AngularJS Directives

Objectives

- What are directives?
- The Directive Definition Object
- Link & Compile functions
- Using templates
- Transclusion
- Isolated scope
- Change notification

What are directives?

- Directives are markup extensions to trigger specific behavior
  - Processed by the Angular HTML compiler $compile
- Created using module.directive()
  - Defined through a Directive Definition Object
- Can be used as:
  - Attributes
  - Elements
  - CSS Classes
  - Comments
- Turn your markup into a DSL using custom directives

Verbose Markup

- **What does this do?**

```
<div ng-controller="peopleCtrl as ctrl" class="container">
    <form name="form" class="form-horizontal" role="form">
        <div class="form-group">
            <label class="col-lg-2 control-label">Firstname</label>
            <div class="col-lg-8">
                <input type="text" class="form-control" ng-model="person.firstName" />
            </div>
        </div>
        <div class="form-group">
            <label class="col-lg-2 control-label">Lastname</label>
            <div class="col-lg-8">
                <input type="text" class="form-control" ng-model="person.lastName" />
            </div>
        </div>

        <div class="form-group">
            <div class="col-lg-offset-2 col-lg-8">
                <button ng-click="ctrl.save()" class="btn btn-primary">Save</button>
            </div>
        </div>
    </form>
</div>
```

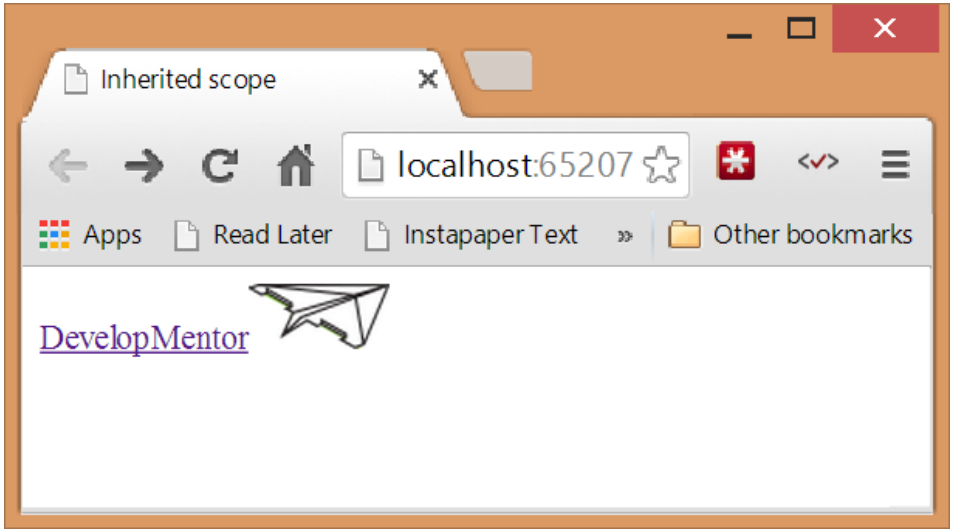
Angular as a Domain Specific Language

- **What does this do?**

```
<div ng-controller="peopleCtrl as ctrl"
     class="container">

    <my-person-editor model="person"
                      on-save="ctrl.save()" />
</div>
```

Example: Creating a reusable logo

```
<body ng-app="myApp">

    <dm-logo />

    <script src="/Scripts/angular.js"></script>
    <script src="App.js"></script>
</body>
```



Example: Creating a reusable logo

- Only usable as an element
- Replaces the element with the template

```
var app = angular.module('myApp', []);

app.directive('dmLogo', function () {
    var ddo = {
        restrict: 'E',
        replace: true,
        template: '<a href="http://www.develop.com/">' +
            '<span>DevelopMentor</span>' +
            '<img src="/images/v3/logos/dm-logo-airplane.png">' +
            '</a>'
    };

    return ddo;
});
```

Example: Setting focus to an element

```
<body ng-app="myApp">

    <input type="text" value="" dm-set-focus="“true" />

    <script src="/Scripts/angular.js"></script>
    <script src="App.js"></script>
</body>
```

Example: Setting focus to an element

- Only usable as an attribute
- Link function does the actual work

```
var app = angular.module('myApp', []);

app.directive('dmSetFocus', function () {
    var ddo = {
        restrict: 'A',
        link: function (scope, element) {
            element[0].focus();
        }
    };

    return ddo;
});
```

