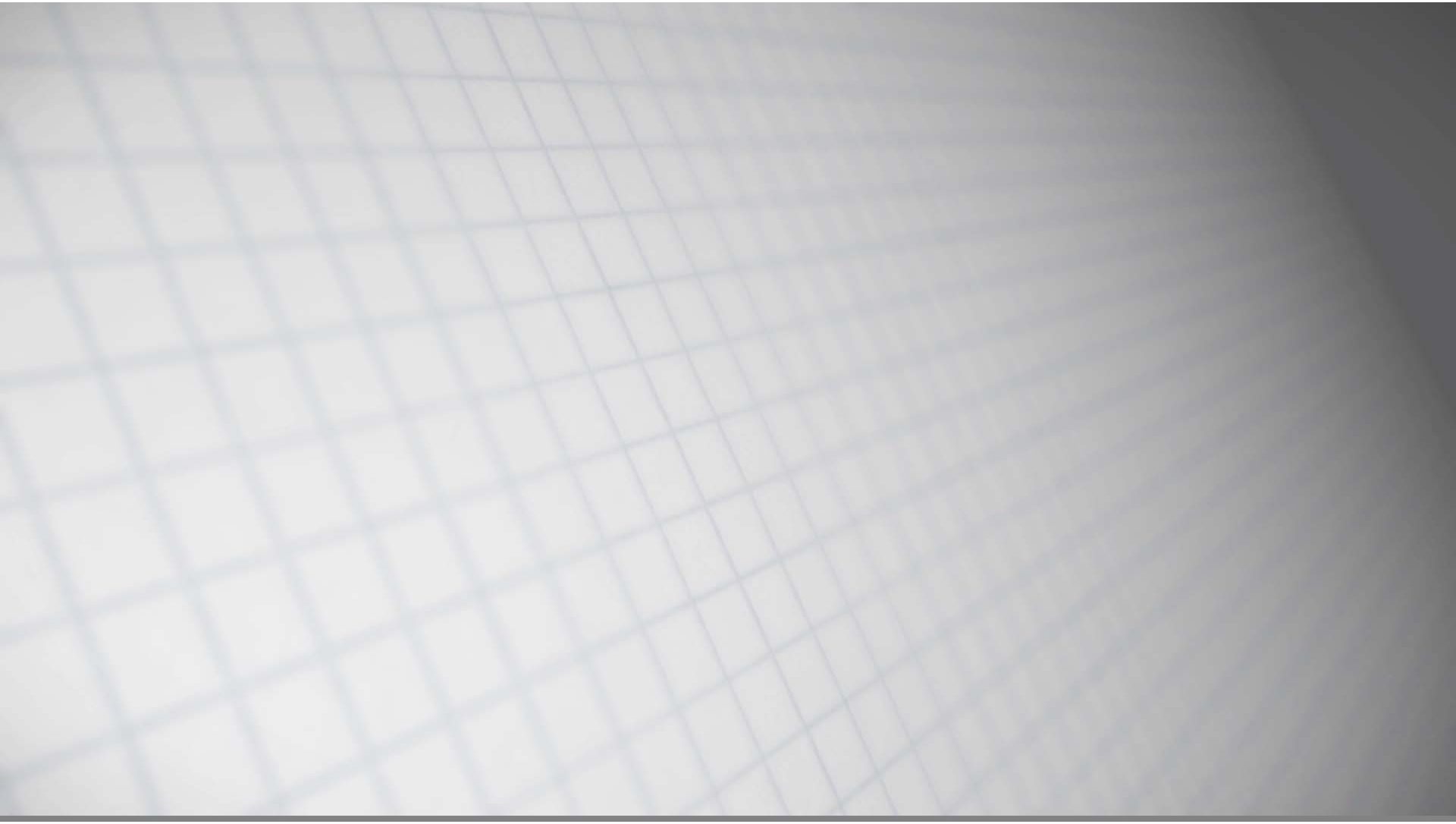
REST in Peace
Mastering the JSDO with a Dynamic ABL backend

Mike Fechner, Consultingwerk Ltd.
mike.fechner@consultingwerk.de



Consultingwerk Ltd.

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

Agenda

- **JSDO / Kendo UI Data Source**
- REST Web Services
- REST Adapter for Data Object Services
- JSDO Backend Methods
- Dynamic REST Adapter Backend
- WebSpeed Web Handlers (11.6)
- Dynamic WebSpeed based Backend

Cust Num	Kundenname	Country	Stadt	
		USA		
1025	Athlete's Track	USA	Vienna	× Delete
1030	Soccer Universe	USA	Oak Brook	× Delete
1045	Play Sports	USA	Boston	× Delete
182340	BASCO	USA	Amherst	× Delete
408860	University Stereo	USA	Amherst	× Delete
473170	Balanced Fortune	USA	Amherst	× Delete
617690	Friendly Advice	USA	Mountain Green	× Delete
960540	Express Merchant Service	USA	Amherst	× Delete

1 2 3 4 5 ... 10 items per page

1 - 10 of 15874 items

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

Kendo UI DataSource for JSDO

- Integrates JSDO into the Kendo UI framework
- Extends Kendo UI Data Source
- Included in the JSDO library
- Query manipulation (Kendo filters to ABL query string)
- Manages ProDataset before-image

Kendo UI DataSource

```
var serviceURI = "http://localhost:8980/SmartJsdoBackendService",
    jsdoSettings = {
        serviceURI: serviceURI,
        catalogURIs: serviceURI + "/rest/SmartJsdoBackendService/Catalog/Consultingwerk.SmartComponentsDemo.OERA.Sports
    },
    promise;

// create a new session object
jsdosession = new progress.data.JSDOSession(jsdoSettings);
promise = jsdosession.login("", "");

promise.done(function(jsdosession, result, info){
    jsdosession.addCatalog(jsdoSettings.catalogURIs)
        .done(function(jsdosession, result, details){

            dataSource = new kendo.data.DataSource( {
                                type: "jsdo",
                                serverPaging: true,
                                serverFiltering: true,
                                // filter: { field: "Country", operator: "eq", value: "USA" },
                                serverSorting: true,
                                // sort: { field: "State", dir: "desc" },
                                pageSize: 10,
                                transport: {
                                    jsdo: "Consultingwerk.SmartComponentsDemo.OERA.Sports2000.CustomerBusinessEntity",
                                    tableRef: "eCustomer",
                                    countFnName: "count"
                                },
                                error: function(e) {
                                    console.log ('Error: ', e);
                                }
                            }
```

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REST protocol

- **RE**presentional **S**tate **T**ransfer
- W3C standard
- Typically http/1.1 transport
- Simpler than SOAP web services
- Client and Server communicate about the state of an object
- State transitions as the message
- Client may request (GET) using URI
- Client may post using request content

REST „verbs“

- Additional http REQUEST_METHOD’s
- Multiple interactions on the same URI
- **GET** – client requests resource (record), should not modify the resource
- **POST** – client posts a new instance of the resource (create a record)
- **PUT** – client posts a modification of a resource (update record)
- **DELETE** – client requests deletion of a resource
- …

JSON – JavaScript Object Notation

- The “little brother of XML“
- Originates from JavaScript development
- JavaScript objects can be written to and read from JSON, also supported in other languages
- More lightweight, typically smaller than XML (no need for end tag), easier human readable
- OE10.2B, support for READ/WRITE-JSON of ProDataset and Temp-Table
- OE11.0, support for JSON ObjectModel Parser
- OE11.2, document format of the REST Adapter
- Mime-Type: application/json

