



MARIA KERN – NETZ98 GMBH

JS

MAGENTO 2 UI COMPONENTS
THE JS PART

Magento 2 UI Components – The JS part



Maria Kern

Senior Frontend Architect at netz98 GmbH

www.netz98.de

 @maja_kern

CommerceHero: maria-kern

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MAGENTO 2 UI COMPONENTS – THE JS PART

UI components definition

The UI components are:

- the **base** for many **user interface (UI) elements** (buttons, fields, tables, minicart)
- designed for simple and flexible rendering of user interfaces
- defined in the module `Magento_UI`
- used in Magento **frontend** and **backend**

UI COMPONENTS DEFINITION

BACKEND

Attribute Set

Product Name *

SKU *

Price € [global]

[Advanced Pricing](#)

Tax Class [website]

Quantity [global]

[Advanced Inventory](#)

Actions Filters Default View Columns

	ID	Thumbnail	Type	SKU	Price	Quantity	Visibility	Status	Action
<input type="checkbox"/>	1		Downloadable Product	9783829781114	€11.99	10000.0000	Catalog, Search	Enabled	<input type="button" value="Edit"/>
<input type="checkbox"/>	2		Downloadable Product	9783829799737	€7.99	10000.0000	Catalog, Search	Enabled	<input type="button" value="Edit"/>
<input type="checkbox"/>	3		Downloadable Product	9783829782920	€2.99	10000.0000	Catalog, Search	Enabled	<input type="button" value="Edit"/>

FRONTEND

Subtotal €23.98

Order Total €23.98

[Shopping Cart](#)

Search entire store here...

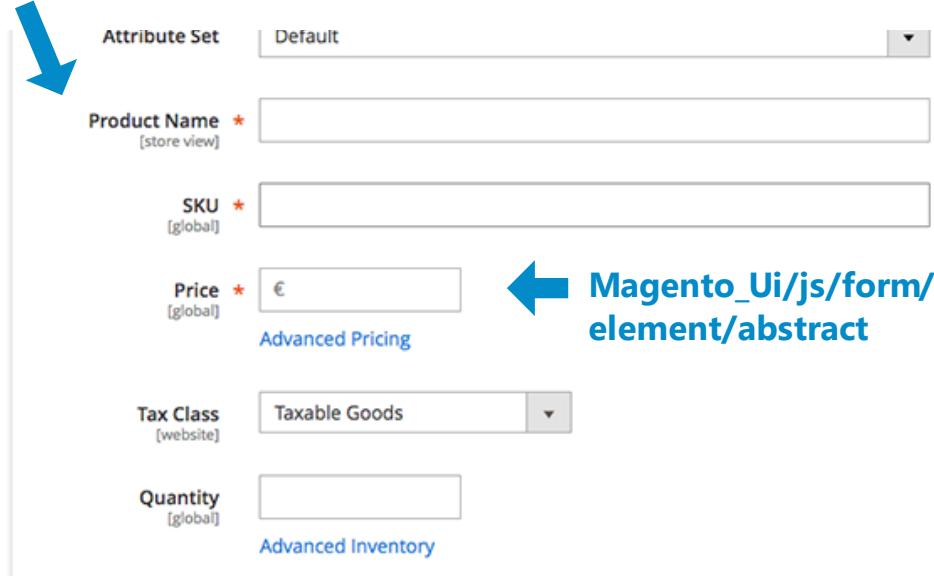
2 items Cart Subtotal : **23,98 €**

Example Product
See Details
11,99 €
Qty:

UI COMPONENTS DEFINITION

BACKEND

`Magento_Ui/js/form/components/fieldset`



Attribute Set Default

Product Name *

SKU *

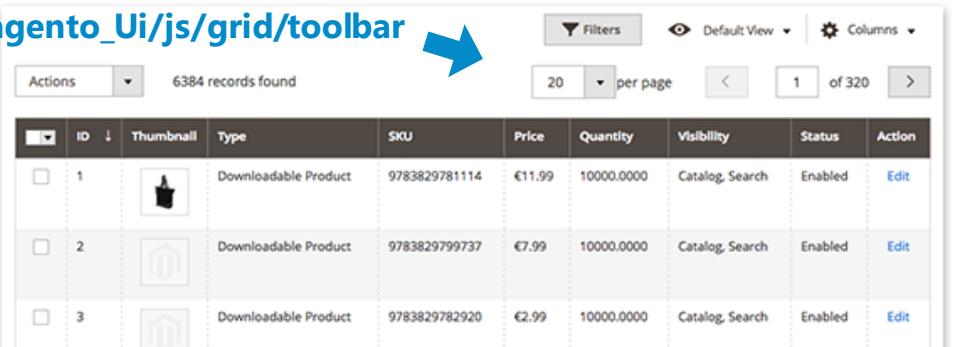
Price * €

Tax Class Taxable Goods

Quantity

`Magento_Ui/js/form/element/abstract`

`Magento_Ui/js/grid/toolbar`



Actions

6384 records found

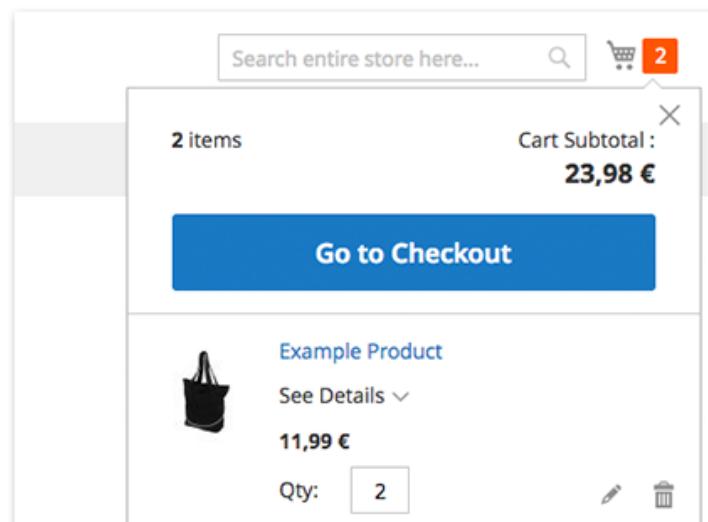
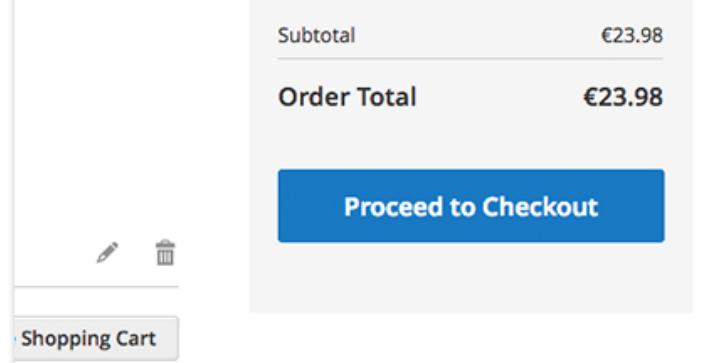
Filters Default View Columns

20 per page 1 of 320

ID	Thumbnail	Type	SKU	Price	Quantity	Visibility	Status	Action
1		Downloadable Product	9783829781114	€11.99	10000.0000	Catalog, Search	Enabled	Edit
2		Downloadable Product	9783829799737	€7.99	10000.0000	Catalog, Search	Enabled	Edit
3		Downloadable Product	9783829782920	€2.99	10000.0000	Catalog, Search	Enabled	Edit

