OpenEdge REST Backends, JSDO, Kendo UI & Angular

Modern technology for modern web frontends

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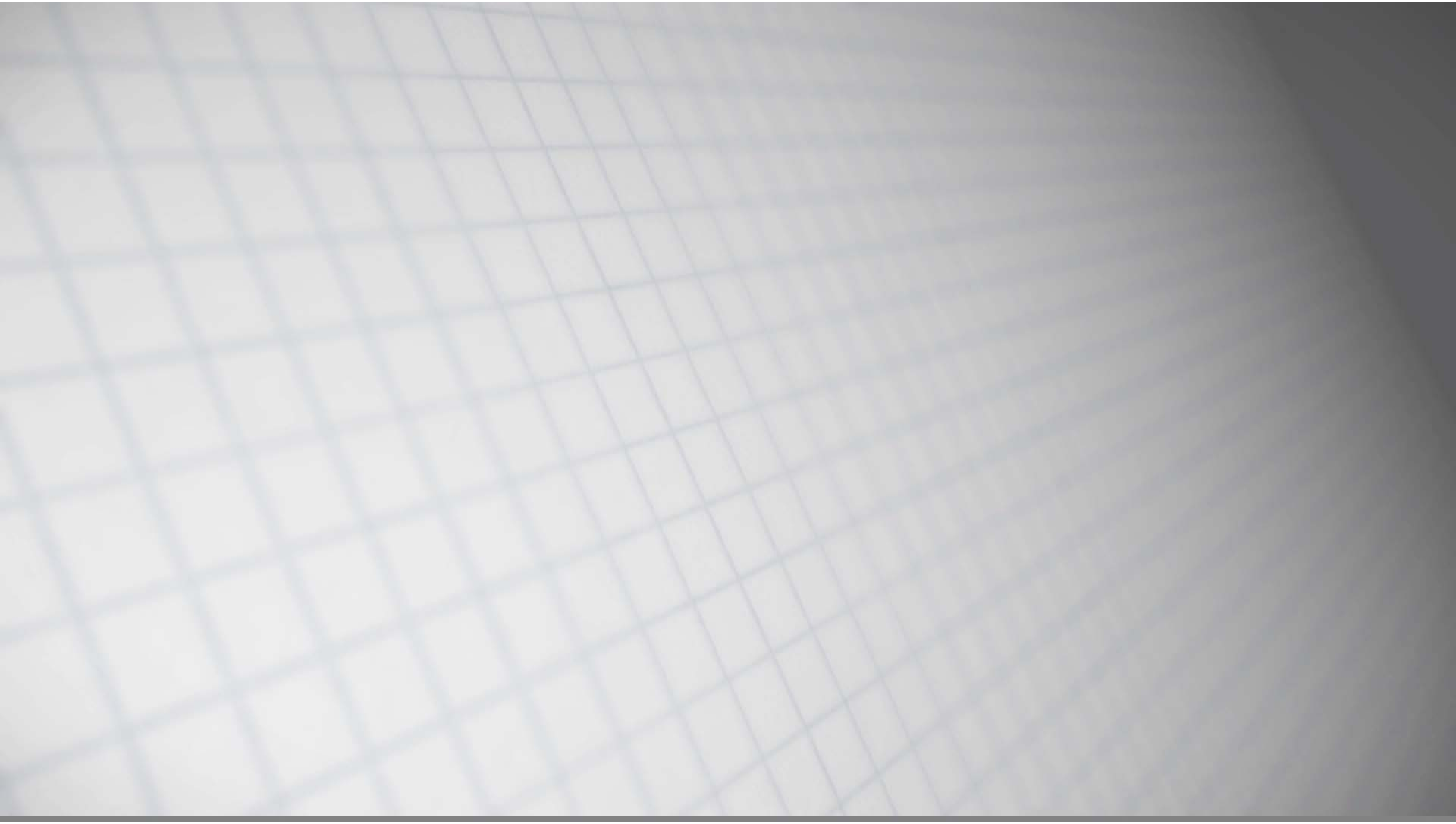


Consultingwerk Ltd.

- Independent IT consulting organization
- Focusing on **OpenEdge** and **related technology**
- Located in Cologne, Germany, and UK subsidiary
- Customers in Europe, North America, Australia and South Africa
- Vendor of tools and consulting programs
- 27 years of Progress experience (V5 … OE11)
- Specialized in GUI for .NET, OO, Software Architecture, Application Integration

Sample Code on Github

- https://github.com/consultingwerk/Angular2JsdoSamples

Agenda

- **Angular / Angular 2**
- Kendo UI Components for Angular
- JSDO
- OpenEdge REST Backends
- Using the JSDO with Angular 2
- Using the JSDO with Type Script Bindings
- Application Infrastructure Components

Angular

- Application development **platform** for **web** and **mobile applications**
- Open-Source, developed primarily by **Google** and others
  - **Progress Telerik** (NativeScript), **Microsoft**
- Development framework
- Component based architecture
- Dependency injection
- Data binding
- Object oriented

Angular Development Environment

- **Angular CLI** (command line interface)
  - Create new projects and modules
  - Create new components, services, etc.
  - Execute, Test and Deploy Application
- **TypeScript** (JavaScript compatible object oriented language), developed by Anders Hejlsberg (Microsoft), author of C#, Delphi and Turbo Pascal
  - Finally a well designed language for the web