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"
        }
      ]
    }
  ]
}}
```

JSON Catalog

- Describes capabilities of OpenEdge backend resource to JSDO
- Methods
  - create
  - read
  - update
  - delete
  - submit
  - count
  - custom operations

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

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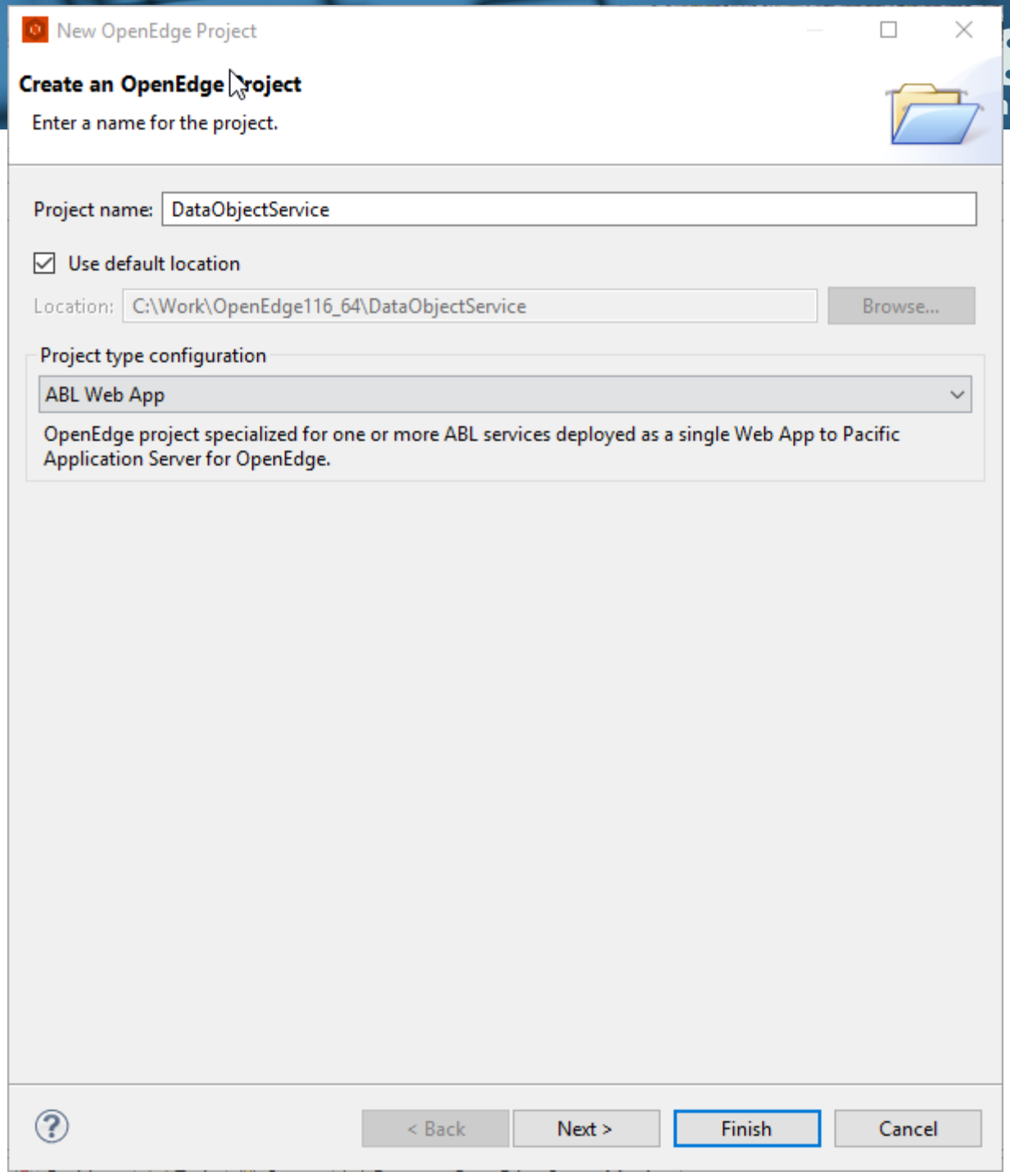
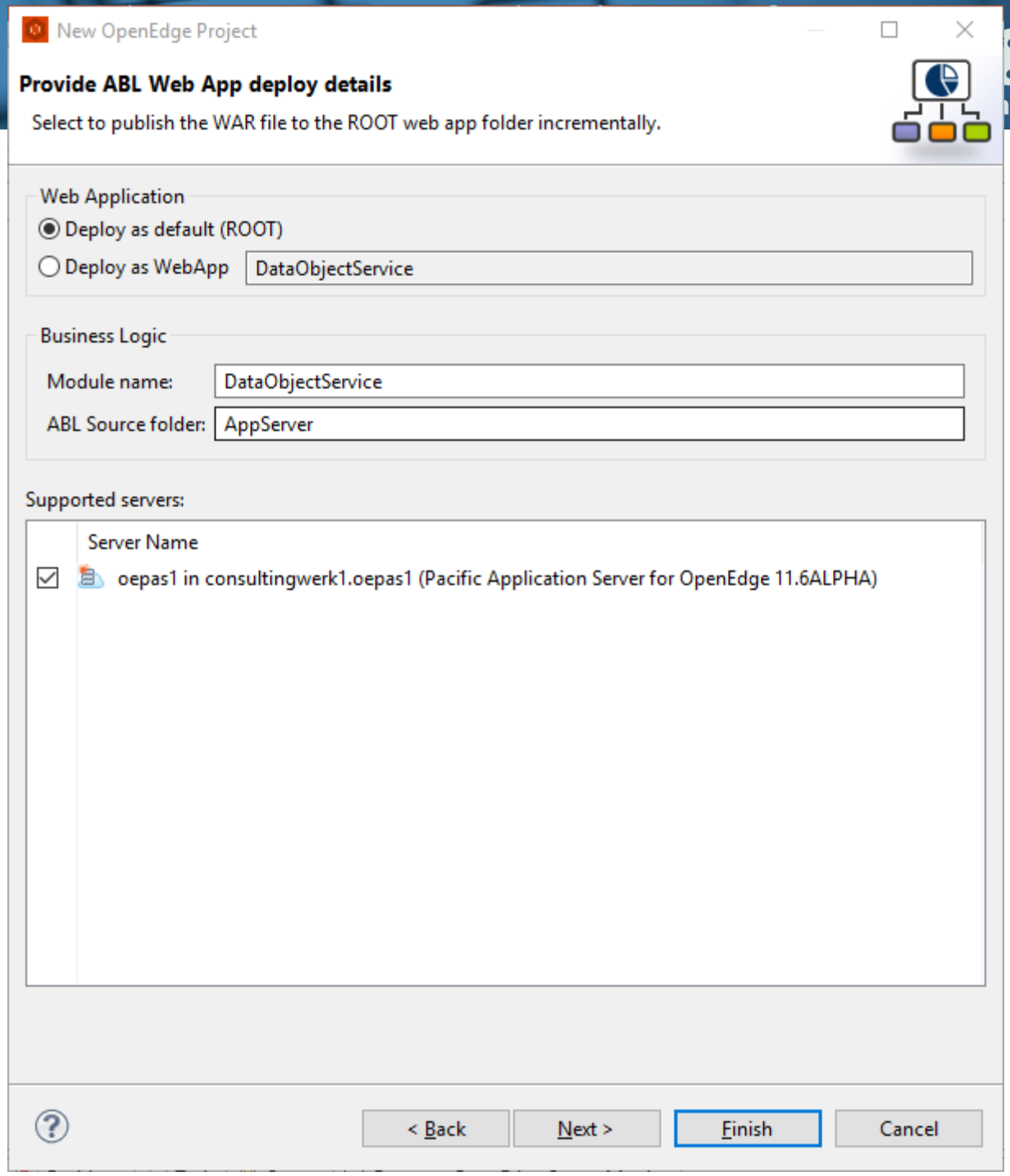
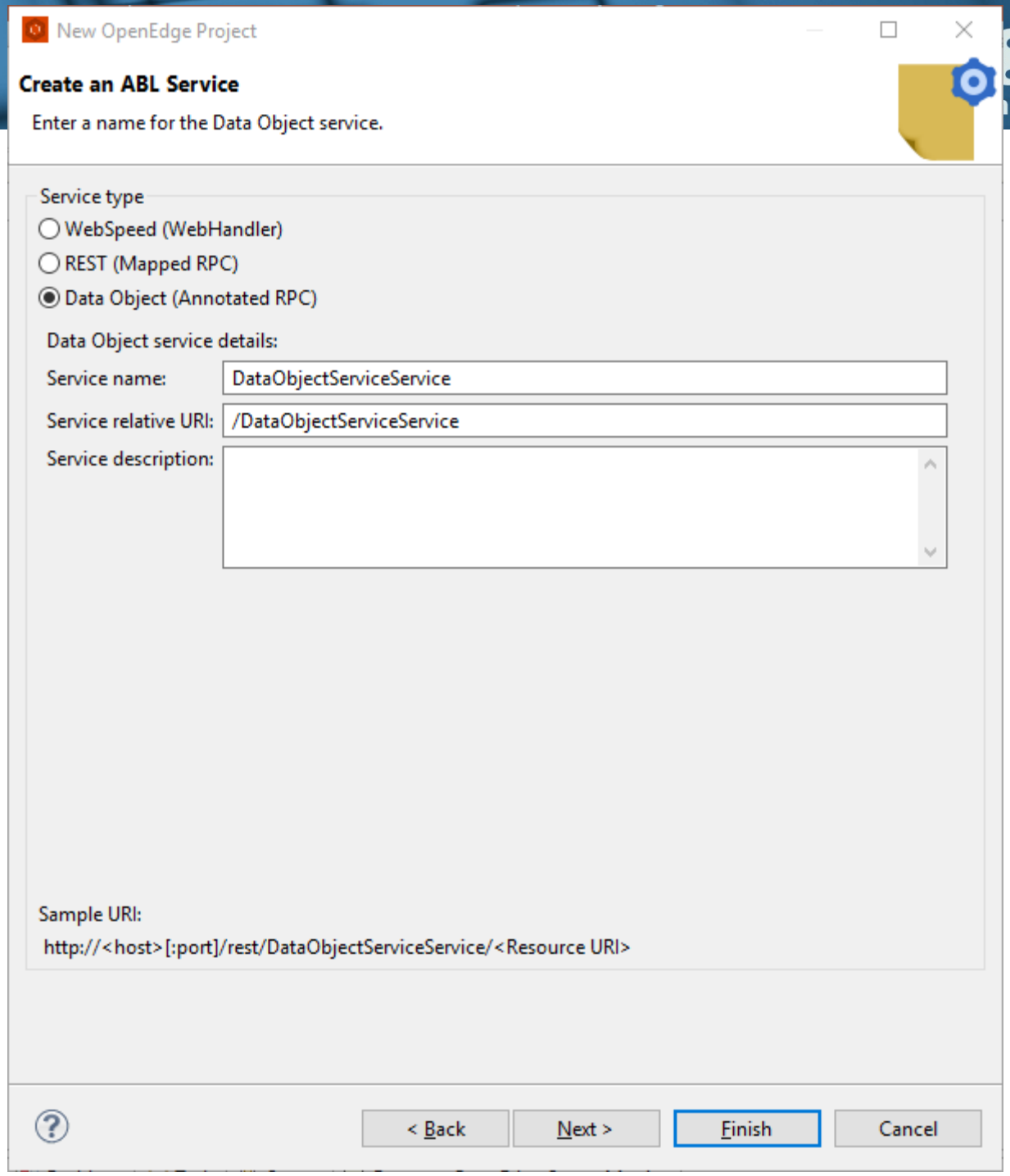
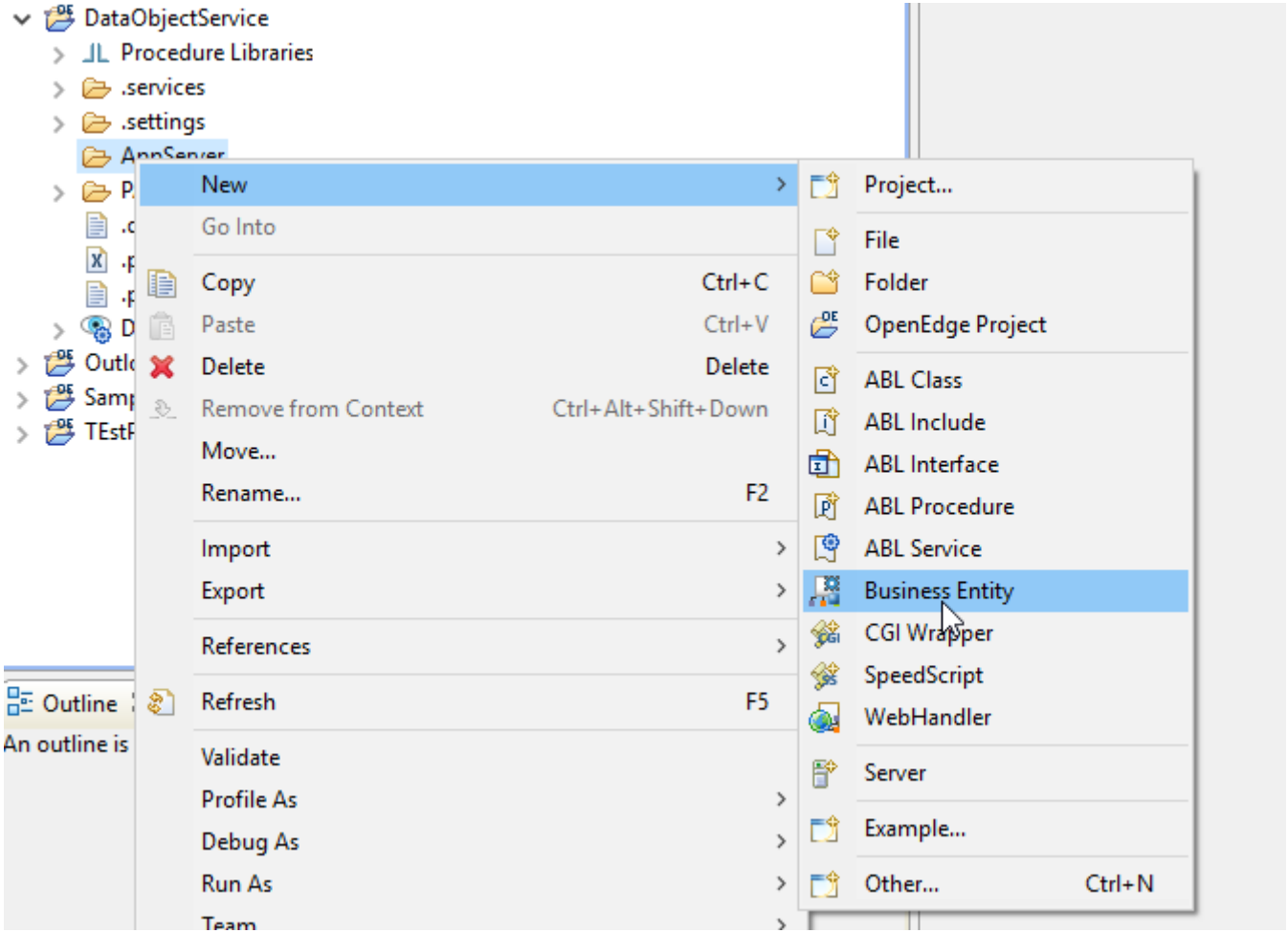
REST Adapter

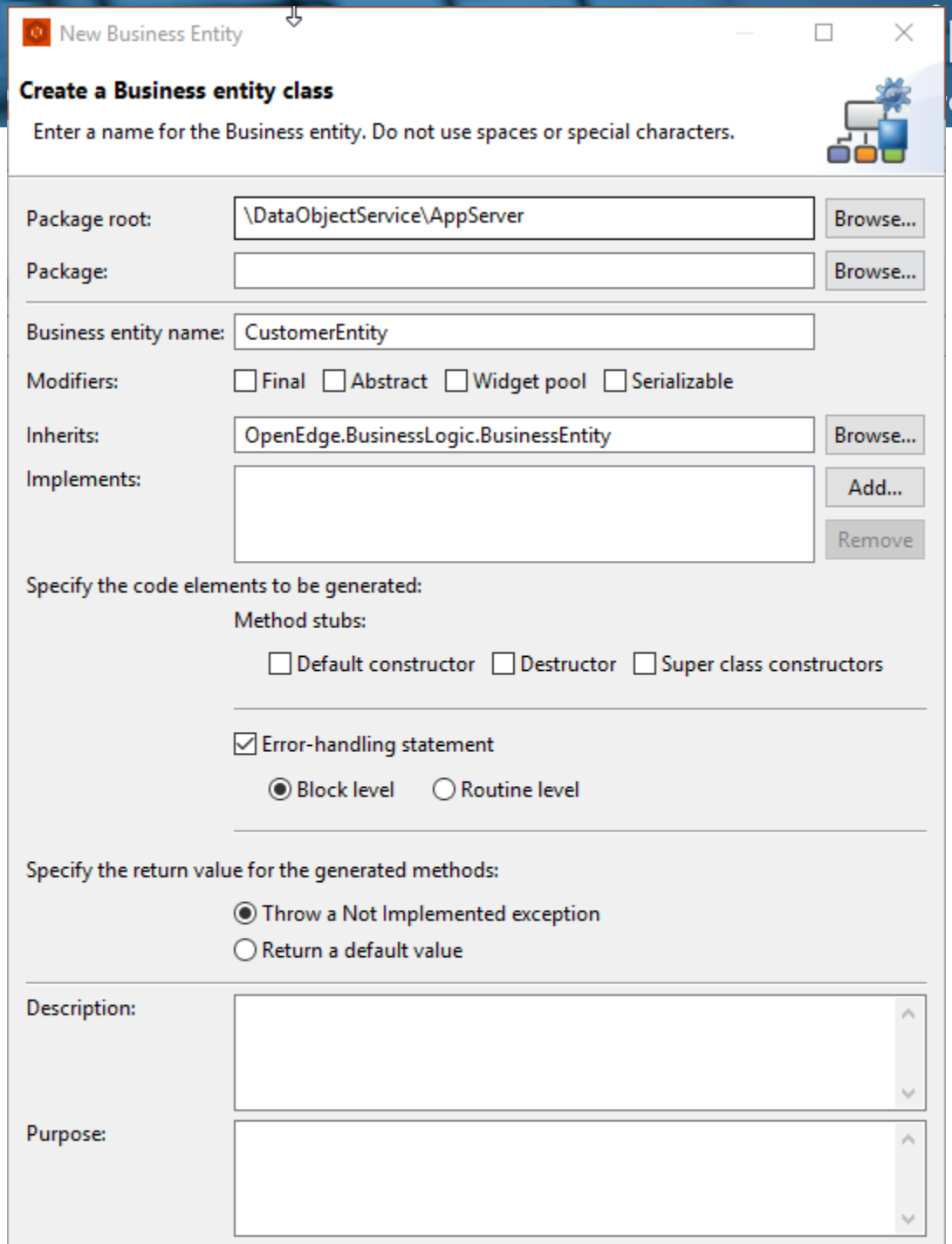
- JavaServlet that translates REST messages into AppServer calls
- Similar to WSA and AIA
- Tooling integrated into Progress Developer Studio
- Not integrated into ProxyGen
- Can be deployed on standard Tomcat
- Integrated in PASOE as the REST transport

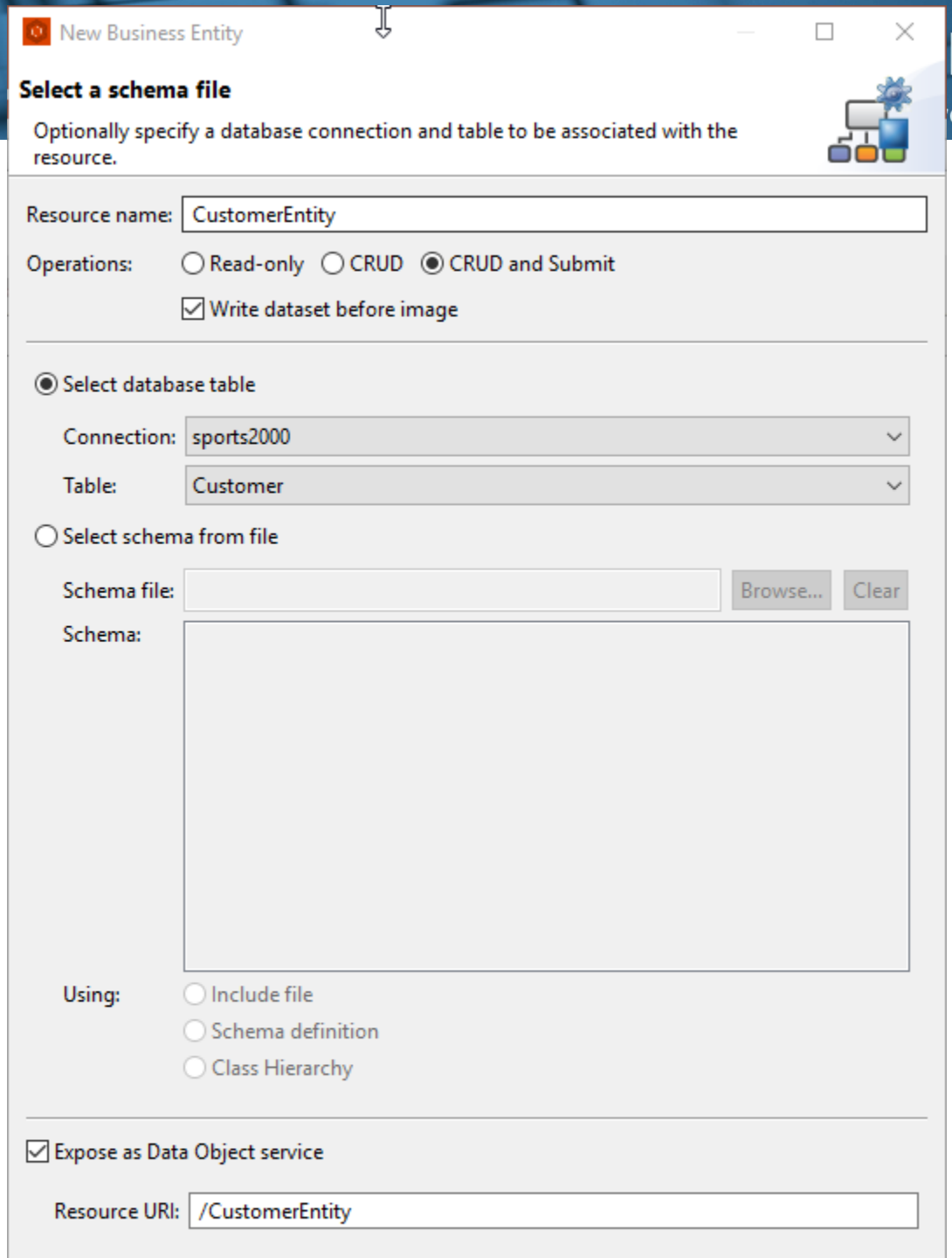

New OpenEdge Project
Create an OpenEdge Project
Enter a name for the project.
Project name: DataObjectService
Use default location
Location: C:\Work\OpenEdge116_64\DataObjectService
Browse...
Project type configuration
ABL Web App
OpenEdge project specialized for one or more ABL services deployed as a single Web App to Pacific Application Server for OpenEdge.
< Back
Next >
Finish
Cancel


New OpenEdge Project
Provide ABL Web App deploy details
Select to publish the WAR file to the ROOT web app folder incrementally.
Web Application
Deploy as default (ROOT)
Deploy as WebApp
DataObjectService
Business Logic
Module name:
DataObjectService
ABL Source folder:
AppServer
Supported servers:
Server Name
oepas1 in consultingwerk1.oepas1 (Pacific Application Server for OpenEdge 11.6ALPHA)
< Back
Next >
Finish
Cancel


New OpenEdge Project
Create an ABL Service
Enter a name for the Data Object service.
Service type
WebSpeed (WebHandler)
REST (Mapped RPC)
Data Object (Annotated RPC)
Data Object service details:
Service name:
DataObjectServiceService
