Helm
  - Modular HTTP access, uses an adaptor to talk with Grafana's built-in AngularJS HTTP API
  - Supports Measurements API, Flow, and correlation queries
- Future: Port Compass to OpenNMS.js
- Future: Port OpenNMS web UI components that use ReST to OpenNMS.js

QUESTIONS?