Angular Development Environment

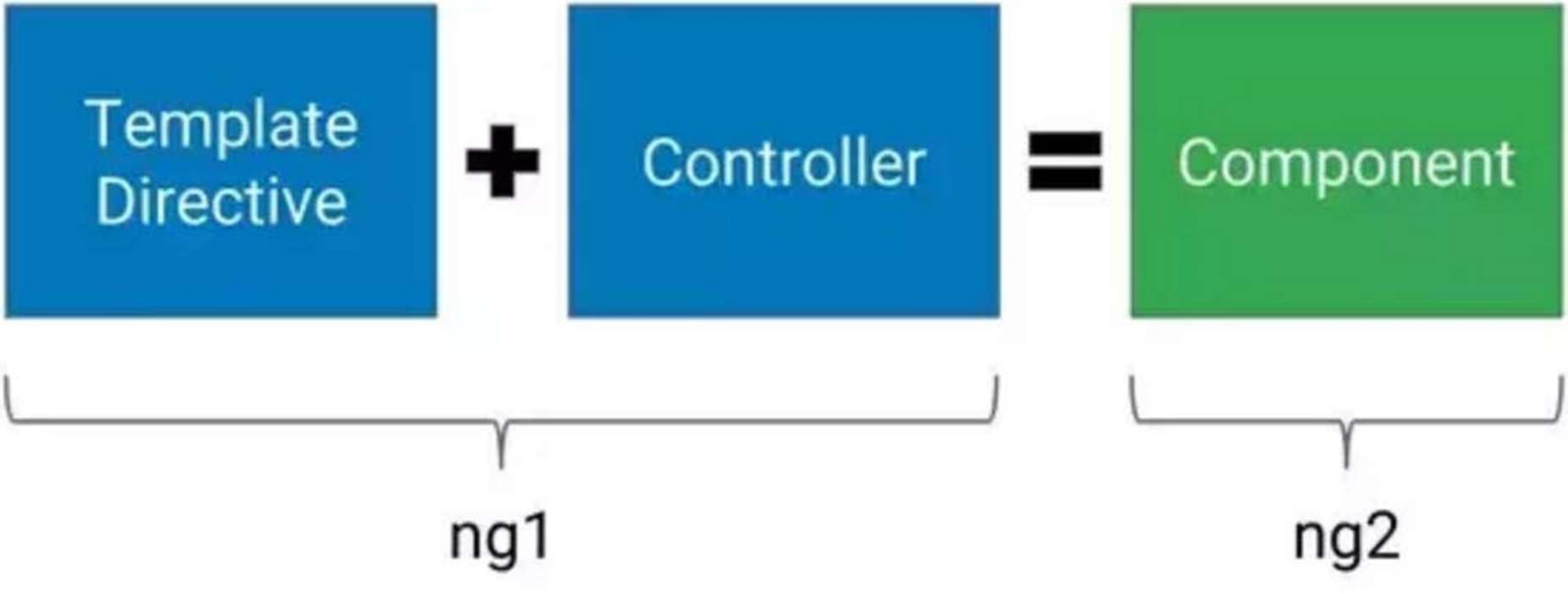
- Choice of TypeScript and Angular aware editors
  - Microsoft **Visual Studio Code** (free and cross platform)
  - Sublime Text
  - Eclipse, …
- **npm** – Node Package Manager
  - Repository of libraries for JavaScript and Angular Development
  - Management of peer dependencies

Angular vs. AngularJS

- Angular is not the next version of AngularJS (currently in version 1.5)
- Angular is a complete rewrite in a new language (TypeScript)
- Angular JS is just a framework
- Compatibility and conversion of Angular JS
  - **NO goal** during the development
- Angular developed with mobile as priority (performance of mobile applications important)
- Angular **performs** up to 5 times **better**

Angular vs. AngularJS

- **AngularJS controllers** no longer present in Angular
- Angular introduces **components**



Angular vs. Angular

- Angular 2 was the first version of Angular (released September 2016)
- Current Version is Angular v4.0 (released March 2017)
- Version 3 was skipped (to avoid confusion about versions …)

- Due to rapid development, the version number is no longer part of the “product” name
- Angular 2 still widely used as a synonym for Angular, *ng* used as the typical abbreviation

Demo

- Create new Angular CLI project
- „ng serve“ to start the development server
- Generate simple component
- Insert into app.html
- Change component property in code
- Demonstrate data binding and auto-refresh

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Kendo UI for Angular

- Two versions of Kendo UI available
  - New set of components for Angular 2
  - Previous set of components, now called Kendo UI for JQuery (with AngularJS bindings)
- Different implementations, complete rewrite in TypeScript
- Similar set of components
- Not all components available yet

Kendo UI for Angular Roadmap

- http://www.telerik.com/kendo-angular-ui/roadmap/
- RC.0 shipped January 2017
- Included in Kendo UI Professional
- Scheduler, TreeView, TreeList, and Editor will be added in later releases
- Feature parity with JQuery based Kendo UI planned

Demo

- Show grid demos on http://www.telerik.com/kendo-angular-ui/components/grid/, including
  - „grouping“ (on plunker)
  - „detail template“ (on plunker)
- Inputs
- Scrollview
- Upload
- …

Data Source Support

- Kendo UI for Angular does not have it‘s own concept of Data Sources
- **Data Source in Kendo for JQuery** (AngularJS) provides abstraction type of remote data, including full automation of Batching/Paging/Sorting/Filtering
- Kendo UI Data Source for the JSDO provided automated binding of Kendo UI components to OpenEdge Business Entities
- **No such component available for Angular 2!**