Service relative URI:
/DataObjectServiceService
Service description:
Sample URI:
http://<host>[:port]/rest/DataObjectServiceService/<Resource URI>
< Back
Next >
Finish
Cancel


DataObjectService
Procedure Libraries
.services
.settings
AppServer
New
Go Into
Copy Ctrl+C
Paste Ctrl+V
Delete Delete
Remove from Context Ctrl+Alt+Shift+Down
Move...
Rename... F2
Import
Export
References
Refresh F5
Validate
Profile As
Debug As
Run As
Team
Project...
File
Folder
OpenEdge Project
ABL Class
ABL Include
ABL Interface
ABL Procedure
ABL Service
Business Entity
CGI Wrapper
SpeedScript
WebHandler
Server
Example...
Other... Ctrl+N
Outline
An outline is

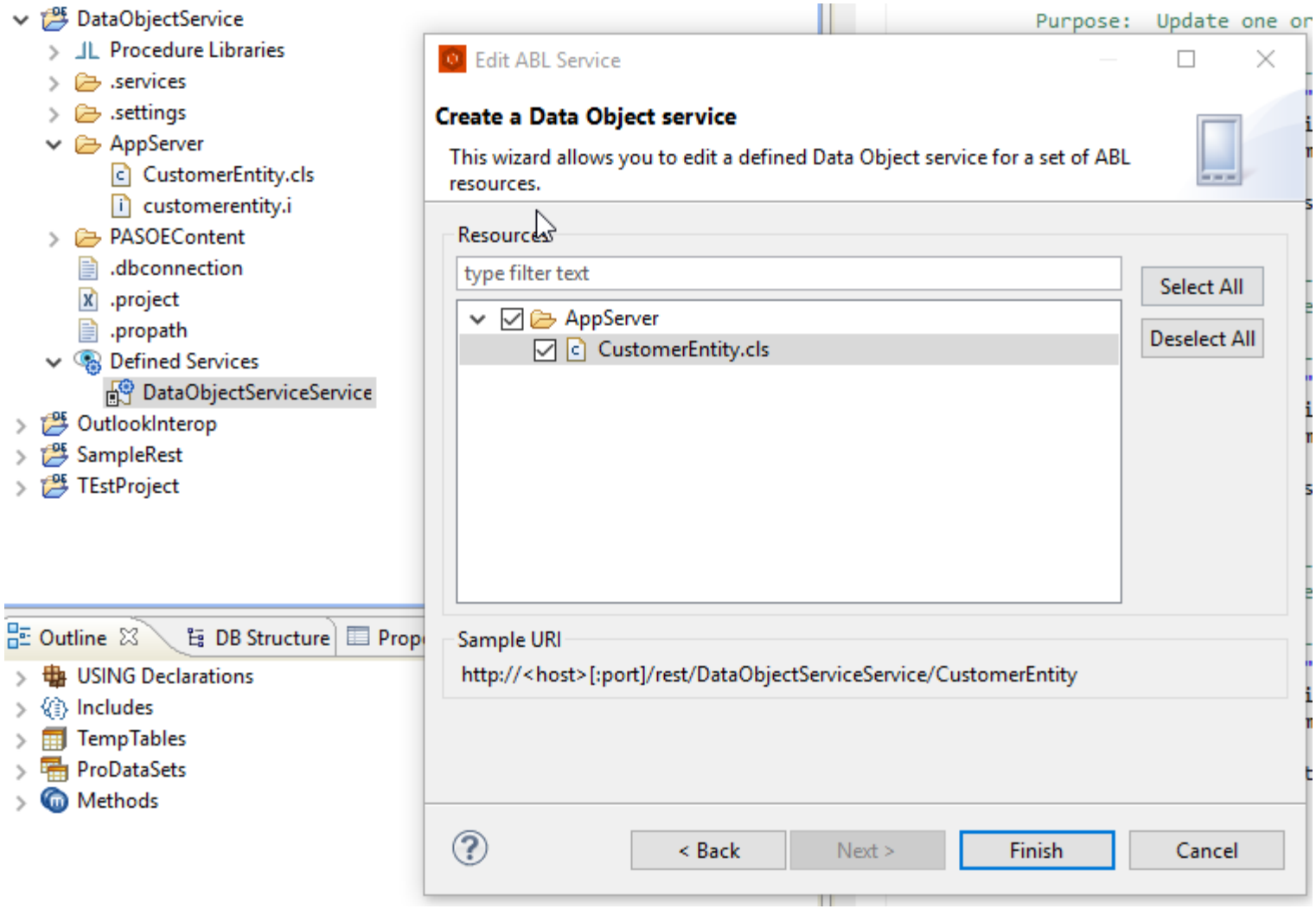

New Business Entity
Create a Business entity class
Enter a name for the Business entity. Do not use spaces or special characters.
Package root:
\DataObjectService\AppServer
Browse...
Package:
Browse...
Business entity name:
CustomerEntity
Modifiers:
Final
Abstract
Widget pool
Serializable
Inherits:
OpenEdge.BusinessLogic.BusinessEntity
Browse...
Implements:
Add...
Remove
Specify the code elements to be generated:
Method stubs:
Default constructor
Destructor
Super class constructors
Error-handling statement
Block level
Routine level
Specify the return value for the generated methods:
Throw a Not Implemented exception
Return a default value
Description:
Purpose:

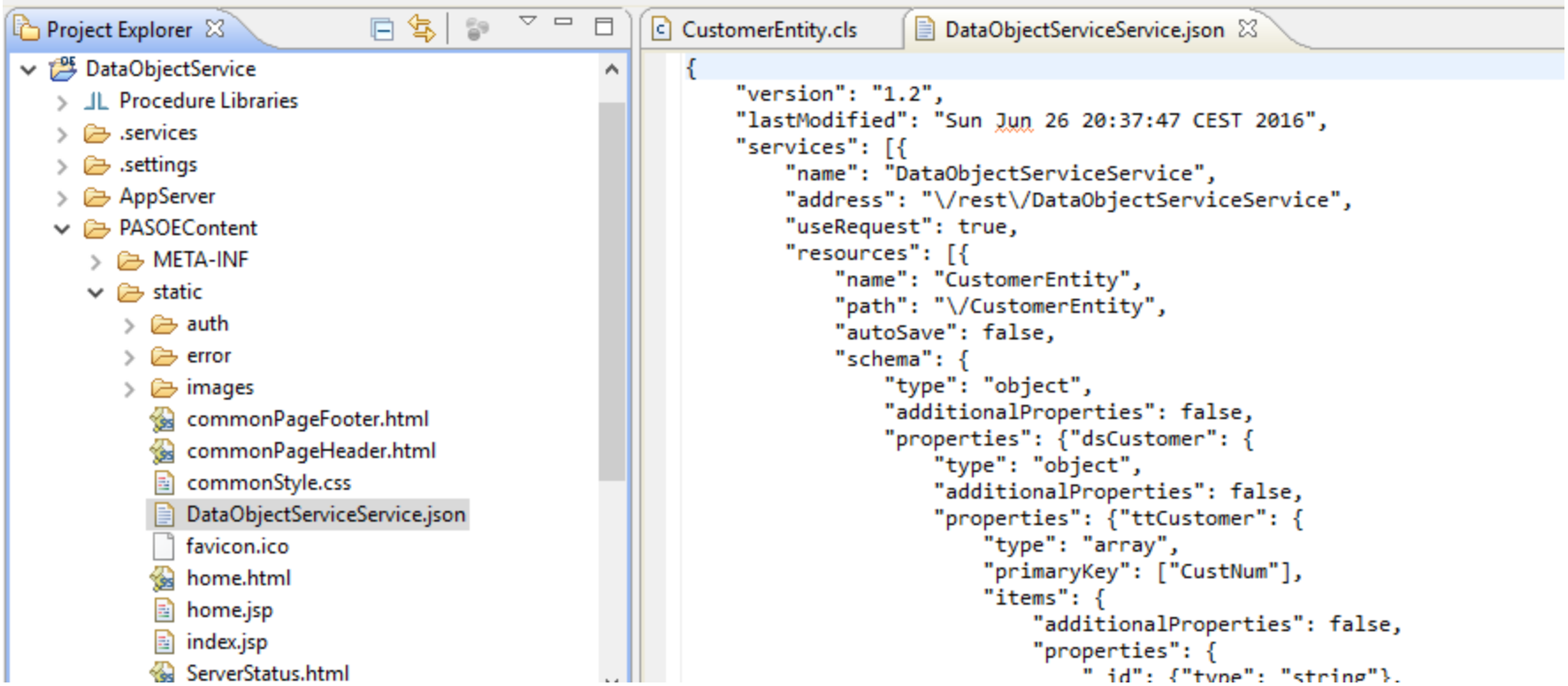

New Business Entity
Select a schema file
Optionally specify a database connection and table to be associated with the resource.
Resource name: CustomerEntity
Operations: Read-only CRUD CRUD and Submit
Write dataset before image
Select database table
Connection: sports2000
Table: Customer
Select schema from file
Schema file:
Browse...
Clear
Schema:
Using: Include file
Schema definition
Class Hierarchy
Expose as Data Object service
Resource URI: /CustomerEntity

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": {