`Magento_Ui/js/grid/listing`

FRONTEND



UI COMPONENTS DEFINITION

BACKEND

`Magento_Ui/js/form/components/fieldset`

Attribute Set Default

Product Name *

SKU *

Price * €

Tax Class Taxable Goods

Quantity

`Magento_Ui/js/grid/toolbar`

Actions

6384 records found

Filters Default View Columns

20 per page 1 of 320

ID	Thumbnail	Type	SKU	Price	Quantity	Visibility	Status	Action
1		Downloadable Product	9783829781114	€11.99	10000.0000	Catalog, Search	Enabled	Edit
2		Downloadable Product	9783829799737	€7.99	10000.0000	Catalog, Search	Enabled	Edit
3		Downloadable Product	9783829782920	€2.99	10000.0000	Catalog, Search	Enabled	Edit

`Magento_Ui/js/grid/listing`

FRONTEND

`Magento_Checkout/js/view/cart/totals`

Subtotal €23.98

Order Total €23.98

Proceed to Checkout

Search entire store here... 2

2 items Cart Subtotal : 23,98 €

Go to Checkout

Example Product
See Details
11,99 €
Qty: 2

`Magento_Checkout/js/view/minicart`

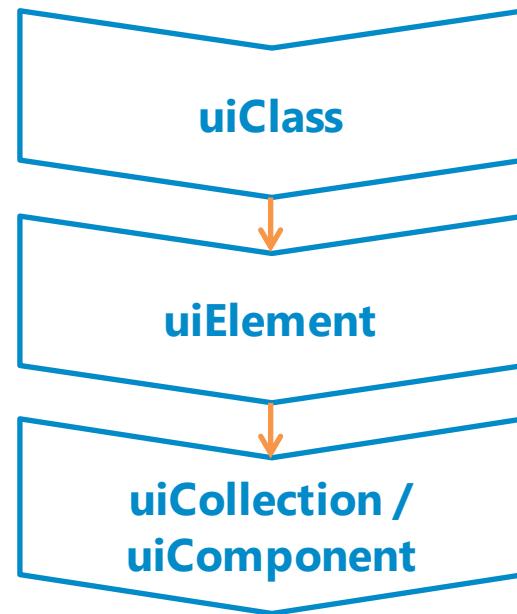


MAGENTO 2 UI COMPONENTS – THE JS PART

Basic structure of UI components

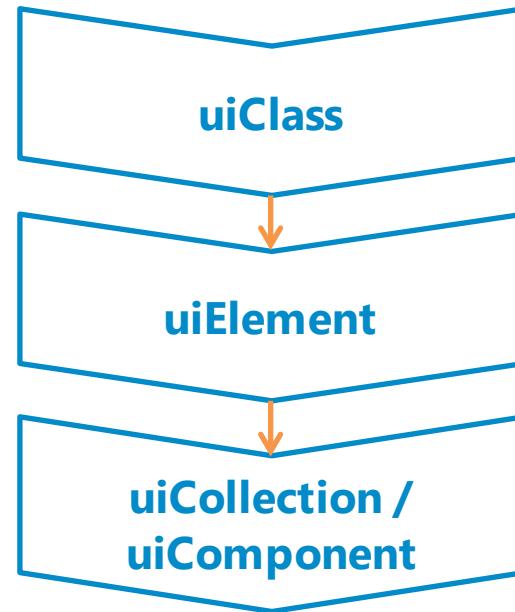
BASIC STRUCTURE OF UI COMPONENTS

JS DEPENDENCY AND INHERITANCE



BASIC STRUCTURE OF UI COMPONENTS

JS DEPENDENCY AND INHERITANCE



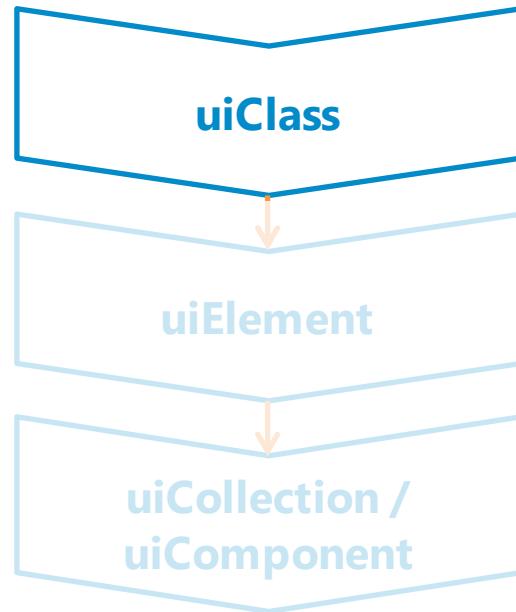
<UI_Module_dir>/view/base/web/js/lib/core/class.js