Data Source Support

- Kendo Components bound to **Array**‘s (table = array of row objects)
- For paging, data should be bound to a **GridDataResult** object (provided by Kendo UI)
- Data Access to be implemented in Application source code, instead of a UI component (Kendo Data Source)
- Flexibility, but more responsibility for developer

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JSDO

- JavaScript Library to provide access for JavaScript (Web Browser, Mobile, Rollbase) clients to OpenEdge Data Object Services (Business Entities)
- Introduced in OpenEdge 11.2 for OpenEdge Mobile
- Included in Telerik Platform
- Included in Rollbase
- Can be used with any JavaScript client
- Github, Apache license, royalty free

JSON Catalog

- Describes capabilities of OpenEdge backend resource to JSDO
- Required to create JSDO instance
- Describes methods for
  - create, update, delete
  - read
  - submit
  - count
  - custom operations (invokable methods)

Demo

- Simple JSDO Sample (show source and explain) http://oemobiledemo.progress.com/jsdo/example001.html
- JSDO with JQuery grid and Kendo UI Data Source (show source, explain session, catalog and Kendo UI Grid constructor) http://oemobiledemo.progress.com/jsdo/example014.html

localhost:8820/web/Catalc

localhost:8820/web/Catalog/Consultingwerk.SmartComponentsDemo.OERA.Sports2000.SalesRepBusinessEntity

```
// 20160625122443
//
http://localhost:8820/web/Catalog/Consultingwerk.SmartComponentsDemo.OERA.Sports2000.SalesRepBusinessEntity

{
  "version": "1.2",
  "lastModified": "2016-06-25T12:24:42.691+02:00",
  "services": [
    {
      "name": "web-Consultingwerk.SmartComponentsDemo.OERA.Sports2000.SalesRepBusinessEntity",
      "address": "/Resource",
      "useRequest": true,
      "resources": [
        {
          "name": "Consultingwerk.SmartComponentsDemo.OERA.Sports2000.SalesRepBusinessEntity",
          "path": "/Consultingwerk.SmartComponentsDemo.OERA.Sports2000.SalesRepBusinessEntity",
          "autoSave": true,
          "schema": {
            "type": "object",
            "additionalProperties": false,
            "properties": {
              "dsSalesRep": {
                "type": "object",
                "additionalProperties": false,
                "properties": {
                  "eSalesrep": {
                    "type": "array",
                    "items": {
                      "additionalProperties": false,
                      "properties": {
                        "_id": {
                          "type": "string"
                        },
```

Catalog Header, Addre

```
    },
    "_errorString": {
      "type": "string"
    },
    "CustNum": {
      "type": "integer",
      "ablType": "INTEGER",
      "default": 0,
      "title": "Cust Num"
    },
    "Country": {
      "type": "string",
      "ablType": "CHARACTER",
      "default": "USA",
      "title": "Country"
    },
    "Name": {
      "type": "string",
      "ablType": "CHARACTER",
      "default": "",
      "title": "Kundenname"
    },
    "Address": {
      "type": "string",
      "ablType": "CHARACTER",
      "default": "",
      "title": "Address"
    },
    "Address2": {
      "type": "string",
      "ablType": "CHARACTER",
      "default": "",
      "title": "Address2"
    },
    "City": {
      "type": "string",
      "ablType": "CHARACTER",
      "default": "",
```

ProDataset Schema definition

```
  "relations": [
    {
      "relationName": "RELATION1",
      "parentName": "eCustomer",
      "childName": "eSalesrep",
      "relationFields": [
        {
          "parentFieldName": "SalesRep",
          "childFieldName": "SalesRep"
        }
      ]
    }
  ],
  "operations": [
    {
      "name": "count",
      "path": "/count?filter={filter}",
      "useBeforeImage": false,
      "type": "invoke",
      "verb": "put",
      "params": [

      ]
    },
    {
      "path": "",
      "useBeforeImage": true,
      "type": "update",
      "verb": "put",
      "params": [
        {
          "name": "dsCustomer",
          "type": "REQUEST_BODY"
        }
      ]
    },
    {
```


List of supported operations

JSDO and ProDatasets

- The JSDO maps ProDatasets to JavaScript
- Provides DATA-RELATIONS
- Provides TRACKING-CHANGES support required for create, delete and update of records
- Understands validation error messages returned by OpenEdge backend services

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Sample ProDataset JSON output

- { } wraps a single object
- [ ] wraps an array of objects
- All strings are quoted
- Data types: Number, String, Boolean, Array, Object, Null
- Everything else must be passed as a String (e.g. Date)
- No real standard for Date


```
{"dsOrder": {
  "eOrder": [
    {
      "Ordernum": 1,
      "CustNum": 53,
      "OrderDate": "2009-01-23",
      "ShipDate": "2009-01-28",
      "PromiseDate": "2009-01-28",
      "Carrier": "FlyByNight Courier",
      "Instructions": "Handle with care",
      "SalesRep": "RDR",
      "OrderStatus": "Shipped",
      "Creditcard": "Master Card",
      "eOrderLine": [
        {
          "Ordernum": 1,
          "Linenum": 1,
          "Itemnum": 54,
          "Price": 4.86,
          "Qty": 30,
          "Discount": 10,
          "ExtendedPrice": 131.22,
          "OrderLineStatus": "Shipped"
        }
      ]
    }
  ]
}}
```