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JSDO Backend Methods

- JSDO calls into Data Object Services, or Business Entities
- Real world scenario: Service Interface to Business Entity (see OEAA, OERA, CSS)
- Progress provides base class OpenEdge.BusinessLogic.BusinessEntity as a starting point for quick prototyping
  - Optional foundation for implementation
  - Suited for rapid prototyping

Read method

- GET http://localhost:8820/web/Resource/CustomerBusinessEntity?filter=...

- filter as single CHARACTER input parameter
- Can be ABL query string:
  “Name BEGINS ‘L’ AND City BEGINS ‘Bos’”
- Can be JSON Object
- ProDataset as Output Parameter

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

JFP Pattern

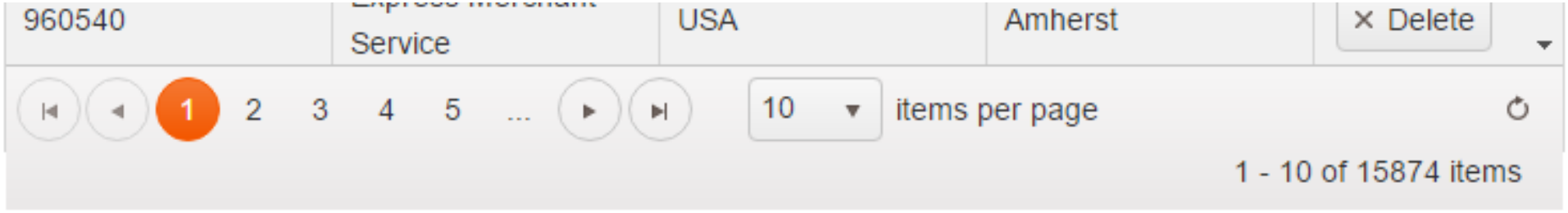
- JavaScript Filter Pattern
- JSON Object provided as filter parameter (CHARACTER)
- Used by the Kendo UI DataSource
- Allows more flexible, structured filter parameter

- **filter=**
  {"ablFilter":"(Name BEGINS 'l' and City BEGINS 'b')",
  "skip":30,
  "top":10}

Count request

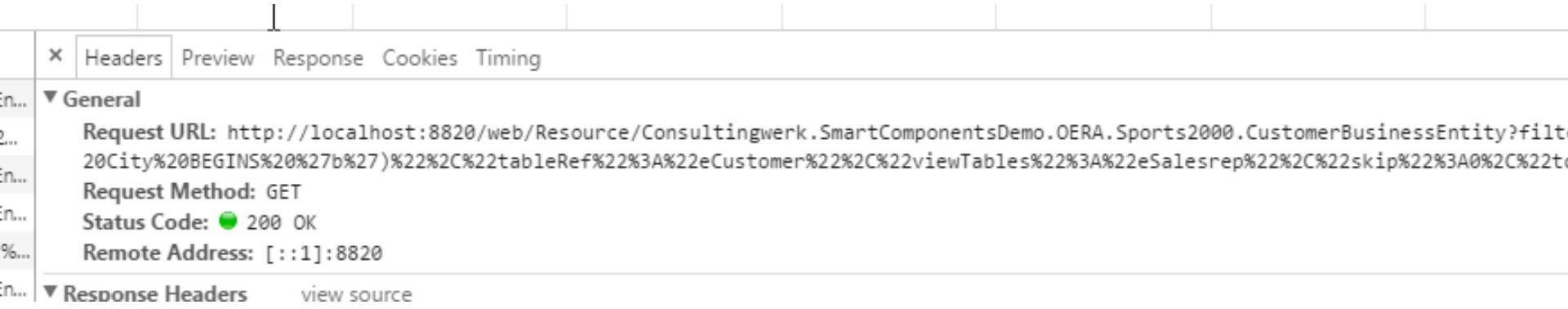
- POST http://localhost:8820/web/Resource/CustomerBusinessEntity/**count**?filter=

- Kendo UI DataSource asks for number of result records from backend
- Populate the paging buttons below the grid
- Good for UX
- May be challenging to implement with ABL



Demo

- Google Chrome Debugger
  - JSDO Read requests
  - Count Request
- F12 Developer Tools



Create / Delete / Update

- Create: POST (single record)
- Delete: DELETE (single record)
- Update: PUT (single record)
- Request URI: http://localhost:8820/web/Resource/CustomerBusinessEntity

- Submit: PUT (multiple records)
- Request URI: http://localhost:8820/web/Resource/CustomerBusinessEntity/**SubmitCustomerEntity**

Create / Delete / Update

- Request body contains JSON representation of ProDataset
- 1 record (create, delete, update)
- Multiple records (submit)
- ProDataset JSON including JSON before-image