<UI_Module_dir>/view/base/web/js/lib/core/element/element.js

<UI_Module_dir>/view/base/web/js/lib/core/collection.js

BASIC STRUCTURE OF UI COMPONENTS

JS DEPENDENCY AND INHERITANCE

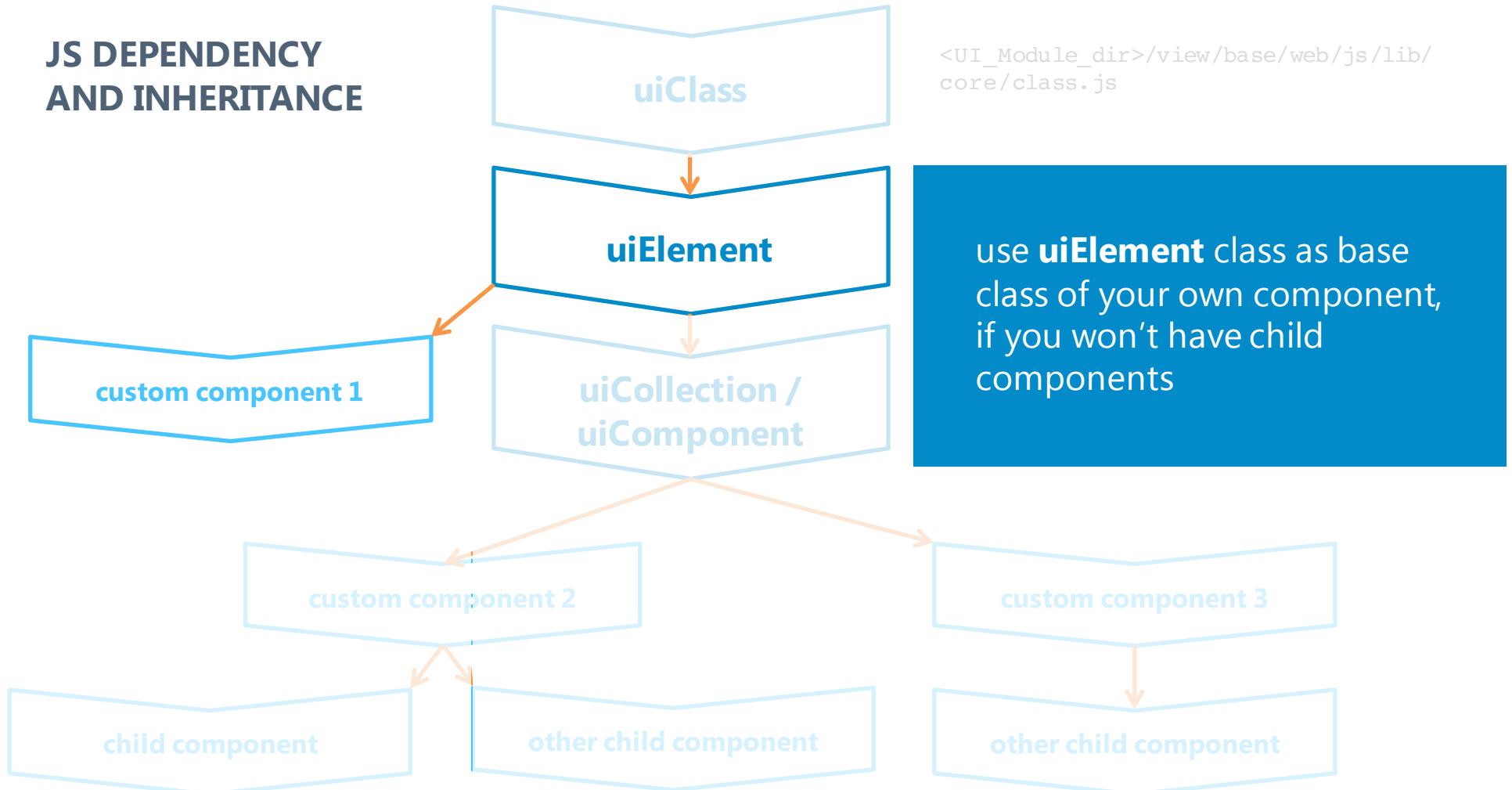


the **uiClass** is an abstract class where all components are extended from

<UI_Module_dir>/view/base/web/js/lib/core/collection.js

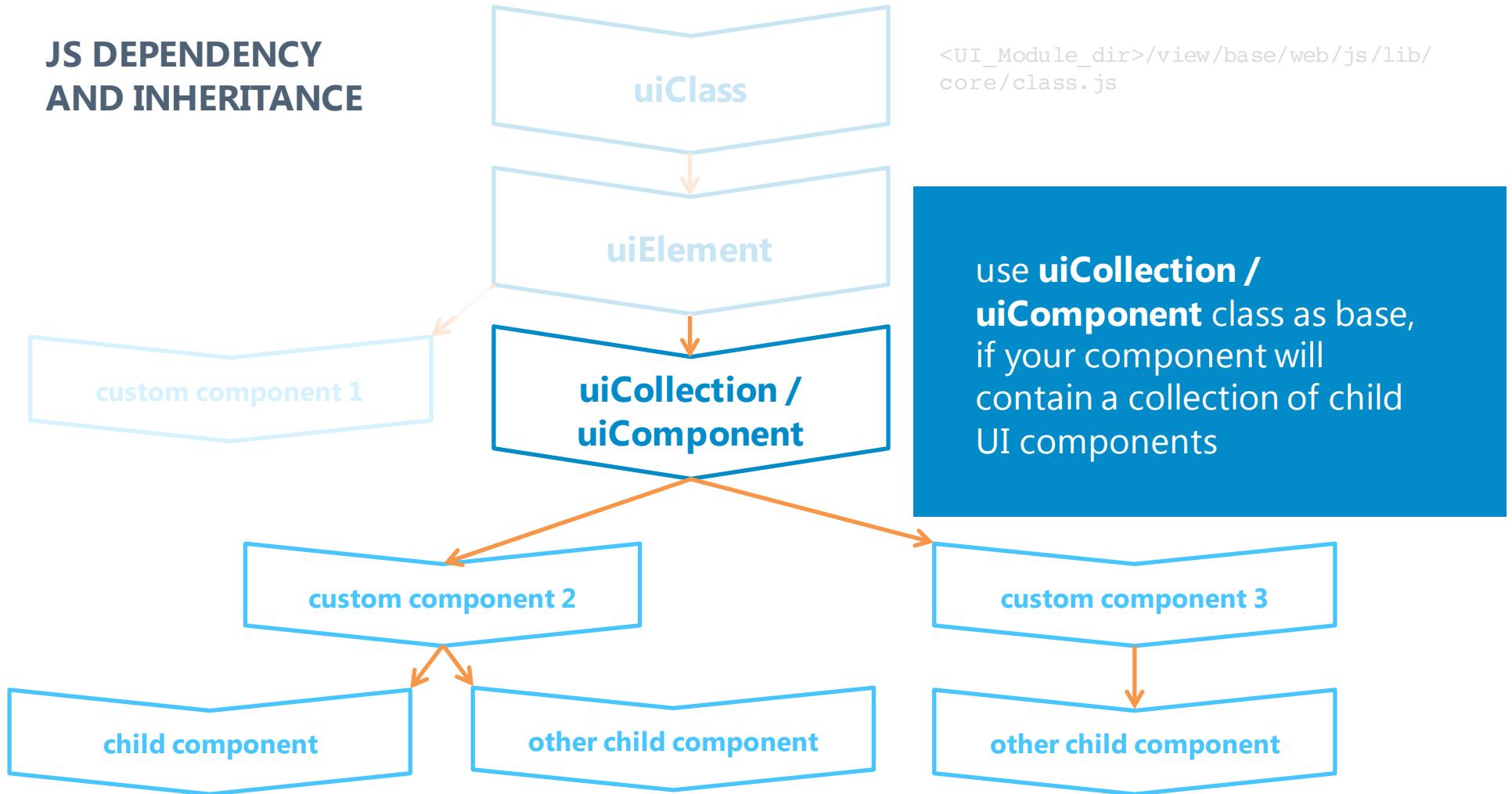
BASIC STRUCTURE OF UI COMPONENTS

JS DEPENDENCY AND INHERITANCE



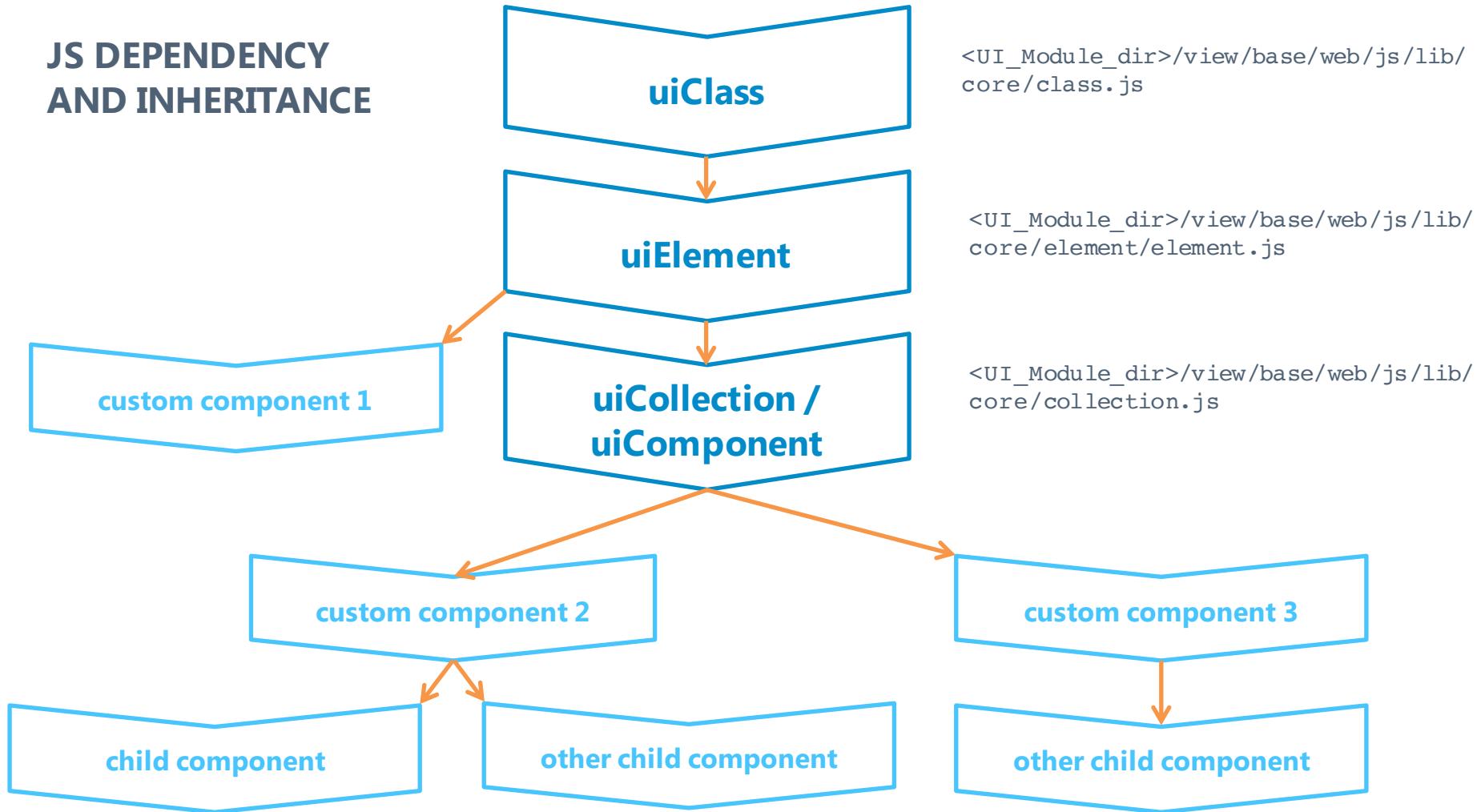
BASIC STRUCTURE OF UI COMPONENTS

JS DEPENDENCY AND INHERITANCE



BASIC STRUCTURE OF UI COMPONENTS

JS DEPENDENCY AND INHERITANCE





MAGENTO 2 UI COMPONENTS – THE JS PART

Useful functions and properties

EXTEND AND INITIALIZE

- extend() implements inheritance of UI components
- initialize() is called during instantiation

```
define([
  'uiComponent'
], function (Component) {
  'use strict';

  return Component.extend({

    initialize: function () {
      /* call the parent UI component method: */
      this._super();

      /* here you can add custom functionality (executed only once) */
      this.myLocalProperty = 'abc'
    },
  });
})
```

EXTEND AND INITIALIZE

- extend() implements inheritance of UI components
- initialize() is called during instantiation

```
define([
  'uiComponent'
], function (Component) {
  'use strict';
```

DEPENDENCY

```
  return Component.extend({
```



```
    initialize: function () {
      /* call the parent UI component method: */
      this._super();
```



```
      /* here you can add custom functionality (executed only once) */
      this.myLocalProperty = 'abc'
```

```
    },
```

EXTEND AND INITIALIZE

- extend() implements inheritance of UI components
- initialize() is called during instantiation

```
define([
  'uiComponent'
], function (Component) {
  'use strict';

  return Component.extend({
```

return Component.extend({

INHERITANCE

```
    initialize: function () {
      /* call the parent UI component method: */
      this._super();

      /* here you can add custom functionality (executed only once) */
      this.myLocalProperty = 'abc'
    },
  },
```

EXTEND AND INITIALIZE

- extend() implements inheritance of UI components
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```
define([
  'uiComponent'
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  return Component.extend({
```

```
    initialize: function () {
      /* call the parent UI component method: */
      this._super();

      /* here you can add custom functionality (executed only once) */
      this.myLocalProperty = 'abc'
    },
  }
```

OVERWRITE / EXTEND A METHOD

CONFIGURATION AND FIRST LEVEL PROPERTIES

```
return Component.extend({  
  
    defaults: {  
        // custom properties:  
        isVisible: true,  
        headline: '',  
        pageSize: 20,  
        selectors: {  
            mapItem: '.map_item'  
        },  
        // linking properties:  
        listens: {  
            'isVisible': 'onVisibleChange'  
        },  
        exports: {},  
        imports: {},  
        links: {},  
        modules: {}  
    },  
},
```

Every component has a “defaults” object

> Declaring properties

CONFIGURATION AND FIRST LEVEL PROPERTIES

```
return Component.extend({  
  
    defaults: {  