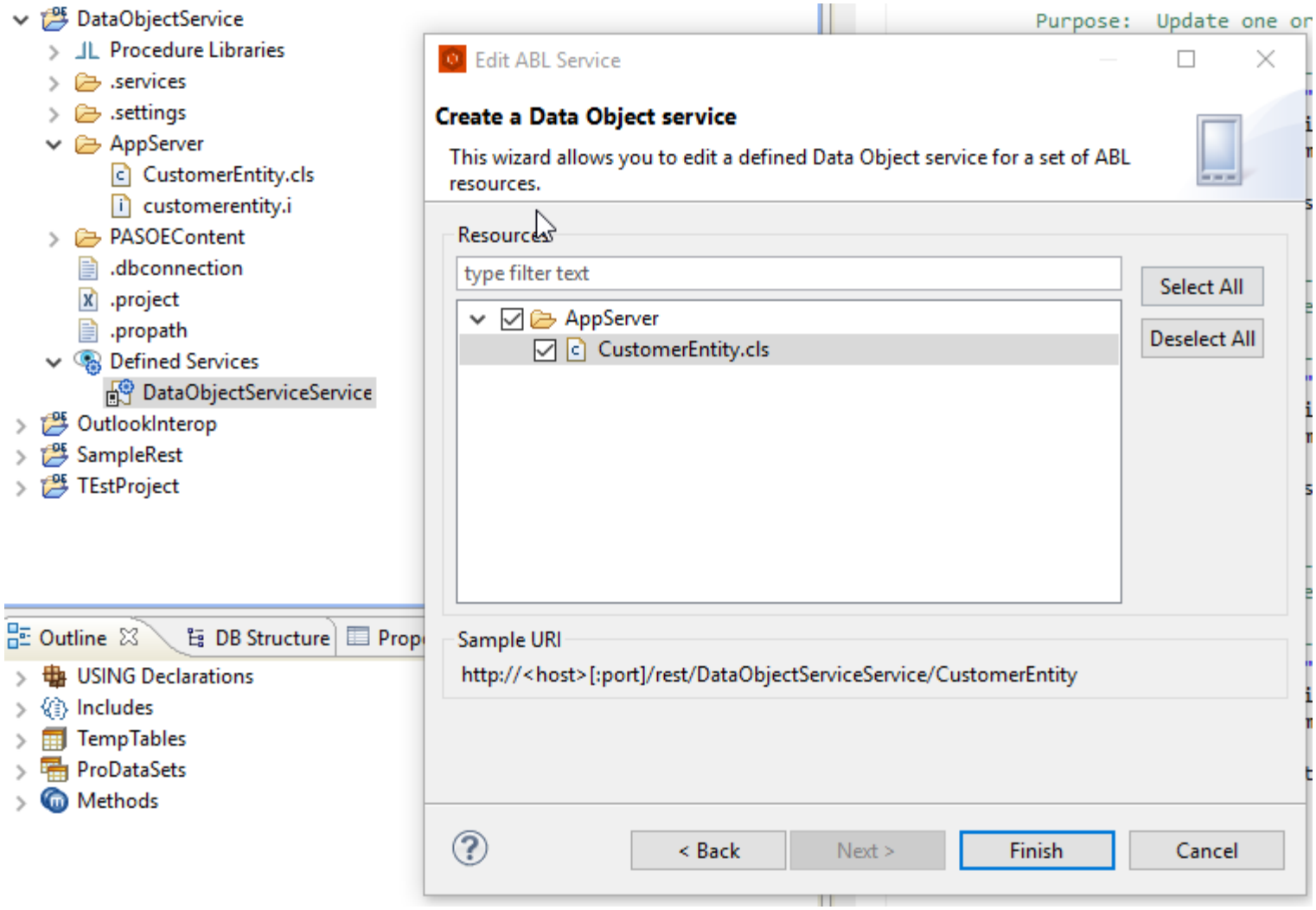
REST Adapter

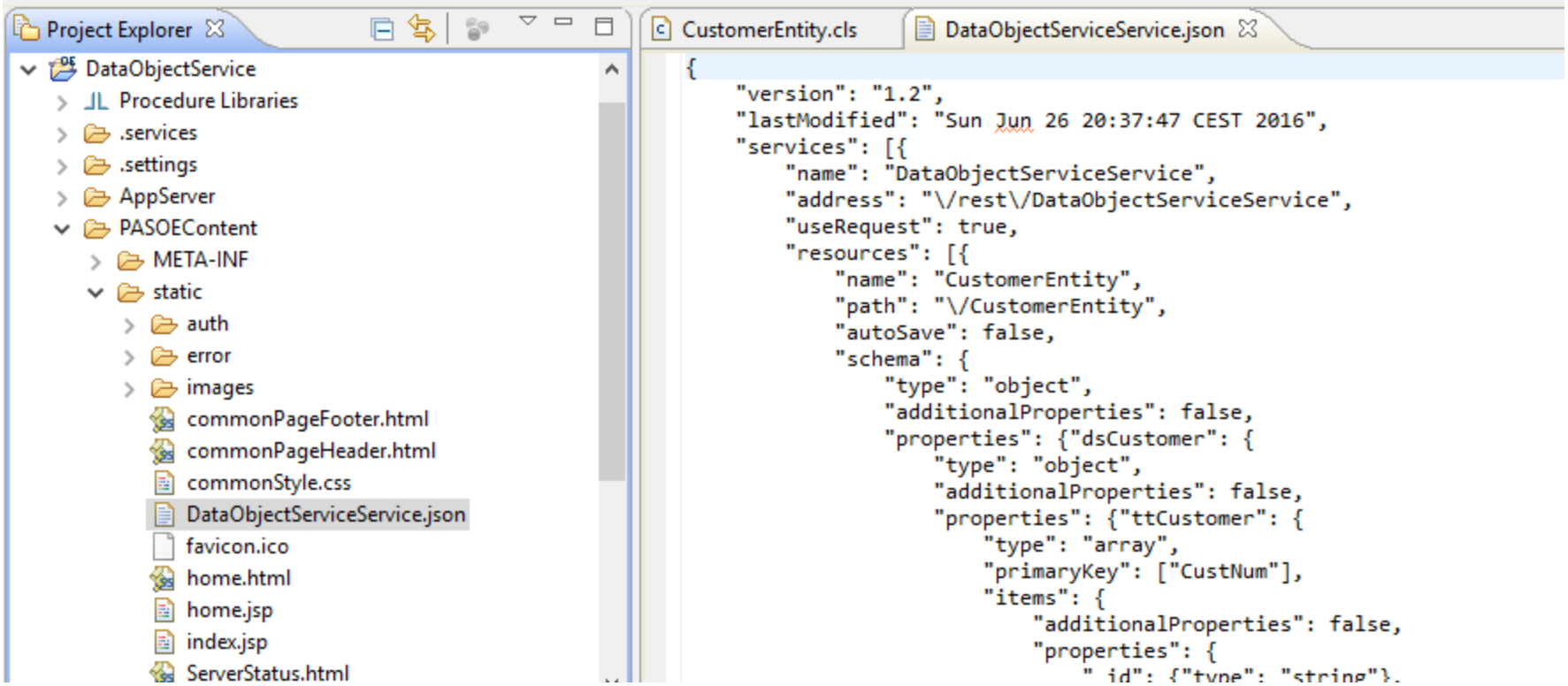
- JavaServlet that translates REST messages into AppServer calls
- Similar to WSA and AIA
- Tooling integrated into Progress Developer Studio
- Not integrated into ProxyGen
- Can be deployed on standard Tomcat
- Integrated in PASOE as the REST transport

CustomerEntity.cls | customerentity.i

```
@program FILE(name="CustomerEntity.cls", module="AppServer").
@openapi.openedge.export FILE(type="REST", executionMode="singleton", useReturnValue="false", writeDataSetBeforeIm
@progress.service.resource FILE(name="CustomerEntity", URI="/CustomerEntity", schemaName="dsCustomer", schemaFile=

USING Progress.Lang.*.
USING OpenEdge.BusinessLogic.BusinessEntity.

BLOCK-LEVEL ON ERROR UNDO, THROW.

CLASS CustomerEntity INHERITS BusinessEntity:
    /*------------------------------------------------------------------------
            Purpose:
            Notes:
    ----------------------------------------------------------------------*/

    {"customerentity.i"}

    DEFINE DATA-SOURCE srcCustomer FOR sports2000.Customer.
```

```
@openapi.openedge.export(type="REST", useReturnValue="false", writeDataSetBeforeImage="true")
@progress.service.resourceMapping(type="REST", operation="read", URI="?filter=~{filter~}", al
METHOD PUBLIC VOID ReadCustomerEntity(
        INPUT filter AS CHARACTER,
        OUTPUT DATASET dsCustomer):

    SUPER:ReadData(filter).

END METHOD.
```


DataObjectService
Procedure Libraries
.services
.settings
AppServer
CustomerEntity.cls
customerentity.i
PASOEContent
.dbconnection
.project
.propath
Defined Services