```
/*------------------------------------------------------------------------------
        Purpose:  Update one or more records
        Notes:
------------------------------------------------------------------------------*/
@openapi.openedge.export(type="REST", useReturnValue="false", writeDataSetBeforeImage="true").
@progress.service.resourceMapping(type="REST", operation="update", URI="", alias="", mediaType
METHOD PUBLIC VOID UpdateCustomerEntity(INPUT-OUTPUT DATASET dsCustomer):
```

Request Payload view source

```
▼ {dsCustomer: {prods:hasChanges: true,…}}
  ▼ dsCustomer: {prods:hasChanges: true,…}
    ▼ eCustomer: [{prods:id: "1466967131092-241", prods:rowState: "modified", prods:clientId: "1466967131092-241",…
      ▼ 0: {prods:id: "1466967131092-241", prods:rowState: "modified", prods:clientId: "1466967131092-241",…}
          Address: "Feldstrasse 44"
          Address2: ""
          Balance: 1216.81
          City: "Berßel"
          Comments: ""
          Contact: "Alfonzo Fruehauf"
          Country: "DE"
          CreditLimit: 58000
          CustNum: 264580
          Discount: 0
          EmailAddress: "Alfonzo.Fruehauf@LFish.DE"
          Fax: ""
          Flags: "B"
          Name: "L' Fish Ltd."
          Phone: "02191 97 60 21"
          PostalCode: "38835"
          SalesRep: "KIK"
          SmartAttachments: false
          SmartComments: false
          SmartCopiedFrom: ""
          SmartRecordKey: "000264580"
          State: "ST"
          Terms: "Net30"
        ▶ eSalesrep: [{SalesRep: "KIK", RepName: "Kari Iso-Kauppinen", Region: "Finland", MonthQuota: 1800,…}]
          id: "264580"
          prods:clientId: "1466967131092-241"
          prods:id: "1466967131092-241"
          prods:rowState: "modified"
          seq: 1
    ▶ prods:before: {,…}
      prods:hasChanges: true
```

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Why dynamic?

- REST Adapter tooling in PDSOE
  - problematic for large projects
  - problematic for multi-developer environments (version control, conflict resolution, merge)
- Each time a single field in a Business Entity changes the whole service needs to be redeployed
- Redeploying REST services from PASOE not always smooth …

Why dynamic?

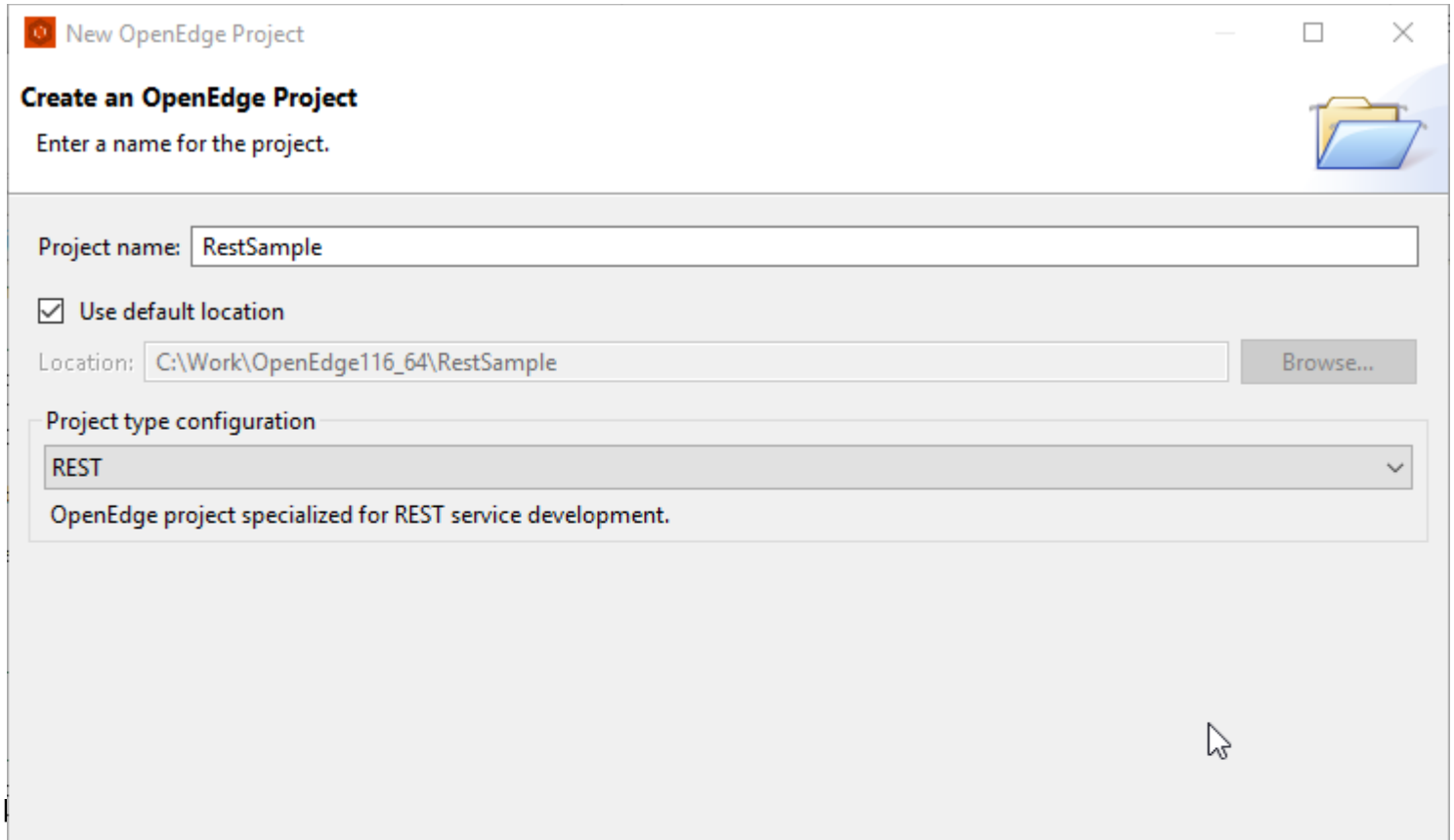
- Eliminate the need to redeploy REST resources when Business Entities are added or removed
- Localized catalog, generated on the fly
- Include application specific attributes in catalog
- Better control over authorization
- Don’t include catalog for Business Entities the consumer has no authorization for
- Easier to split up Catalog by Business Entity (faster load time)

Dynamic Backend

- Catalog retrieved via http GET request
- URI included in JavaScript code, not specific to the “Data Object Service” project type
- Resource data retrieved via http GET, PUT, POST, DELETE request
- URI for resource access described by data catalog, not specific to the “Data Object Service”
- All messages (in/out) are JSON messages
- Full freedom over URI format