The Directive Definition Object

- Defines a directive for the compiler
  - scope
  - require
  - restrict
  - link/compile
  - priority
  - controller
  - template/templateUrl
  - replace
  - transclude

Restricting a directive

- The restrict property determines how a directive can be used
  - Multiple options are possible
- Defaults to Attribute if omitted
- Options
  - E : Element
    <my-menu title=Products></my-menu>
  - A : Attribute
    </my-menu>
  - C : CSS Class

  - M : HTML Comment
    <!-- directive: my-menu Products -->

Link & Compile functions

- Allow full access to the DOM objects
- Normally only the link function is needed
  - Compile function works with templates

The link function

- The link function is used to set register DOM event handlers
  - Has access to the current scope
- Executed one for each element instance
  - After templates have been cloned
- The element passed is a jqLite element
  - A stripped down version of jQuery
  - If jQuery is included it will be a full jQuery object

The link function

```
var app = angular.module('myApp', []);

app.directive('myDirective', function () {
    return {
        link: function (scope, iElement, iAttrs, ctrl, tran) {
            iElement.on('click', function () {
                console.log('Clicked on', iElement);
            });
        }
    };
});
```

The compile function

- The compile function transforms the template DOM
  - Not that commonly used
- Cannot be combined with a link function in the DDO
  - Instead return the link function from the compile function

Combining link & compile functions

```
<body ng-app="myApp">
    <div my-directive>
        Lorem ipsum dolor sit amet.
    </div>

    <ul>
        <li ng-repeat="val in ['One','Two','Three']"
            my-directive>{{val}}</li>
    </ul>
</body>
```

```
app.directive('myDirective', function () {
    return {
        compile: function compile(tElement, tAttrs) {
            console.log('compiling', tElement);

            return function link(scope, iElement, iAttrs, ctrl, tran) {
                console.log('linking', scope, iElement);
            };
        }
    };
});
```

Combining link & compile functions

Inherited scope

localhost:65207/Scopes/Inherited.html

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Lorem ipsum dolor sit amet, consectetur adipiscing elit fusce vel sapien elit in malesuada semper mi, id sollicitudin urna fermentum ut fusce varius nisl ac ipsum gravida vel pretium tellus.

- One
- Two
- Three

Elements | Resources | Network | Sources | Timeline | Profiles | Audits | Console | AngularJS

```
compiling ▶[div, ready: function, toString: function, eq: function, push: function, sort: function…]   App.js:7
compiling ▶[li, ready: function, toString: function, eq: function, push: function, sort: function…]   App.js:7
linking ▶Scope {$id: "002", $$childTail: null, $$childHead: null, $$prevSibling: null, $$nextSibling: null…}
▶[div, ready: function, toString: function, eq: function, push: function, sort: function…]   App.js:10
linking ▶Child {$id: "003", this: Child, $$listeners: Object, $parent: Scope, $$childTail: null…}
▶[li.ng-scope ng-binding, ready: function, toString: function, eq: function, push: function, sort: function…]   App.js:10
linking ▶Child {$id: "004", this: Child, $$listeners: Object, $parent: Scope, $$childTail: null…}
▶[li.ng-scope ng-binding, ready: function, toString: function, eq: function, push: function, sort: function…]   App.js:10
linking ▶Child {$id: "005", this: Child, $$listeners: Object, $parent: Scope, $$childTail: null…}
▶[li.ng-scope ng-binding, ready: function, toString: function, eq: function, push: function, sort: function…]   App.js:10
>
```

<top frame> | <page context> | All | Errors | Warnings | Logs | Debug

Using templates

- Templates can be used to insert markup
  - Replaced the inner content unless replace is true
- The original inner content is replaced
  - Unless transclusion is specified
- Templates can be inline or loaded through a templateUrl
  - Inline is only practical for small templates
- A templateUrl is loaded when first needed and cached
  - Can be preloaded as script bock type text/ng-template
  - The id should be the same as the Url