DataObjectServiceService
OutlookInterop
SampleRest
TEstProject
Outline
DB Structure
USING Declarations
Includes
TempTables
ProDataSets
Methods
Purpose: Update one or
Edit ABL Service
Create a Data Object service
This wizard allows you to edit a defined Data Object service for a set of ABL resources.
Resources
type filter text
AppServer
CustomerEntity.cls
Select All
Deselect All
Sample URI
http://<host>[:port]/rest/DataObjectServiceService/CustomerEntity
< Back
Next >
Finish
Cancel


Project Explorer
DataObjectService
Procedure Libraries
.services
.settings
AppServer
PASOEContent
META-INF
static
auth
error
images
commonPageFooter.html
commonPageHeader.html
commonStyle.css
DataObjectServiceService.json
favicon.ico
home.html
home.jsp
index.jsp
ServerStatus.html
CustomerEntity.cls
DataObjectServiceService.json
{
"version": "1.2",
"lastModified": "Sun Jun 26 20:37:47 CEST 2016",
"services": [{
"name": "DataObjectServiceService",
"address": "\/rest\/DataObjectServiceService",
"useRequest": true,
"resources": [{
"name": "CustomerEntity",
"path": "\/CustomerEntity",
"autoSave": false,
"schema": {
"type": "object",
"additionalProperties": false,
"properties": {"dsCustomer": {
"type": "object",
"additionalProperties": false,
"properties": {"ttCustomer": {
"type": "array",
"primaryKey": ["CustNum"],
"items": {
"additionalProperties": false,
"properties": {

Web Handlers

- OpenEdge 11.6, PASOE
- Web Handlers provide a powerful and flexible alternative to the REST Adapter
- „The new WebSpeed“
- URL patterns mapped to ABL Classes
- Can be used to provide required REST Backend for JSDO
- See Mike Fechner‘s 2016 presentation „REST in Peace“