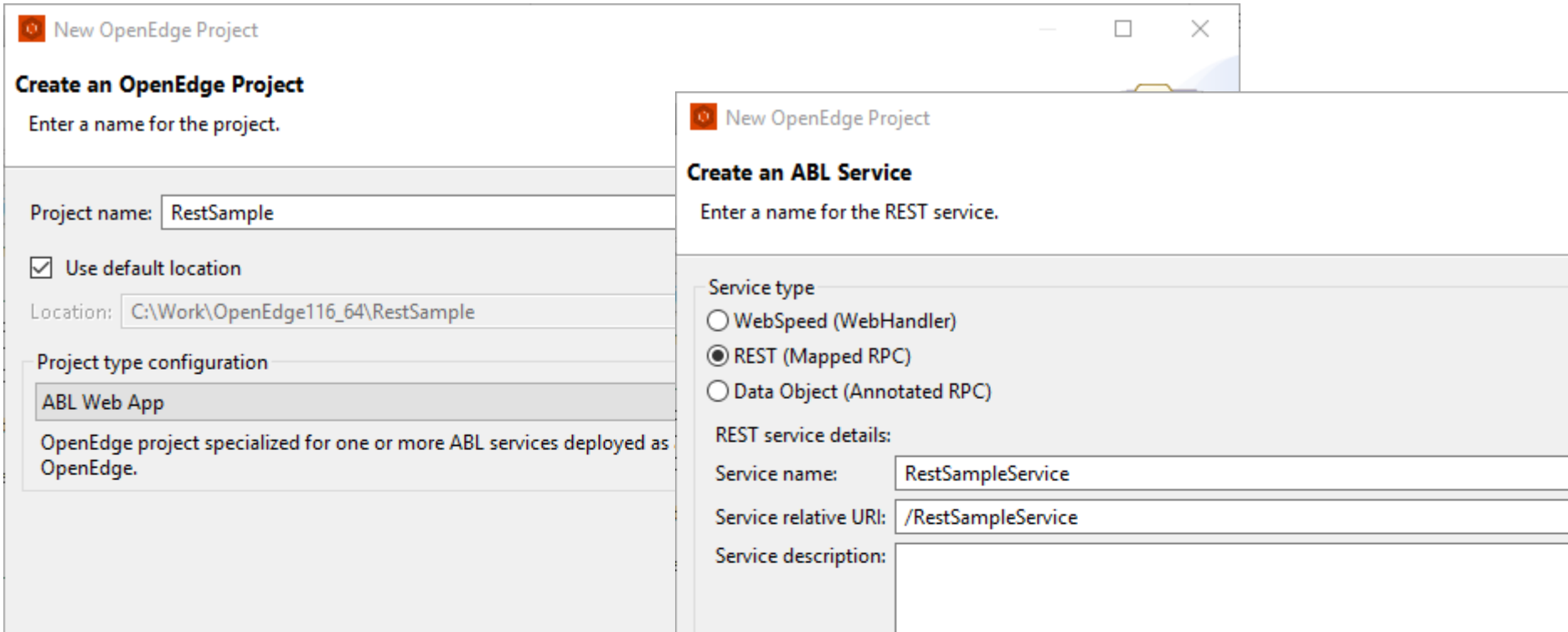
REST Adapter based Backend

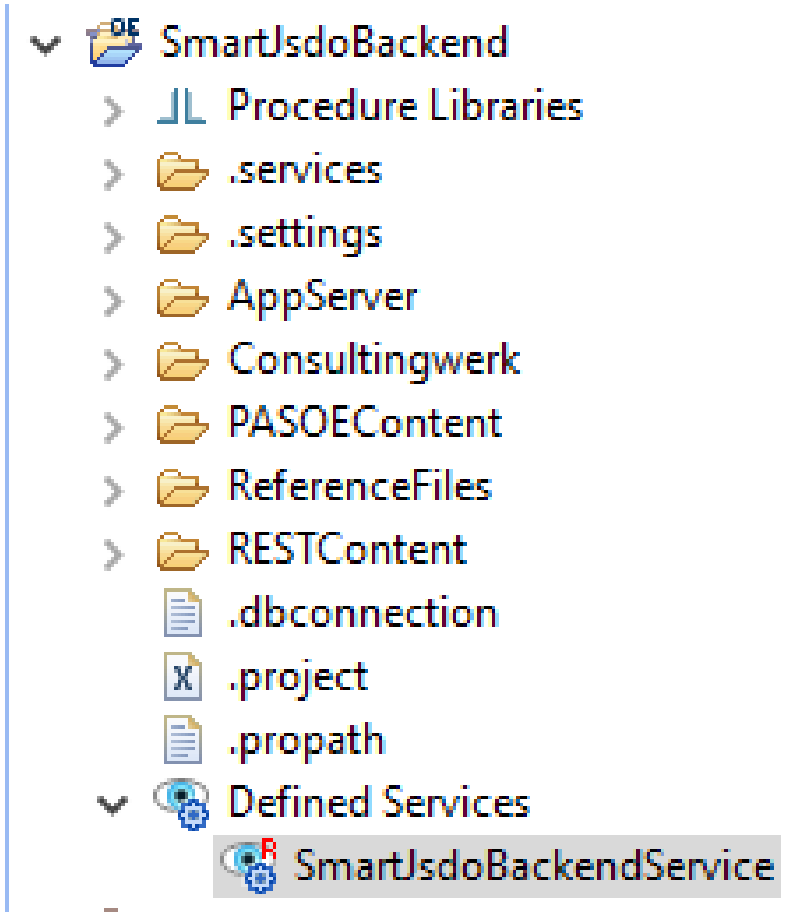
- Classic AppServer: “REST” style OpenEdge Project in Progress Developer Studio

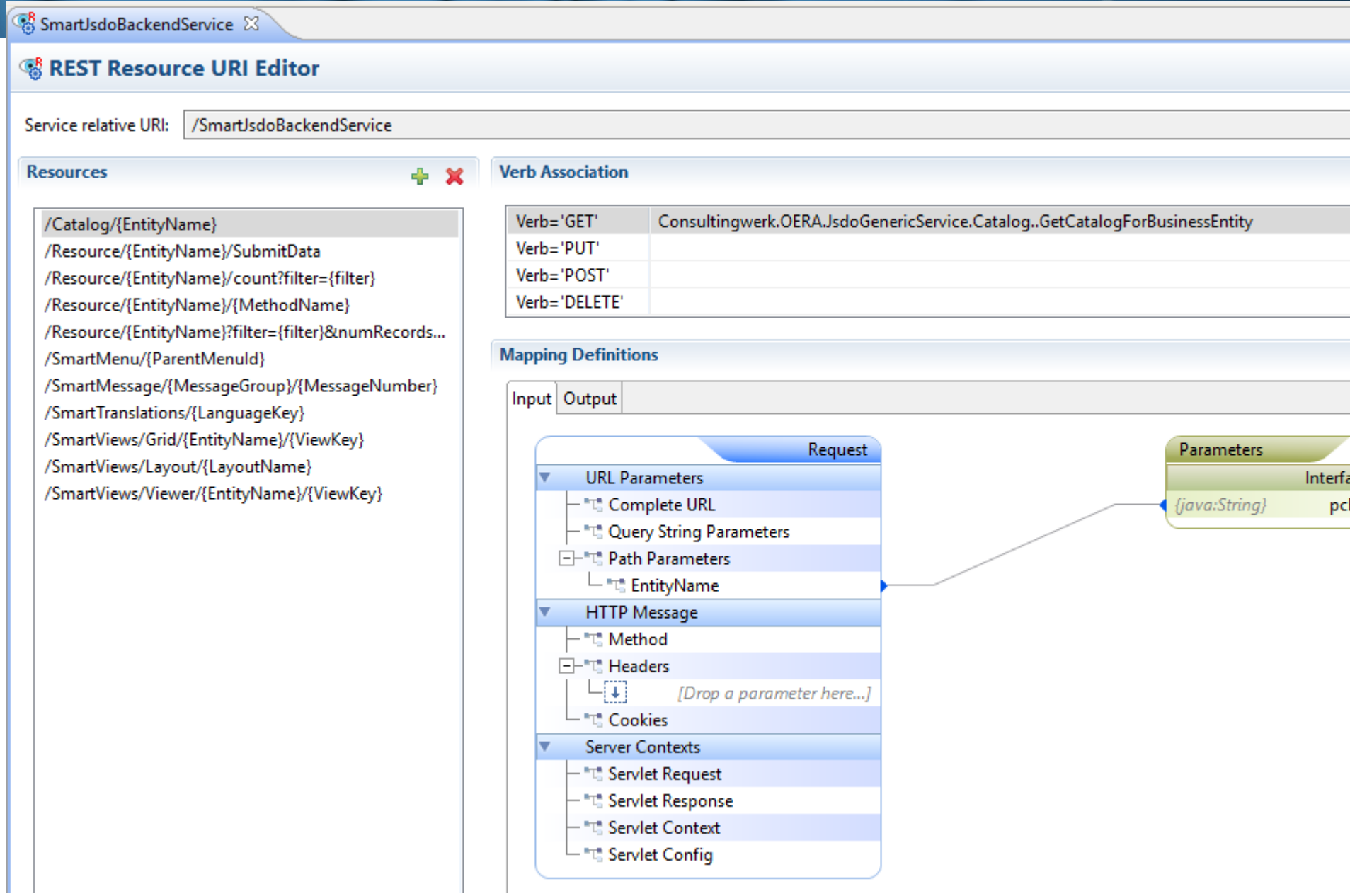


REST Adapter based Backend

- PASOE: “ABL Web App“ style OpenEdge Project in Progress Developer Studio
- Service Type “REST (Mapped RPC)“




SmartJsdoBackend
Procedure Libraries
.services
.settings
AppServer
Consultingwerk
PASOEContent
ReferenceFiles
RESTContent
.dbconnection
.project
.propath
Defined Services
SmartJsdoBackendService


SmartJsdoBackendService
REST Resource URI Editor
Service relative URI:
/SmartJsdoBackendService
Resources
/Catalog/{EntityName}
/Resource/{EntityName}/SubmitData
/Resource/{EntityName}/count?filter={filter}
/Resource/{EntityName}/{MethodName}
/Resource/{EntityName}?filter={filter}&numRecords...
/SmartMenu/{ParentMenuId}
/SmartMessage/{MessageGroup}/{MessageNumber}
/SmartTranslations/{LanguageKey}
/SmartViews/Grid/{EntityName}/{ViewKey}
/SmartViews/Layout/{LayoutName}
/SmartViews/Viewer/{EntityName}/{ViewKey}
Verb Association
Verb='GET'
Consultingwerk.OERA.JsdoGenericService.Catalog..GetCatalogForBusinessEntity
Verb='PUT'
Verb='POST'
Verb='DELETE'
Mapping Definitions
Input
Output
Request
URL Parameters
Complete URL
Query String Parameters
Path Parameters
EntityName
HTTP Message
Method
Headers
[Drop a parameter here...]
Cookies
Server Contexts
Servlet Request
Servlet Response
Servlet Context
Servlet Config
Parameters
{java:String}

REST URI Mapping

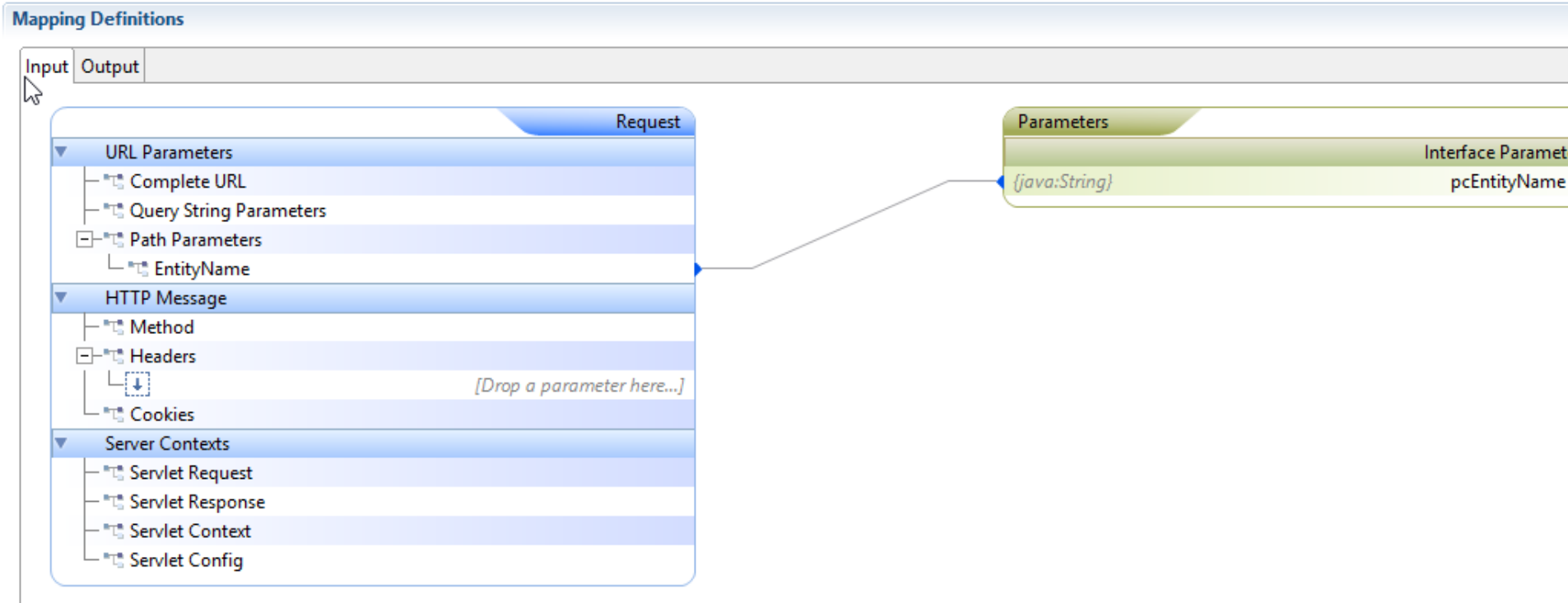
- ABL class method used to handle requests to specific URI pattern and http method
- Drag and drop mapping of request parameters and URI parts to ABL method parameters
  - URI path parameter
  - Query String parameters
  - Request body, body parts
- Client (JSDO) cannot distinguish if it's speaking to "Mapped RPC" or "Data Object Service"

Catalog Access

Catalog access

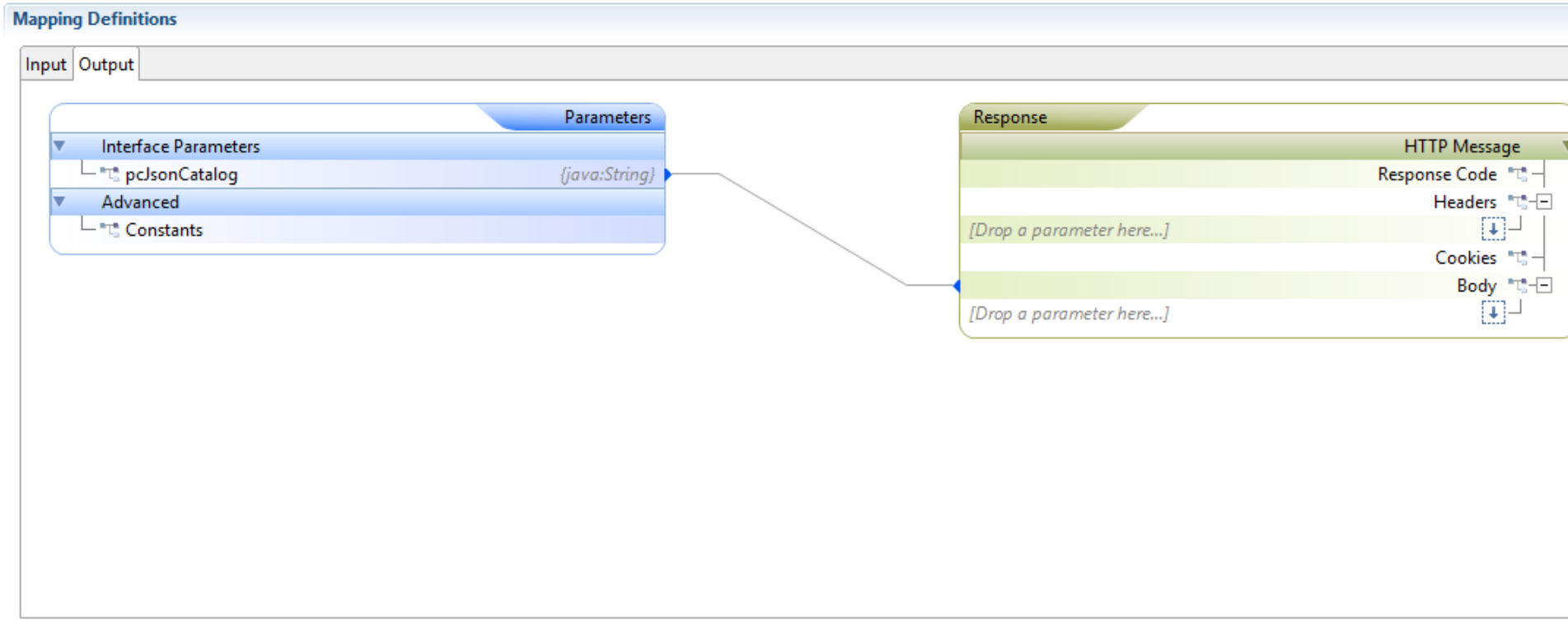
Setting	Value
Resource URI	/Catalog/{EntityName}
Verb='GET'	Consultingwerk.OERA.JsdoGenericService.Catalog..GetCatalogForBusinesEntity

Input Parameter Mapping



Catalog Access

Output Parameter Mapping



Catalog Access

- URI Pattern /rest/Catalog/{EntityName}
- Value of EntityName in URI will be passed as INPUT Parameter to ABL method

- Replacing separate entry points in the REST Adapter with fewer entry points and an additional parameter

- /Catalog/CustomerBusinessEntity -> Parameter value of “CustomerBusinessEntity”

Demo

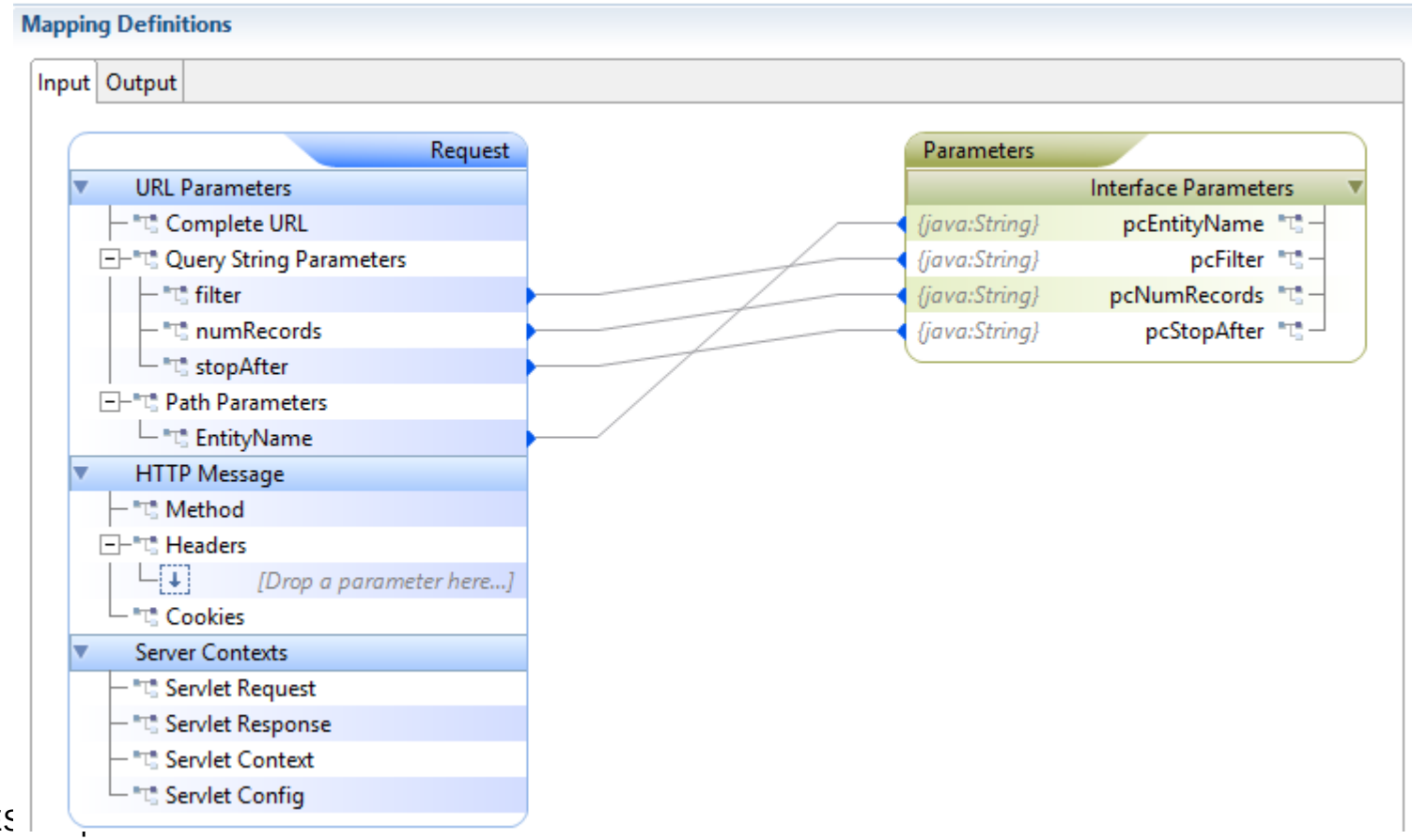
- Code review dynamic catalog generation

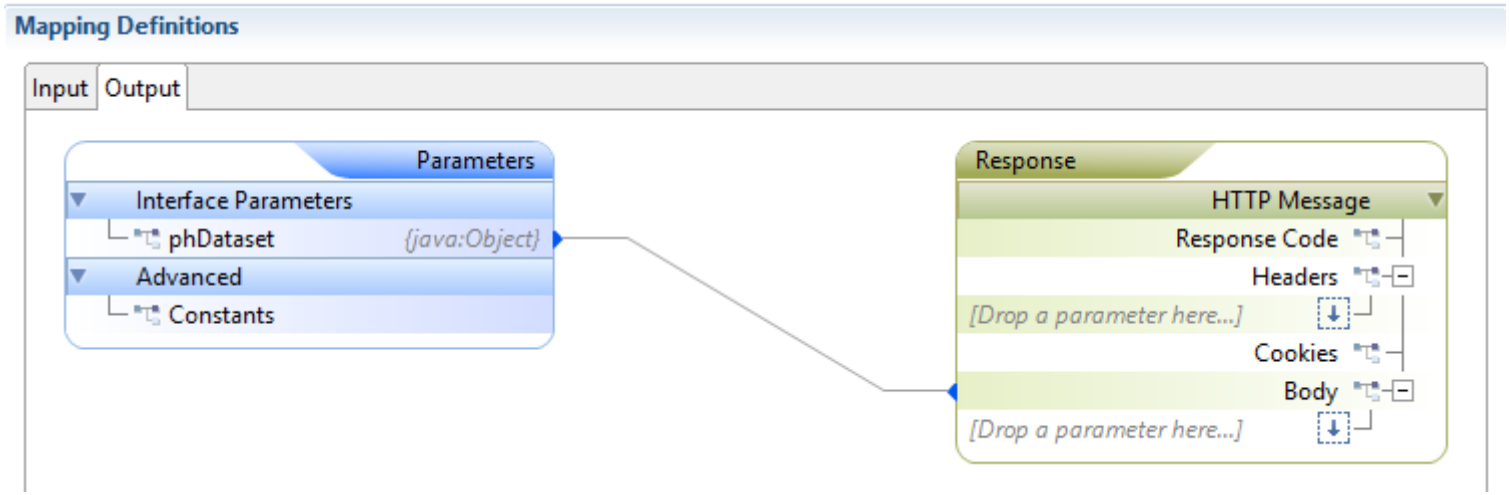
Resource access

- Read
- Create/Update/Delete
- Submit
- Count

Resource Read Access

- /rest/Resource/{EntityName}?filter={filter}




Mapping Definitions
Input
Output
Parameters
Interface Parameters
phDataset
{java:Object}
Advanced
Constants
Response
HTTP Message
Response Code
Headers
[Drop a parameter here...]
Cookies
Body
[Drop a parameter here...]