        // custom properties:  
        isVisible: true,  
        headline: '',  
        pageSize: 20,  
        selectors: {  
            mapItem: '.map_item'  
        },  
        // linking properties:  
        listens: {  
            'isVisible': 'onVisibleChange'  
        },  
        exports: {},  
        imports: {},  
        links: {},  
        modules: {}  
    },  
});
```

custom properties

CONFIGURATION AND FIRST LEVEL PROPERTIES

```
return Component.extend({  
  
    defaults: {  
        // custom properties:  
        isVisible: true,  
        headline: '',  
        pageSize: 20,  
        selectors: {  
            mapItem: '.map_item'  
        },  
        // linking properties:  
        listens: {  
            'isVisible': 'onVisibleChange'  
        },  
        exports: {},  
        imports: {},  
        links: {},  
        modules: {}  
    },  
}, {
```

a lot of **given properties**

CONFIGURATION AND FIRST LEVEL PROPERTIES

```
return Component.extend({  
  
    defaults: {  
        // custom properties:  
        isVisible: true,  
        headline: '',  
        pageSize: 20,  
        selectors: {  
            mapItem: '.map_item'  
        },  
        // linking properties:  
        listens: {  
            'isVisible': 'onVisibleChange'  
        },  
        exports: {},  
        imports: {},  
        links: {},  
        modules: {}  
    },  
});
```

Configuration properties will be available as “**first level properties**”

this.isVisible

CONFIGURATION AND FIRST LEVEL PROPERTIES

A lot of **default properties** and **methods** are already set by the base classes, e.g.:

```
this.index // name of component
```

```
this.name // full name of component including parents
```

```
this.template // path to template file
```

```
this.component
```

```
this.getTemplate()
```

```
this.hasTemplate()
```

USEFUL FUNCTIONS AND PROPERTIES

KNOCKOUT JS

```
<div class="map-widget" data-block="map-widget" data-bind="visible: isVisible">
    <div data-bind="html: headline"></div>
    <div data-bind="html: text"></div>
    <div class="map_wrapper">
        <div class="map" data-bind="bindHtml: map"></div>
        <!-- ko foreach: getRegion('layer') -->
            <!-- ko template: getTemplate() --><!-- /ko -->
        <!--/ko-->
    </div>
</div>
```

Binding data to HTML
Elements by **data-bind**
Attribute

USEFUL FUNCTIONS AND PROPERTIES

KNOCKOUT JS

```
defaults: {
    displayMode: 'grid',
    tracks: {
        displayMode: true
    },
    example1: '',
    example2: '',
    example3: '',
    example4: ''
},
```

Declaring observable variables

```
initObservable: function () {
    this._super();

    // add tracked items
    this.track('example1');
    this.observe(true, 'example2');

    // add observable items
    this.observe([
        'example3',
        'example4'
    ]);

    return this;
},
```

KNOCKOUT JS

```
defaults: {  
    displayMode: 'grid',  
    tracks: {  
        displayMode: true  
    },  
    example1: '',  
    example2: '',  
    example3: '',  
    example4: ''  
},
```

Declaring observable variables

```
initObservable: function () {  
    ➤ this._super();  
  
    // add tracked items  
    this.track('example1');  
    this.observe(true, 'example2');  
  