Transclusion

- Inserts the original content into the template
  - Otherwise this is lost
- Add transclude: true to the Directive Definition Object
  - Insert the ng-transclude directive into the template

```
<div my-transcluded-directive>
    <span>Original content</span>
</div>
```

```
app.directive('myTranscludedDirective', function () {
    return {
        template: '<div>From template</div>' +
                  '<div ng-transclude></div>' +
                  '<div>More template</div>',
        transclude: true
    };
});
```

Isolating the Scope

- By default a directive shares it's parents scope
  - Often not a good solution
- A directive can have it's own scope
  - Inherited scope
  - Isolated scope
- A DOM element can be associated with a single scope
  - The most restrictive is applied

No scope

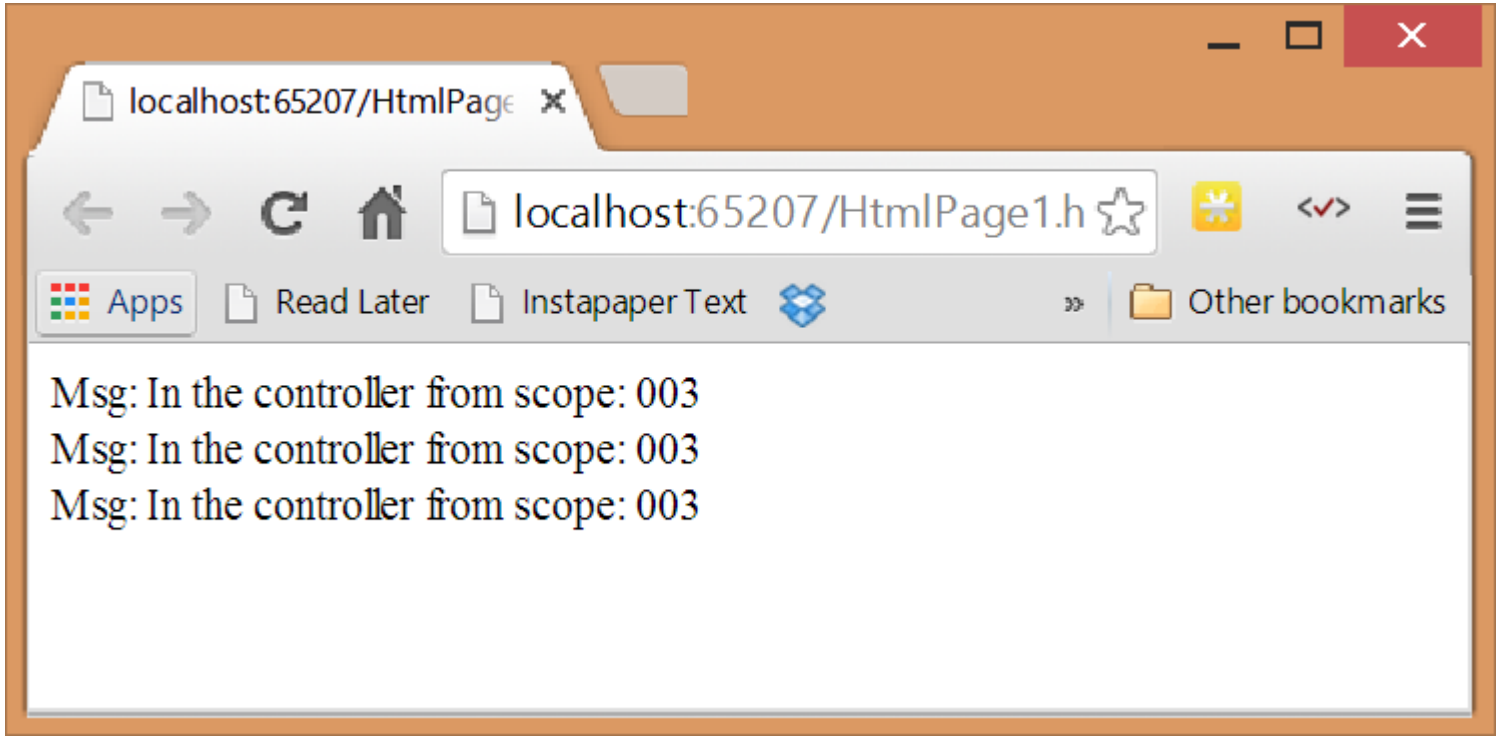
- Uses its parent scope

```
<div ng-controller="myCtrl">
    <div>Msg: {{msg}} from scope: {{$id}}</div>
    <div my-unscoped-directive></div>
    <div my-unscoped-directive></div>
</div>
```

```
app.controller('myCtrl', function ($scope) {
    $scope.msg = “In the controller";
});

app.directive('myUnscopedDirective', function () {
    return {
        template: '<div>Msg: {{msg}} from scope: {{$id}}</div>',
    };
});
```