Demo

- http://localhost:8820/web/BusinessServices/html/Consultingwerk.SmartComponentsDemo.OERA.*
- Show Catalog and Resource responses for Customer and SalesRep Business Entities

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JSDO and Angular 2

- JSDO is a JavaScript library
- Angular supports adding JavaScript libraries as untyped code
  - No compile time checks for functions and parameters
  - No Intellisense while typing
- JavaScript libraries can be used in TypeScript

JSDO and Angular 2

- JSDO provides access to ProDatasets and represents them as
  - ProDataset: Object with temp-tables as properties
  - Temp-Table: Array of records
  - Record: JavaScript object with properties for the fields

Basic Sample on Progress Communities

- The following describes steps taken to use the JSDO with Angular 2 based on the following sample from Progress communities:

- https://community.progress.com/community_groups/mobile/f/17/p/27655/94089

Thanks to Edsel!

Adding progress.js to app Module

- The JSDO library and TypeScript declaration added to the app folder (sub folder progress)
- The progress.d.ts file declares JavaScript functions in progress.js library
- Basic version provided by Progress

```
// Type definitions for progress.js v4.0
//
// Author(s): egarcia
//

export module progress {
    export module data {
        export class Session {···
        }

        export class JSDOSession {
            constructor(options: JSDOSessionOptions);

            login(username: string, password: string): JQueryPromise;
            addCatalog(catalogURI: string): void;
```

Using JSDO in Angular 2

- Import JSDO in app.ts file

```
// Include progress JSDO module
import { progress } from './progress/progress';
```

- Progress TypeScript declaration for the JSDO is not complete, so some types must be declared as „any“
- „any“ instructs TypeScript compiler, that it is not able to perform strong type checking during compilation
- No Intellisense support when editing code

Create JSDO Session and JSDO

- Create JSDOSession instance (AppServer connect)
- Perform Login and Add Catalog
- Create JSDO instance

```
// TODO: Change Session to JSDOSession
let session = new (<any>progress.data.JSDOSession)({
    serviceURI: serviceURI,
    authenticationModel: 'form'
});
session.login('demo', 'demo')
    .done(() => {
        session.addCatalog(catalogURI)
            .done(() => {
                let jsdo1 = new (<any>progress.data.JSDO)({
                    name: 'Consultingwerk.SmartComponentsDemo.OERA.Sports2000.CustomerBusinessEntity',
                    tableRef: this.tableName
                });
                this.jsdo = jsdo1;
                this.jsdoLoaded.emit();
            });
    });
```

Create JSDO Session and JSDO

- session.*login* and session.*addCatalog* calls are executed asynchronously
- Best practice is to avoid blocking operations
- JQuery *promises* used to „wait-for“ response of login and addCatalog call
  - .done (() => {
    // anonymous function
    })
    provides callback for completion
  - login and addCatalog promise stacked

Link JSDO query result to Kendo UI Grid

- (Async) JSDO operations in separate service class
- Service class injected into component descriptor, component subscribes to *jsdoLoaded* event
- This allows the component to initialize in parallel to the JSDO initialization

Demo

- Execute Web app (Demo 1)
- Review code in app.component.ts
  - CustomerJsdoDataService class
  - AppComponent Constructor
  - fetch Method of CustomerJsdoDataService

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TypeScript Declarations

- Web development relies heavily on JavaScript libraries
- JavaScript libraries lack strong typing (JavaScript is not a strong typed language)
- TypeScript declarations solve this discrepancy
- Declares the interfaces and types of JavaScript libraries, allows weak typed implementation to be treated as strong-typed

TypeScript Declarations

- JavaScript community active in providing TypeScript declarations
- http://definitelytyped.org/

- Wiki Article on TypeScript declaration best-practices: https://typescript.codeplex.com/wikipage?title=Writing%20Definition%20%28.d.ts%29%20Files