    // add observable items  
    this.observe([  
        'example3',  
        'example4'  
    ]);  
  
    return this;  
},
```

HANDLING OF CHILDREN

The **uiCollection class** (mainly) provides a lot of methods for handling of child components

HANDLING OF CHILDREN

The **uiCollection class** (mainly) provides a lot of methods for handling of child components

```
initElement: function(elem) {
    this._super();
    elem.on({
        'update': this.onChildrenUpdate,
        'loading': this.onContentLoading
    });
    elem.customProperty = 21;
    return this;
},
```

Called for **every child** component
> Child is given as **parameter**

HANDLING OF CHILDREN

The **uiCollection class** (mainly) provides a lot of methods for handling of child components

```
initElement(child) {}  
this.elems()  
this.containers  
this.getChild('nameOfChild') // UI component  
this.hasChild('nameOfChild') // boolean  
this.insertChild('nameOfComponent')
```



Initialize...



MAGENTO 2 UI COMPONENTS – THE JS PART

Initialization process

INITIALIZATION PROCESS

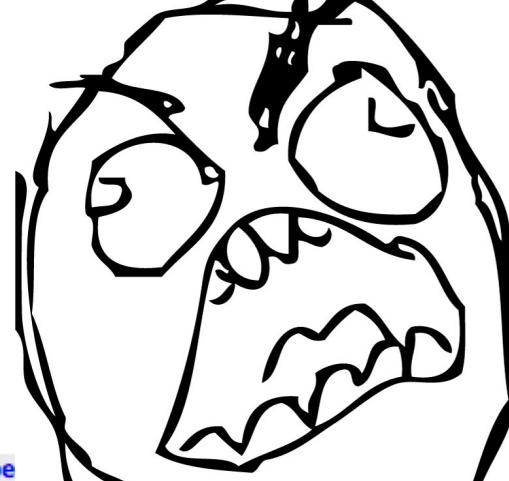
All the configurations are translated into json and added to the body

```
<script type="text/x-magento-init">{"*": {"Magento_Ui/js/core/app":{<JSON_configuration>}}}</script>

<!-- Example: -->
<script type="text/x-magento-init">
{
    "[data-role=compare-products-link)": {
        "Magento_Ui/js/core/app": {
            "components": {
                "compareProducts": {
                    "component": "Magento_Catalog/js/view/compare-products",
                    "customProperty1": "abc",
                    "customProperty2": true,
                    "children": {
                        "childNameOfCompareProducts": {
                            "component": "Magento_Catalog/js/view/subfolder/nameOfFile",
                            "customProperty1": "abc",
                            "displayArea": "nameOfDisplayArea"
                        }
                    }
                }
            }
        }
    }
}
</script>
```

INITIALIZATION PROCESS

```
referenceBlock name="checkout.root">
<arguments>
    <argument name="jsLayout" xsi:type="array">
        <item name="components" xsi:type="array">
            <item name="checkout" xsi:type="array">
                <item name="children" xsi:type="array">
                    <item name="steps" xsi:type="array">
                        <item name="children" xsi:type="array">
                            <item name="billing-step" xsi:type="array">
                                <item name="children" xsi:type="array">
                                    <item name="payment" xsi:type="array">
                                        <item name="children" xsi:type="array">
                                            <item name="payments-list" xsi:type="array">
                                                <item name="children" xsi:type="array">
                                                    <item name="before-place-order" xsi:type="array">
                                                        <item name="children" xsi:type="array">
                                                            <item name="agreements" xsi:type="array">
                                                                <item name="component" xsi:type="string">Magento_CheckoutAgreements/js/view/checkc
                                                                <item name="sortOrder" xsi:type="string">100</item>
                                                                <item name="displayArea" xsi:type="string">before-place-order</item>
                                                                <item name="dataScope" xsi:type="string">checkoutAgreements</item>
                                                                <item name="provider" xsi:type="string">checkoutProvider</item>
                                                            </item>
                                                        </item>
                                                    </item>
                                                </item>
                                            </item>
                                        </item>
                                    </item>
                                </item>
                            </item>
                        </item>
                    </item>
                </item>
            </item>
        </item>
    </argument>
</arguments>
```



INITIALIZATION PROCESS

All the configurations are translated into json and added to the body

```
<script type="text/x-magento-init">{"*": {"Magento_Ui/js/core/app":{<JSON_configuration>}}}</script>
```

```
<!-- Example: -->
<script type="text/x-magento-init">
{
    "[data-role=compare-products-link)": {
        "Magento_Ui/js/core/app": {
            "components": {
                "compareProducts": {
                    "component": "Magento_Catalog/js/view/compare-products",
                    "customProperty1": "abc",
                    "customProperty2": true,
                    "children": {
                        "childNameOfCompareProducts": {
                            "component": "Magento_Catalog/js/view/subfolder/nameOfFile",
                            "customProperty1": "abc",
                            "displayArea": "nameOfDisplayArea"
                        }
                    }
                }
            }
        }
    }
}</script>
```

INITIALIZATION PROCESS

All the configurations are translated into json and added to the body

```
<script type="text/x-magento-init">{"*": {"Magento_Ui/js/core/app":{<JSON_configuration>}}}</script>

<!-- Example: -->
<script type="text/x-magento-init">
{
    "[data-role=compare-products-link)": {
        "Magento_Ui/js/core/app": {
            "components": {
                "compareProducts": {
                    "component": "Magento_Catalog/js/view/compare-products",
                    "customProperty1": "abc",
                    "customProperty2": true,
                    "children": {
                        "childNameOfCompareProducts": {
                            "component": "Magento_Catalog/js/view/subfolder/nameOfFile",
                            "customProperty1": "abc",
                            "displayArea": "nameOfDisplayArea"
                        }
                    }
                }
            }
        }
    }
}
</script>
```

INITIALIZATION PROCESS

- The app calls `Magento_Ui/js/core/renderer/layout` and passes the UI component's configuration into the layout

The screenshot shows a browser developer tools debugger interface. On the left, there are tabs for `require.js`, `main.js`, and `app.js x`, with `app.js` currently selected. The main area displays the code for `app.js`:

```
1 /**
2 * Copyright © 2013–2017 Magento, Inc. All rights reserved.
3 * See COPYING.txt for license details.
4 */
5 define([
6     './renderer/types',
7     './renderer/layout',
8     '../lib/knockout/bootstrap'
9 ], function (types, layout) {
10     'use strict';
11
12     return function (data, merge) { data = Object.assign({}, types);
13         types.set(data.types);
14         layout(data.components, undefined, true, merge);
15     };
16 });
17
```

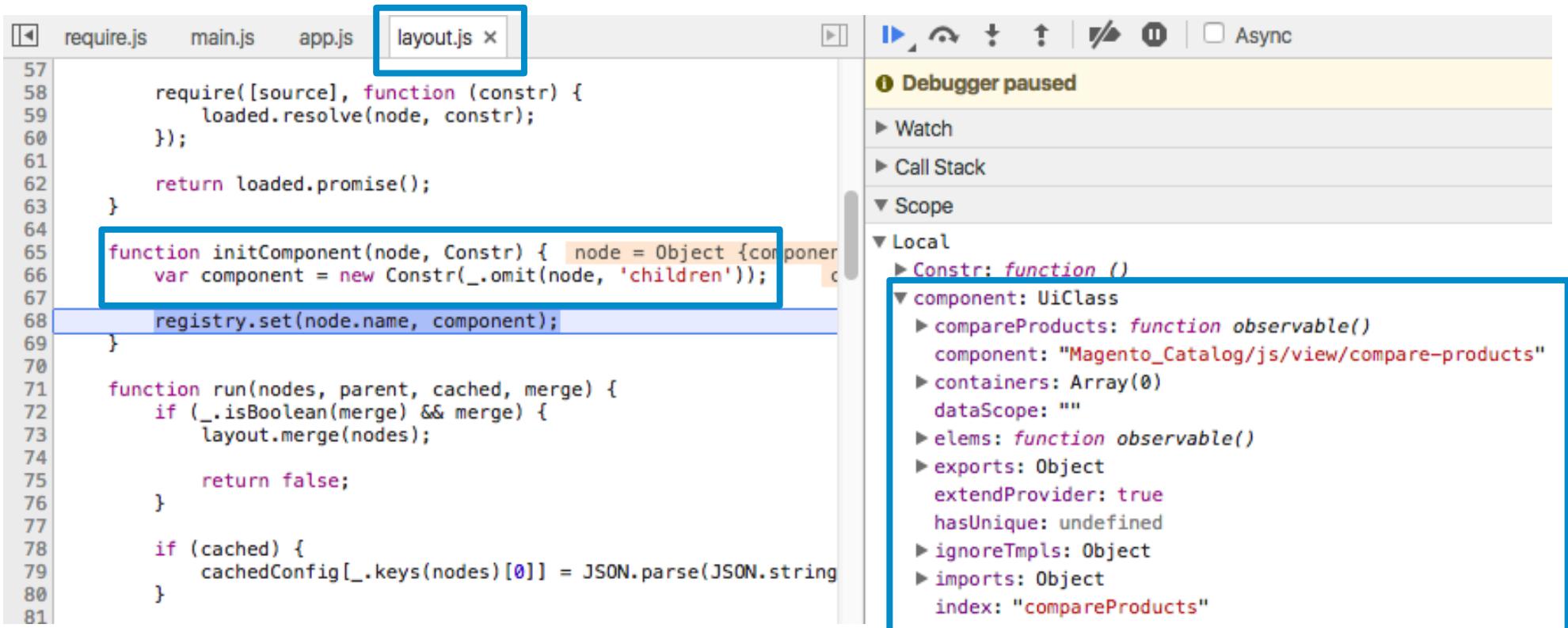
The line `layout(data.components, undefined, true, merge);` is highlighted with a blue rectangle. On the right, the debugger sidebar shows the state of variables at a breakpoint:

- Paused on breakpoint**
- Watch**
- Call Stack**
- Scope**
- Local**

The `Local` panel is expanded, showing the variable `data` which is an object. The `components` property of `data` is also an object, and its `compareProducts` property is further expanded, showing the value `"Magento_Catalog/js/view/compare-products"`. This indicates that the `layout` function has received the configuration for the compare products UI component.

INITIALIZATION PROCESS

- layout.js creates instances of UI components and its child components



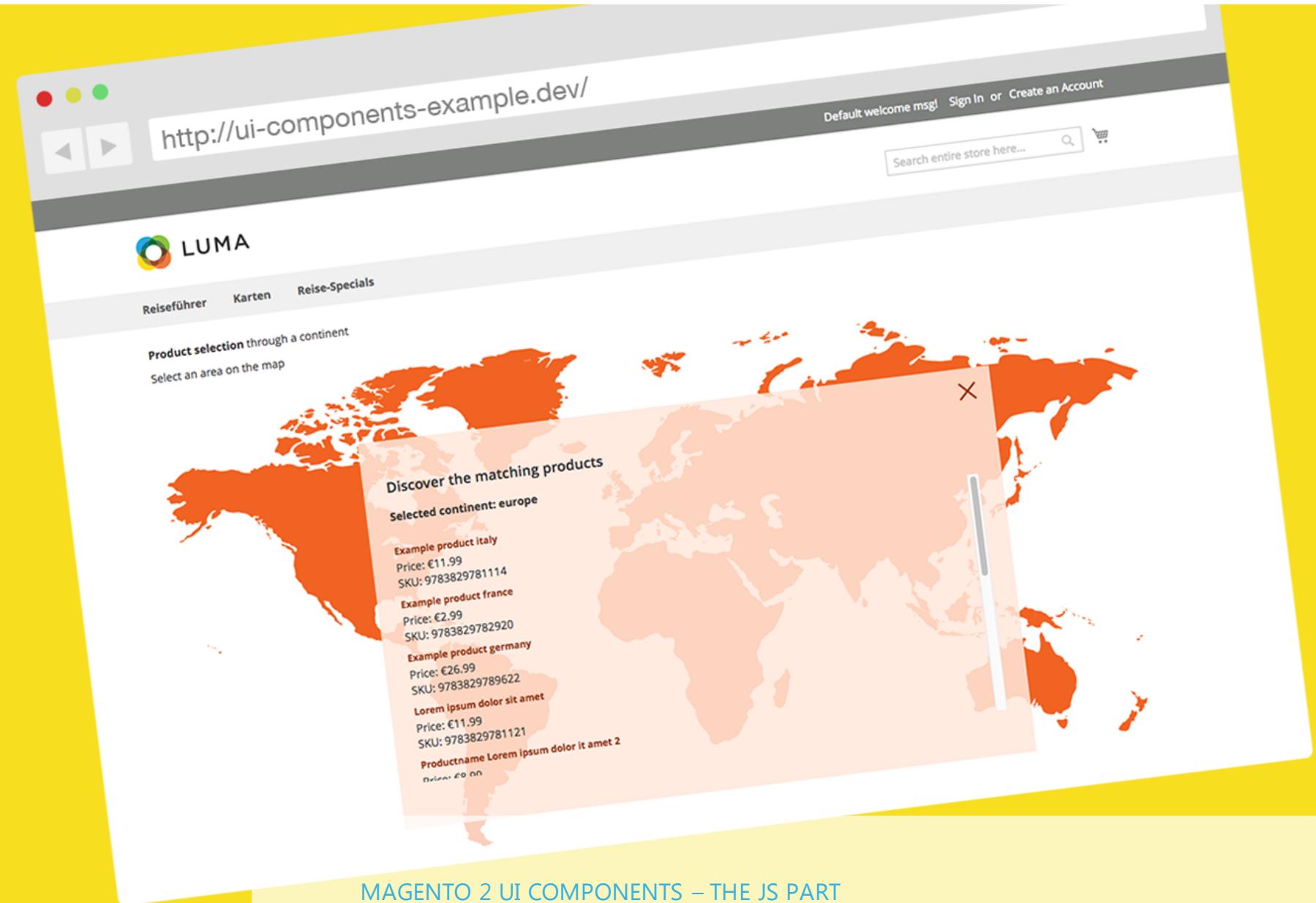
The screenshot shows a code editor with several tabs: require.js, main.js, app.js, and layout.js (which is currently selected). The code in layout.js is as follows:

```

57     require([source], function (constr) {
58         loaded.resolve(node, constr);
59     });
60
61     return loaded.promise();
62 }
63
64
65     function initComponent(node, Constr) { node = Object.assign({}, node, {componentType: 'ui-component'}); }
66     var component = new Constr(_.omit(node, 'children'));
67
68     registry.set(node.name, component);
69 }
70
71     function run(nodes, parent, cached, merge) {
72         if (_.isBoolean(merge) && merge) {
73             layout.merge(nodes);
74
75             return false;
76         }
77
78         if (cached) {
79             cachedConfig[_.keys(nodes)[0]] = JSON.parse(JSON.stringify(node));
80         }
81     }
  
```

To the right of the code editor is a debugger interface. The 'Scope' panel is expanded, showing the 'Local' scope. A specific object, 'component', is highlighted with a blue border. The properties of this object are listed below:

- Constr: function ()
- component: UiClass
 - compareProducts: function observable()
 - component: "Magento_Catalog/js/view/compare-products"
 - containers: Array(0)
 - dataScope: ""
 - elems: function observable()
 - exports: Object
 - extendProvider: true
 - hasUnique: undefined
 - ignoreTmpls: Object
 - imports: Object
 - index: "compareProducts"

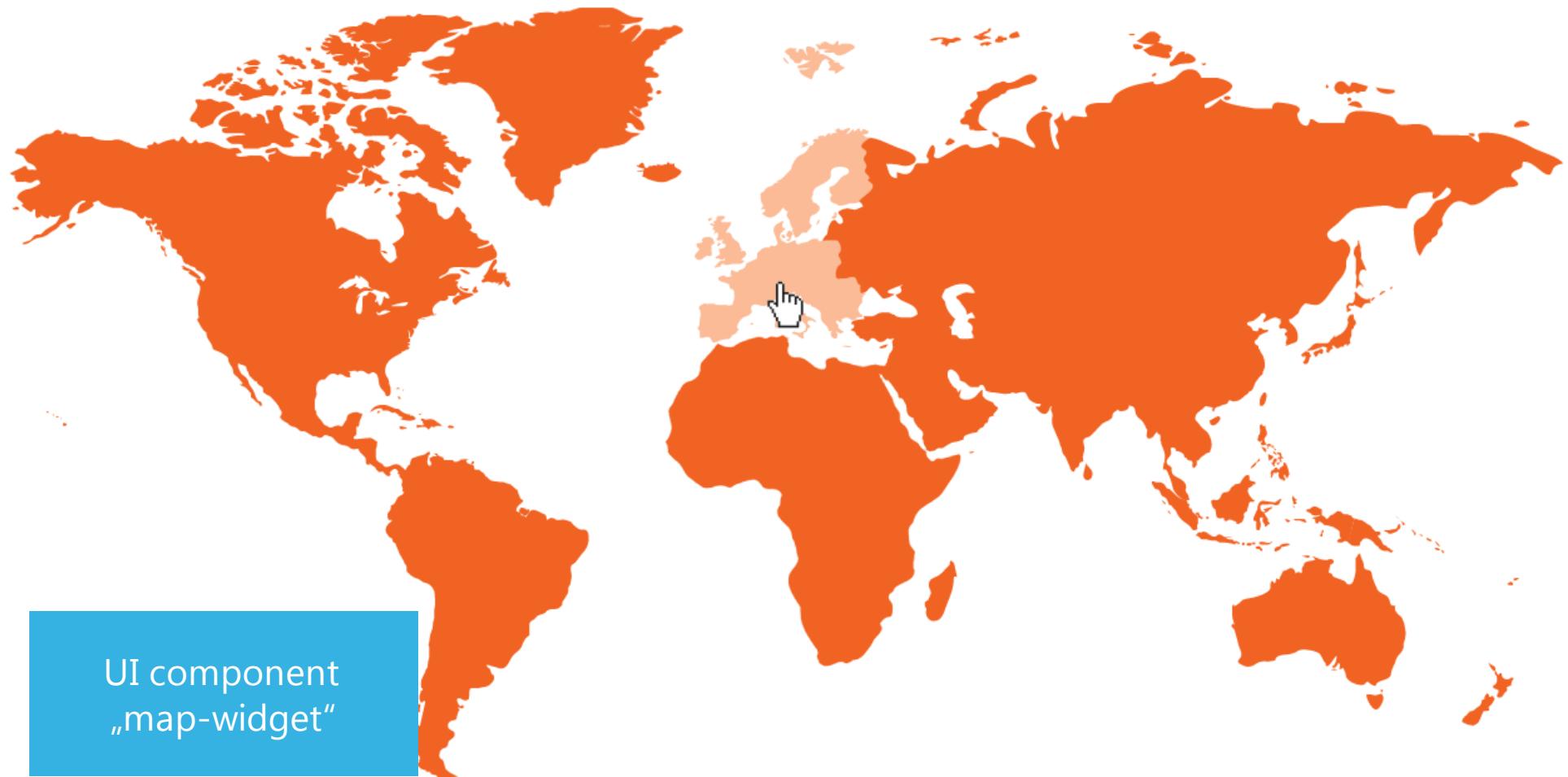


MAGENTO 2 UI COMPONENTS – THE JS PART

Real life example

Product selection through a continent

Select an area on the map



REAL LIFE EXAMPLE

Product selection through a continent

Select an area on the map



REAL LIFE EXAMPLE

Product selection through a continent

Select an area on the map

The image shows a world map where continents are colored in shades of orange, representing different regions or countries. A vertical white bar with a grey scroll bar is positioned on the right side of the map. On the left side, there is a blue rectangular box containing the text "child UI component 'productlist'". Inside this box, a blue arrow points from the text towards the sidebar. The sidebar itself contains the following text:
Discover the matching products
Selected continent: europe
Example product italy
Price: €11.99
SKU: 9783829781114
Example product france
Price: €2.99
SKU: 9783829782920
Example product germany
Price: €26.99
SKU: 9783829789622
Lorem ipsum dolor sit amet
Price: €11.99
SKU: 9783829781121
name Lorem ipsum dolor sit amet 2
...
A large blue arrow points downwards from the sidebar towards the bottom center of the slide, pointing to the text "productlist could be used in other components as well".

Discover the matching products

Selected continent: europe

Example product italy

Price: €11.99

SKU: 9783829781114

Example product france

Price: €2.99

SKU: 9783829782920

Example product germany

Price: €26.99

SKU: 9783829789622

name Lorem ipsum dolor sit amet 2

...
productlist could be used in other components as well

REAL LIFE EXAMPLE

Initialization

UI Components JS and Template files

```

<!--
/*
 * @copyright Copyright (c) 2017 netz98 GmbH (http://www.netz98.de)
 *
 * @see PROJECT_LICENSE.txt
 */
-->
<div class="map-widget" data-block="map-widget" data-bind="visible: isVisible">
    <div data-bind="html: headline"></div>
    <div data-bind="html: text"></div>
    <div class="map_wrapper">
        <div class="map" data-bind="bindHtml: map"></div>
        <!-- ko foreach: getRegion('layer') -->
            <!-- ko template: getTemplate() --><!-- /ko -->
        <!--/ko-->
    </div>
</div>

```

REAL LIFE EXAMPLE

```

<div data-bind="scope: '<?php echo $block->getComponentName() ?>'>" class="map-widget">
  <!-- ko template: getTemplate() --><!-- /ko -->
</div>
<script type="text/x-magento-init">
{
  "*": {
    "Magento_Ui/js/core/app": {
      <?php if($hasJsLayout): ?>
        <?php /* @escapeNotVerified */ echo $block->getJsLayout();?>
      <?php else: ?>
        {
          "components": {
            "<?php echo $block->stripTags($block->getComponentName()) ?>": {
              "component": "N98_MapWidget/js/view/map-widget",
              "headline": "<?php echo $block->getData( key: 'headline'); ?>",
              "text": "<?php echo $block->getData( key: 'text'); ?>",
              "selectionLevel": "<?php echo $block->getData( key: 'selectionLevel'); ?>",
              "mapUrl": "<?php echo $block->getMapUrl(); ?>",
              "isVisible": true,
              "children": {
                "productlist": {
                  "component": "N98_MapWidget/js/view/productlist",
                  "headline": "<h3><?php echo __('Discover the matching products') ?></h3>",
                  "productCount": "<?php echo $block->getData( key: 'productCount'); ?>",
                  "isModal": true,
                  "displayArea": "layer"
                }
              }
            }
          }
        }
      <?php endif; ?>
    }
  }
}
</script>

```

Parent component

Child component

REAL LIFE EXAMPLE

Product selection through a continent

Select an area on the map

Discover the matching products

Selected continent: europe

Example product italy
Price: €11.99
SKU: 9783829781114

Example product france
Price: €2.99
SKU: 9783829782920

Example product germany
Price: €26.99
SKU: 9783829789622

Example product spain
Price: €11.99
SKU: 9783829781121

Example product uk
Price: €0.00
SKU: 9783829781122

Parent extends uiCollection class