No scope



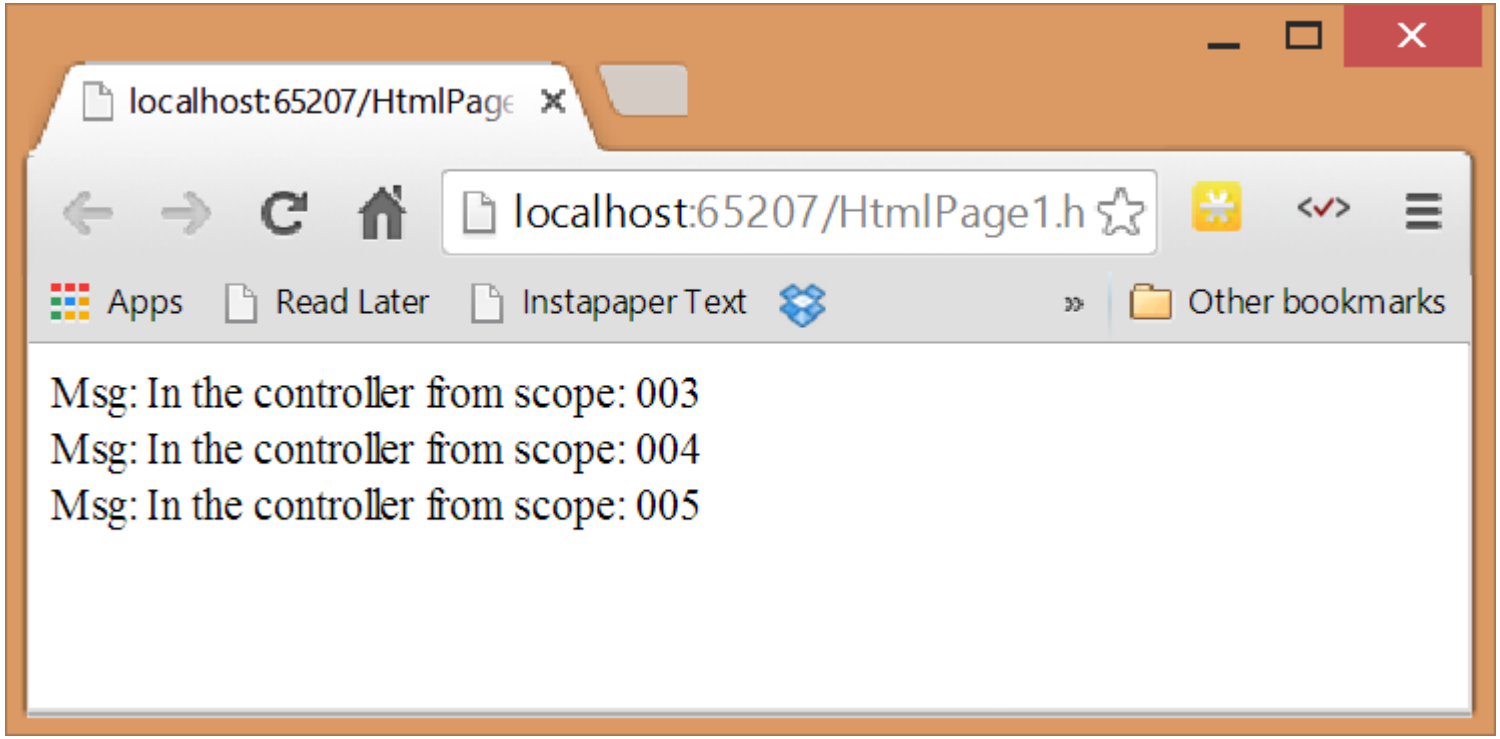
Inherited scope

- Creates a new scope
  - Prototypically linked to its parent scope

```
<div ng-controller="myCtrl">
    <div>Msg: {{msg}} from scope: {{$id}}</div>
    <div my-linked-scoped-directive></div>
    <div my-linked-scoped-directive></div>
</div>
```

```
app.directive('myLinkedScopedDirective', function () {
    return {
        template: '<div>Msg: {{msg}} from scope: {{$id}}</div>',
        scope: true
    };
});
```