```
/*------------------------------------------------------------------------------
    Purpose: Generic GetData (get/read) Service Interface
    Notes:
    @param pcEntityName The name of the Business Entity
    @param pcFilter The filter parameter
    @param pcNumRecords The numRecords value from the http client, see method ParseNumRecords
    @param pcStopAfter The stopAfter value from the http client, see method ParseStopAfter
    @param phDataset The Dataset to return to the client
------------------------------------------------------------------------------*/
@openapi.openedge.export(type="REST", useReturnValue="false", writeDataSetBeforeImage="true").
METHOD PUBLIC VOID GetData (pcEntityName AS CHARACTER,
                            pcFilter AS CHARACTER,
                            pcNumRecords AS CHARACTER,
                            pcStopAfter AS CHARACTER,
                            OUTPUT DATASET-HANDLE phDataset):
```

```
ServiceInterface:FetchData (pcEntityName,
                            oFetchDataRequest,
                            OUTPUT DATASET-HANDLE hFetchDataset) .
```

Update methods

- Update methods are implemented similar to read requests
- Dataset passed as LONGCHAR, to ensure numeric values are converted to the right ABL type

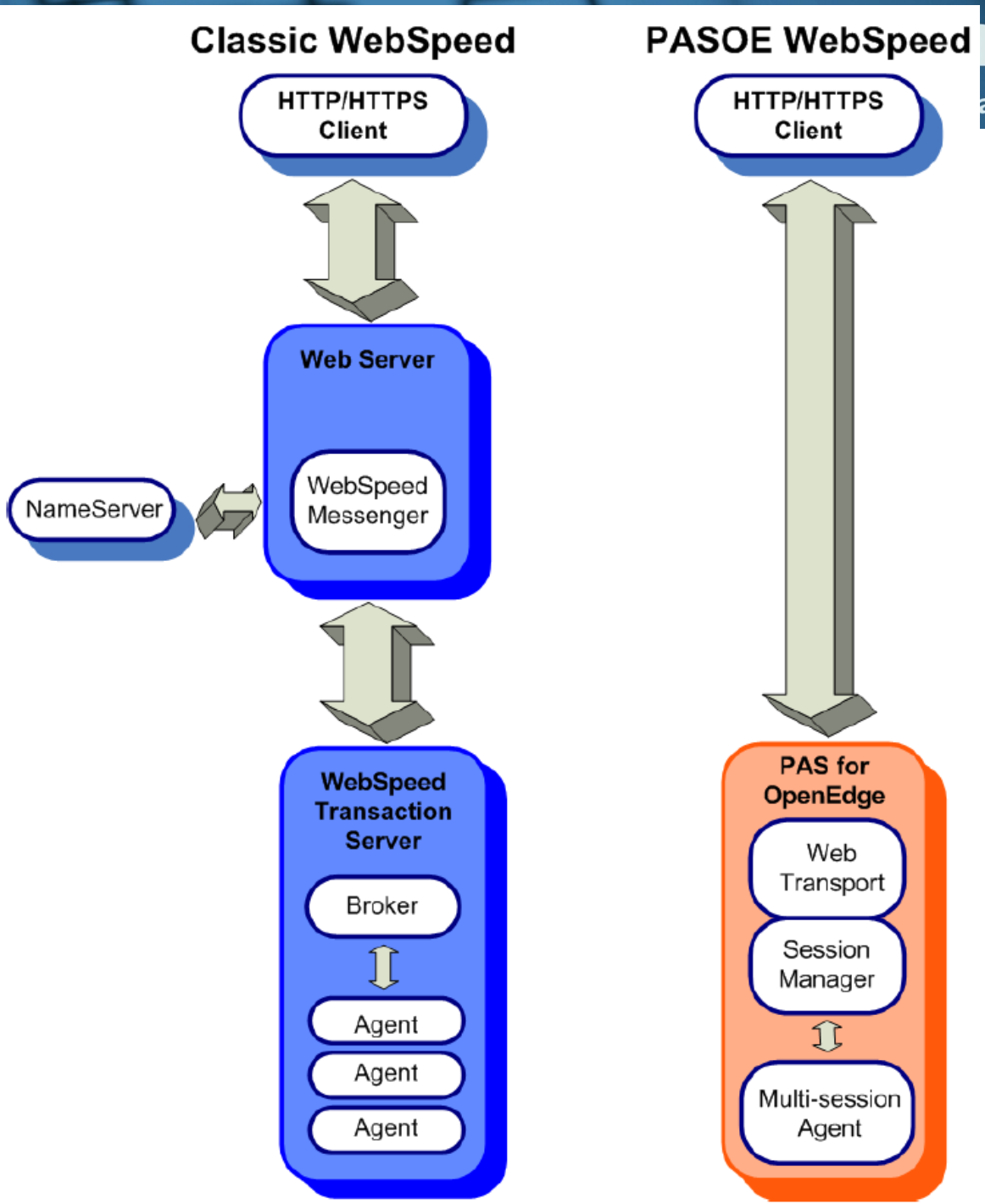
```
/*------------------------------------------------------------------------------
    Purpose: Generic UpdateData (put/update) Service Interface
    Notes:   Uses a LONGCHAR as INPUT-OUTPUT for the Dataset, to allow to map this
             to the actual data types of the fields in the Dataset from the business entity.
             The default mapping for JSON number would be a DECIMAL fields, which
             would cause conflicts integer fields in the business entity while
             updating
    @param pcEntityName The name of the Business Entity
    @param lcDataset The JSON Representation of the Dataset to update
------------------------------------------------------------------------------*/
@openapi.openedge.export(type="REST", useReturnValue="false", writeDataSetBeforeImage="true").
METHOD PUBLIC VOID UpdateData (pcEntityName AS CHARACTER,
                               INPUT-OUTPUT lcDataset AS LONGCHAR):