Home | Guides | Directory | Repository | TSD | NuGet

DefinitelyTyped

The repository for high quality TypeScript type definitions

Usage

Include a line like this:

```
/// <reference path="jquery/jquery.d.ts" />
```

Get the definitions

GitHub repository
NuGet package manager
TypeScript Definition manager

Contributing

See the contribution guide

News

Add a badge to your library
TypeScript directory restructured

Guides

Best practices
Contribution guide
Creating a definition file
Pull Requests

TypeScript Directory

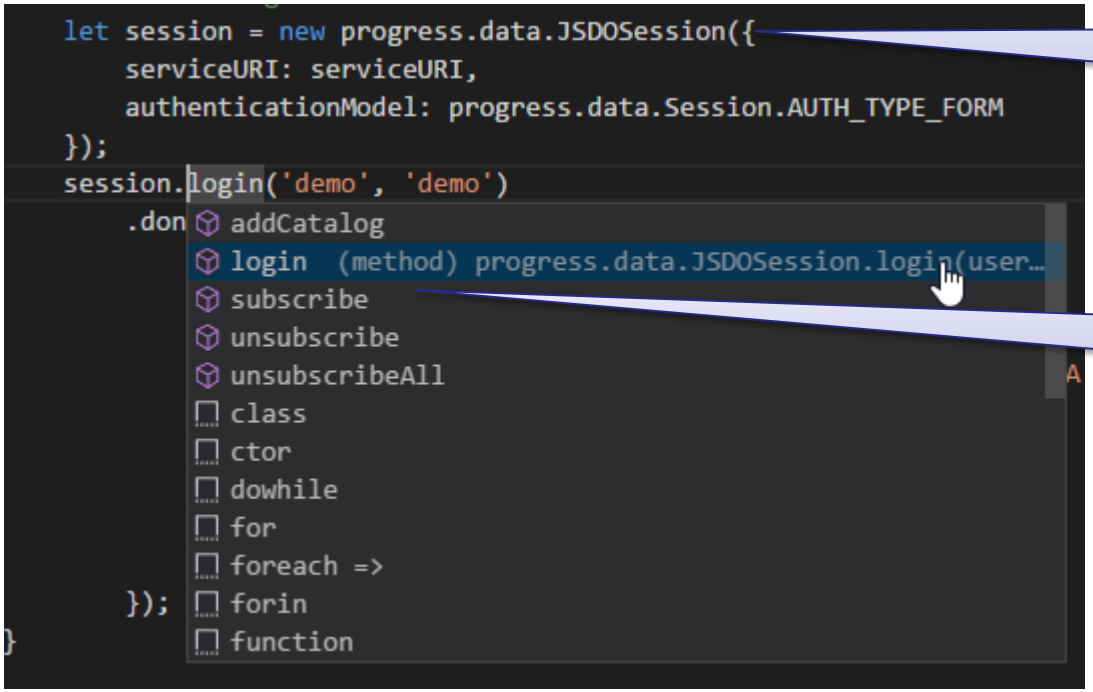
Discuss
Learn TypeScript
Libraries
Projects
Tools & Editors

Pages

Badges
Language issues
Website contributions

TypeScript Declaration for the JSDO

- Complete declaration available at https://github.com/consultingwerk/JSDO



Variable defined as strong type

IntelliSense of class methods

TypeScript Declaration for the JSDO

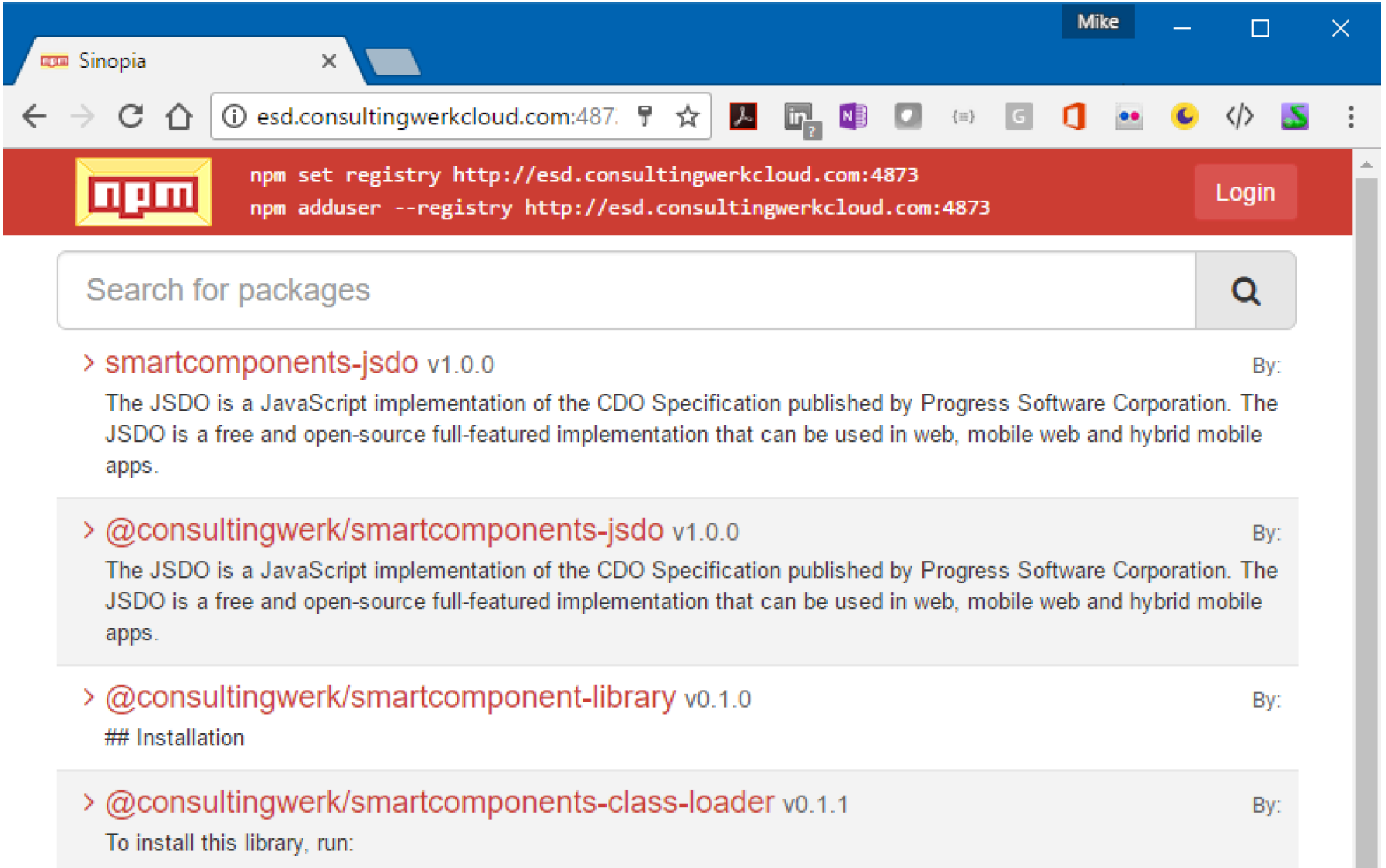
```
export module progress {
        export module data {
                export class Session {
                        constructor(options?: SessionOptions);
                        static AUTH_TYPE_ANON : string;
                        static AUTH_TYPE_BASIC : string;
                        static AUTH_TYPE_FORM : string;
                        login(serviceURI: string, username: string, password: string): void;
                        addCatalog(catalogURI: string): void;
                        subscribe(eventName: string, callback: Function, scope?: any): void;
                        unsubscribe(eventName: string, callback: Function, scope?: any): void;
                        unsubscribeAll(eventName: string): void;
                }

                export class JSDOSession {
                        constructor(options: JSDOSessionOptions);
                        login(username: string, password: string): JQueryPromise;
                        addCatalog(catalogURI: string): JQueryPromise;
                        subscribe(eventName: string, callback: Function, scope?: any): void;
                        unsubscribe(eventName: string, callback: Function, scope?: any): void;
                        unsubscribeAll(eventName: string): void;
                }
```