Inherited scope



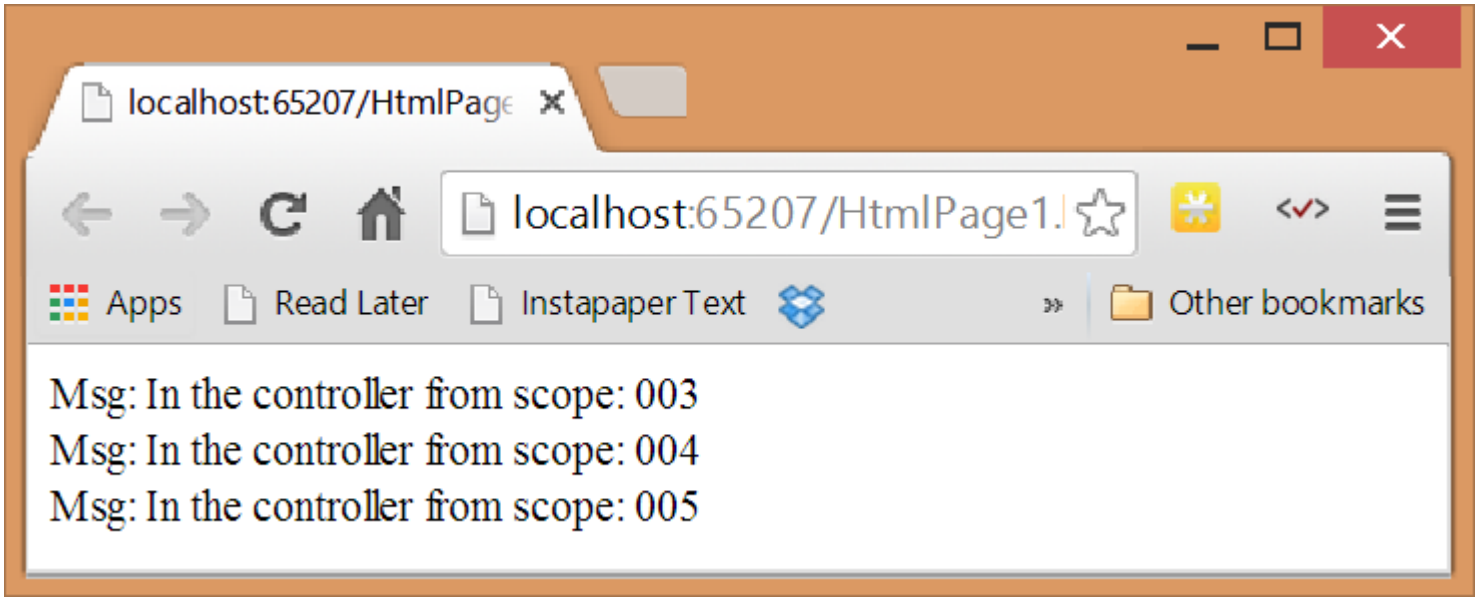
Isolated scope

- Creates a new scope
  - Not linked to its parent scope

```
<div ng-controller="myCtrl">
    <div>Msg: {{msg}} from scope: {{$id}}</div>
    <div my-isolated-scoped-directive the-msg="msg"></div>
    <div my-isolated-scoped-directive the-msg="msg"></div>
</div>
```

```
app.directive('myIsolatedScopedDirective', function () {
    return {
        template: '<div>Msg: {{theMsg}} from scope: {{$id}}</div>',
        scope: { theMsg: '=' }
    };
});
```

Isolated scope



Isolated scope

- The scope has no prototypical link to the parent scope
  - Properties are not just available
  - Can be reached explicitly via $parent
- Populate the scope with:
  - Parent scope items using =
  - Attribute strings using @
  - Function expressions from parent scope using &