```
initElement(child) {}  
this.getChild('productlist')
```



MAGENTO 2 UI COMPONENTS – THE JS PART

Options for debugging

OPTIONS FOR DEBUGGING

Chrome Knockoutjs Context Debugger

Elements Memory Console Sources Network Application Performance Audits Security Magento KnockoutJS

Styles Computed Event Listeners DOM Breakpoints Properties **Knockout context** Magento

```

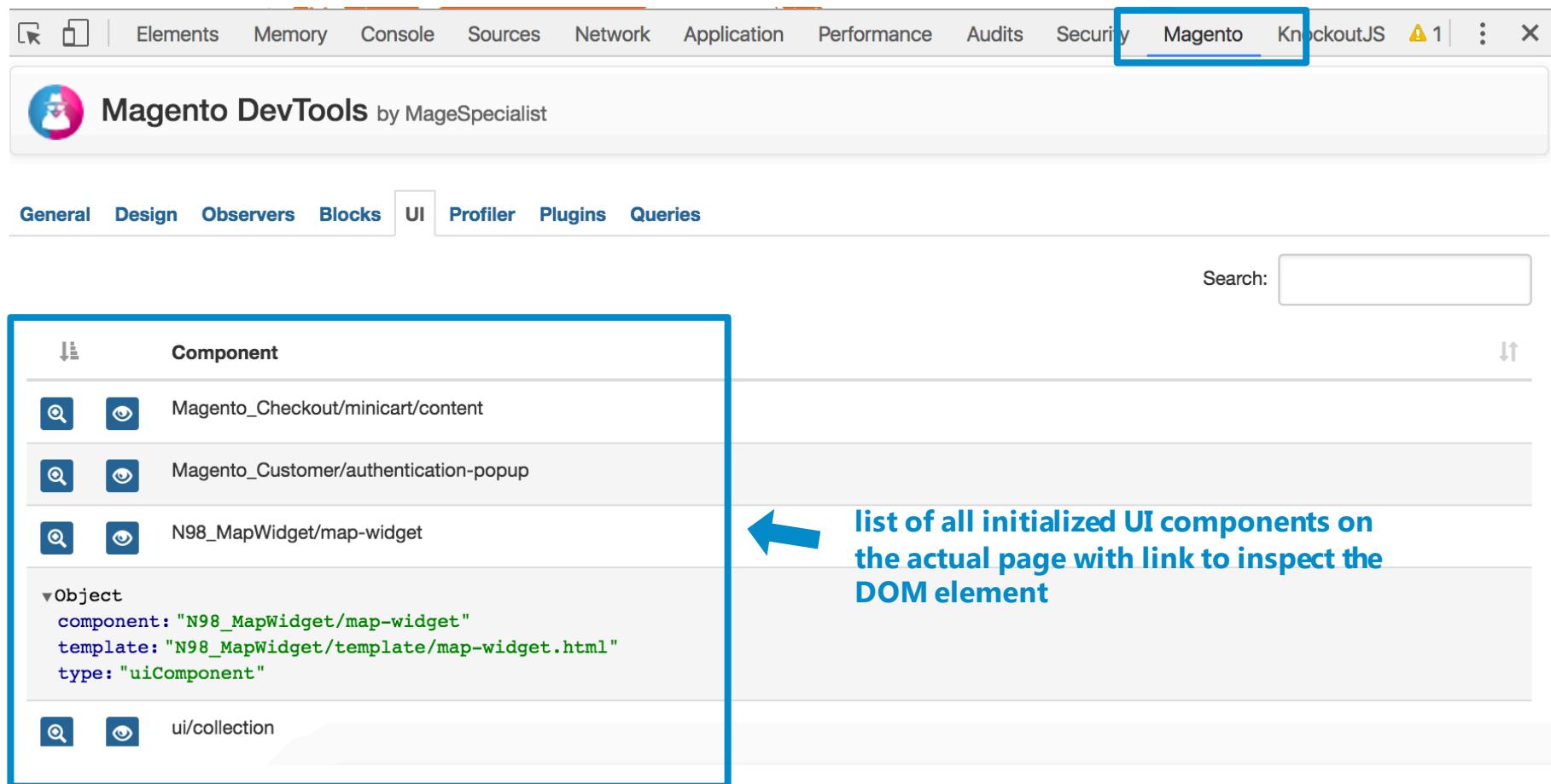
<div data-bind="visible: isVisible" data-mspdevtools-ui="b4019872c3e85a1138fc7145f78dd123">
  <div class="content">
    <div data-bind="html: headline">
      <h3>Discover the matching products</h3> == $0
    </div>
    <h4 class="selected_value" ...>...
    <div class="products">...</div>
    <button type="button" class="action close" data-bind="click: function() { isVisible(false); }, attr: { title: $t('Close') }" title="Close">...</button>
  </div>
<!-- /ko -->
<!--/ko-->
  
```

**click on DOM element
inside UI component scope**

\$data: UiClass
 component: "N98_MapWidget/js/view/productlist"
 containers: Array(1)
 dataScope: ""
 displayArea: "layer"
 elems: *function observable()*
 exports: Object
 extendProvider: true
 hasUnique: undefined
 headline: *function observable()*
 ignoreTmpls: Object
 imports: Object
 index: "productlist"
 isModal: true
 isVisible: *function observable()*
 links: Object
 listens: Object
 loader: *function observable()*
 maps: Object
 modules: Object
 name: "widgetmapwidget0.productlist"
 ns: "widgetmapwidget0"
 parentName: "widgetmapwidget0"

OPTIONS FOR DEBUGGING

Magento DevTools by MageSpecialist, with Chrome extension



The screenshot shows the Magento DevTools interface within a browser's developer tools. The tabs at the top include Elements, Memory, Console, Sources, Network, Application, Performance, Audits, Security, **Magento**, KnockoutJS, and a warning icon. The **Magento** tab is highlighted with a blue border.

The main area displays the "Component" section under the "UI" tab. It lists initialized UI components with icons for search and inspect. The components listed are:

- Magento_Checkout/minicart/content
- Magento_Customer/authentication-popup
- N98_MapWidget/map-widget

Below this, there is an expanded object entry:

```
▼Object
  component: "N98_MapWidget/map-widget"
  template: "N98_MapWidget/template/map-widget.html"
  type: "uiComponent"
```

A blue arrow points from the text "list of all initialized UI components on the actual page with link to inspect the DOM element" to the "Component" section.

list of all initialized UI components on the actual page with link to inspect the DOM element

CONCLUSION

UI COMPONENTS – THE JS PART

PERSONAL PROS & CONS

Advantages

- easy teamwork – standardized programming
- common procedures and requirements have already been implemented
- configuring without inline scripting!

Disadvantages

- it takes time to get familiar with
- sometimes it feels to be restricted in frontend development

THANK YOU!



<http://XXXXXXXXXXXXXX/>

Slides

References:

<http://devdocs.magento.com/>