npm repositories

- Node Package Manager
- Structured way of managing dependencies for (web) development projects
- Angular CLI build process pulls libraries from NPM repositories
- Supports updating the local copy of the library when the library provided in the repository is updated
- Alternatively enforce a certain version/range

http://esd.consultingwerkcloud.com:4873



Demo

- Create new Angular CLI project
- Add JSDO from Consultingwerk NPM repository
- Review strong typed access to JSDO in sample application (Demo 2)

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Real application requirements

- Avoid duplicating code for communicating with the application backend
- Focus on business logic or specific client side code, not on infrastructure
- Integrated session management
- Security incl. authentication, authorization & menu
- Simple reuse of Data Sources between Components
- Localization
- Hide any complexity caused by the above

Kendo UI and JSDO … the *Smart* way

- **NgModule** extension
  - Handles JSDOSession configuration
  - Manages Authentication (display Login Dialog, handle session time out, authorization issues)
  - Manages active Data Sources
  - Manages communication between components (links)

Smart-Data-Source

- Encapsulates JSDO instance
- Rich set of configuration options
  - Business Entity Name
  - Table(s), Support for joining child tables in resultset
  - Batch size
- Communication with one or multiple visual components
- Support for parent/child filtering

```
<smart-data-source
    smart-business-entity-name="Consultingwerk.SmartComponentsDemo.OERA.Sports2000.CustomerBusinessEntity"
    smart-entity-table="eCustomer"
    smart-entity-view="eSalesrep"
    smart-object-name="customerDatasource">
</smart-data-source>
```

Smart-Data-Source parent/child mode

```
<smart-data-source
        smart-filter-source='salesrepFilter'
        smart-object-name='salesrepDataSource'
        smart-business-entity-name="Consultingwerk.SmartComponentsDemo.OERA.Sports2000.SalesRepBusinessEntity"
        smart-entity-table="eSalesrep"
        smart-navigation-source="salesrepToolbar">
</smart-data-source>

<smart-data-source
        smart-object-name='customerDataSource'
        smart-data-source='salesrepDataSource'
        smart-foreign-fields='SalesRep,SalesRep'
        smart-business-entity-name="Consultingwerk.SmartComponentsDemo.OERA.Sports2000.CustomerBusinessEntity"
        smart-entity-table="eCustomer"
        smart-entity-view="eSalesrep"
        smart-navigation-source="customerToolbar"
        smart-filter-source="customerFilter">
</smart-data-source>
```

smart-data-source and foreign-fields define parent/child relation

Smart-Data-Source UI Binding

- Filter (control selection)
- Navigation Toolbar (control)
- Grids (display, navigation, update)
- Viewer (display, update)
- Simple components (every Angular 2 component can display and update fields)
- Smart-Lookup or Auto-Complete component (complex components with own linked Smart-Data-Source)

Smart-Grid

- Encapsulates Kendo UI Grid
- Manages communication (display, update, navigation, multi-row-selection) with Smart-Data-Source
- Layout either in html code or provided by backend

```
</div>
<div class="col-xs-12" style="margin-top: 1em;">
    <smart-grid
        (selection-changed)="onCustomerGridSelectionChanged($event)"
        smart-object-name='customerGrid'
        smart-data-source='customerDataSource'
        smart-grid-layout='Consultingwerk.SmartComponentsDemo.OERA.Sports2000.CustomerBusinessEntity/customer'>
    </smart-grid>
</div>
```

Demo

- Demo3 … review
  - app.module.ts (NgModule)
  - smart-data-source-binding.html
- Demo4 … review
  - smart-data-source-binding with simple html input tags
  - Execute in browser

Smart-Viewer component

- Container for Input components (and similar components)
- Central data-binding to Smart-Data-Source
- Layout options similar to grid
- Manages update state with Smart-Data-Source
  - during update, disallows navigation form Grid and Navigation Toolbar

```
<div class="col-xs-12" style="margin-top: 10px">
    <smart-viewer
        smart-object-name='customerViewer'
        smart-data-source='customerDataSource'
        smart-tableio-source='customerToolbar'
        smart-viewer-layout='Consultingwerk/SmartComponentsDemo/Web2/Ng2/customer-smart-viewer.template.html'>
    </smart-viewer>
</div>
```

SmartComponents NG2 Demo

- Review component definitions in **getting-started-form.html**
- Parent Child relation between SalesRep and Customer
- Filter component
- Smart Viewer
- Smart Lookup

Questions