Require

- Requires another directive to the present
  - Can be optional or located on the parent element
  - Possible to specify an array if needed
- Use $setViewValue() to update the underlying model
  - Updates ngForm values like $pristine and $dirty

```
return {
        require: "ngModel",
        link: function (scope, element, attrs, ctrl) {
                ctrl.$setViewValue("New Value");
        }
};
```

Change notification

- The $watch function on the scope will notify of changes
  - Use either a watch function or expression string
- The $watch function will be called often!
  - Be careful with performance
- Specify true as the third parameter for a deep watch
  - Also watched nested objects

Change notification

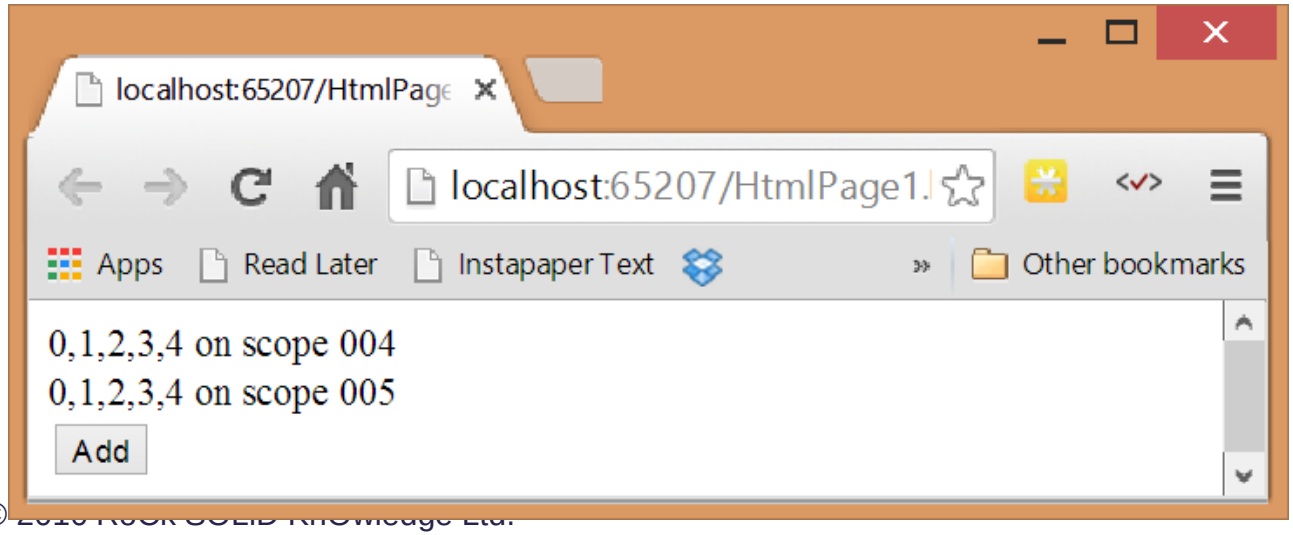
```
<div ng-controller="myCtrl">
    <div my-watching-directive values="values"></div>
    <div my-watching-directive values="values"></div>
    <button ng-click="addNumber()">Add</button>
</div>
```

```
app.controller('myCtrl', function ($scope) {
    $scope.values = [0, 1];

    $scope.addNumber = function () {
        $scope.values.push($scope.values.length);
    };
});
```

Change notification

```
app.directive('myWatchingDirective', function () {
    return {
        link: function (scope, element) {
            scope.$watch('values', function (newVal) {
                element.text(newVal.toString() +
                    " on scope " + scope.$id);
            }, true);
        },
        scope: { values: '=' }
    };
});
```



Cleaning up

- Sometimes you need to do cleanup work in a directive
  - Unbind event handlers
- Add an event handler for the $destroy event
  - Either on the element or the scope

- element.on('$destroy', …)
- scope.$on('$destroy', …)

Summary

- Directives are markup extensions to trigger specific behavior
  - Defined using the Directive Definition Object
- Use the link function to add DOM event handlers
- Using templates to insert new markup
  - Transclude markup into templates where needed
- Isolate the directives scope as needed
  - Only include the data you really need
- Use change notification for updates
  - Do not forget to clean up after yourself