    THIS-OBJECT:ProcessUpdate (pcEntityName, INPUT-OUTPUT lcDataset) .

END METHOD.
```

Demo

- Walk through Resource access Service.cls

Agenda

- JSDO / Kendo UI Data Source
- REST Web Services
- REST Adapter for Data Object Services
- JSDO Backend Methods
- Dynamic REST Adapter Backend
- **WebSpeed Web Handlers (11.6)**
- Dynamic WebSpeed based Backend


Classic WebSpeed
HTTP/HTTPS Client
Web Server
WebSpeed Messenger
NameServer
WebSpeed Transaction Server
Broker
Agent
Agent
Agent
PASOE WebSpeed
HTTP/HTTPS Client
PAS for OpenEdge
Web Transport
Session Manager
Multi-session Agent

Web handler

- Web handlers provide a very flexible way to handle web requests
- Synchronous request-response pattern
- Supports html page generation
- Supports service requests as well
- Flexible enough to provide an alternative to the REST Adapter and Web Services Adapter (SOAP)
- ABL classes, extending OpenEdge.Web.WebHandler

OpenEdge.Web.WebHandler

Method Summary

Options	Name
	INTEGER **HandleDelete (IWebRequest)**
	INTEGER **HandleGet (IWebRequest)**
	INTEGER **HandleHead (IWebRequest)**
A	INTEGER **HandleNotAllowedMethod (IWebRequest)**
A	INTEGER **HandleNotImplemented (IWebRequest)**
	INTEGER **HandleOptions (IWebRequest)**
	INTEGER **HandlePatch (IWebRequest)**
	INTEGER **HandlePost (IWebRequest)**
	INTEGER **HandlePut (IWebRequest)**
#	INTEGER **HandleRequest ()**
	INTEGER **HandleTrace (IWebRequest)**

Web handler

- WebSpeed in PASOE brings request handler mapping out of the box (classic Web Speed requires customization of web-disp.p for this)
- Based on configuration in openedge.properties
- New PDSOE project type ABL Web Application creates and registers a single handler
- Additional handlers can be set up in OpenEdge Management

URL Mapping

- Configuration based
- Tomcat parses request URI for patterns
- http://localhost/web/Customer/1
- More „rest-style“ URI‘s
- Higher ranking in search engines compared to http://localhost/cgi-bin/cgiip.exe/Customer.w?CustNum=1

- Request handler are specialized ABL classes

URL Mapping

openedge.properties

```
[oepas1.ROOT.WEB]
    adapterEnabled=1
    defaultCookieDomain=
    defaultCookiePath=
    defaultHandler=OpenEdge.Web.CompatibilityHandler
    handler1=JsonDataHandler: /JsonData/{BusinessEntityName}
    handler2=CustomerListWithSearchHandler: /CustomerSearch
    handler3=CustomerHandler: /Customer/{CustNum}
    handler4=DemoHandler: /Demo
    handler5=nullHandler: /AblWebAppProject
    handler6=nullHandler: /Data
    srvrDebug=0
```

Sample request handler

CustomerHandler.cls

```
39  METHOD OVERRIDE PROTECTED INTEGER HandleGet (poRequest AS OpenEdge.Web.IWebRequest):
40
41      DEFINE VARIABLE response   AS OpenEdge.Web.WebResponse       NO-UNDO.
42      DEFINE VARIABLE writer     AS OpenEdge.Web.WebResponseWriter NO-UNDO.
43
44      DEFINE VARIABLE jsonObject AS JsonObject                     NO-UNDO.
45
46      DEFINE VARIABLE iCustNum   AS INTEGER                        NO-UNDO.
47      DEFINE VARIABLE cCustNum   AS CHARACTER                      NO-UNDO.
48
49      EMPTY TEMP-TABLE ttCustomer .
50
51      response = NEW WebResponse().
52      writer = NEW WebResponseWriter(response).
53
54      cCustNum = poRequest:GetPathParameter("CustNum") .
55
56      ASSIGN iCustNum = INTEGER (cCustNum) NO-ERROR .


        jsonObject = NEW JsonObject().
        jsonObject:READ(TEMP-TABLE ttCustomer:HANDLE).

        response:StatusCode = 200.
        response:ContentType = "application/json".

        writer:Write(jsonObject:GetJsonText()).

        writer:Flush().
        writer:Close().

        RETURN 0.
```

Agenda

- JSDO / Kendo UI Data Source
- REST Web Services
- REST Adapter for Data Object Services
- JSDO Backend Methods
- Dynamic REST Adapter Backend
- WebSpeed Web Handlers (11.6)
- **Dynamic WebSpeed based Backend**

REST Adapter vs. WebHandler

- REST Adapter supported since OpenEdge 11.2, JSON ProDataset before-image since OpenEdge 11.4
- Classic and PASOE AppServer
- WebHandlers available since OpenEdge 11.6 only
- PASOE AppServer only

REST Adapter vs. WebHandler

- WebHandler offer greater flexibility in handling input and output
- WebHandler provide access to full HTTP protocol without specific parameter mapping
- WebHandler can handle all content types from the same backend address
  - Eliminates CORS issues
- Use case: Angular JS application where page HTML fragments are generated on server
- 100% ABL source code and openedge.properties

openedge.properties

openedge.properties

```
[smartpas.ROOT.WEB]
    adapterEnabled=1
    srvrAppMode=development
    wsRoot=/static/webspeed
    srvrDebug=1
    defaultCookieDomain=
    defaultCookiePath=
    defaultHandler=OpenEdge.Web.CompatibilityHandler
    handler1=Consultingwerk.OERA.JsdoGenericService.WebHandler.CatalogWebHandler: /Catalog/{EntityName}
    handler2=Consultingwerk.OERA.JsdoGenericService.WebHandler.CountWebHandler: /Resource/{EntityName}/cou
    handler3=Consultingwerk.OERA.JsdoGenericService.WebHandler.ResourceSubmitWebHandler: /Resource/{Entity
    handler4=Consultingwerk.OERA.JsdoGenericService.WebHandler.InvokeMethodWebHandler: /Resource/{EntityNa
    handler5=Consultingwerk.OERA.JsdoGenericService.WebHandler.ResourceWebHandler: /Resource/{EntityName}
    handler6=Consultingwerk.Web2.WebHandler.SmartMenuWebHandler: /SmartMenu/{MenuStructureId}
    handler7=Consultingwerk.Web2.Services.SmartViewsHandler.SmartGridWebHandler: /SmartViews/Grid/{EntityN
    handler8=Consultingwerk.Web2.Services.SmartViewsHandler.SmartViewerWebHandler: /SmartViewer/Viewer/{En
    handler9=Consultingwerk.Web2.WebHandler.SmartMessageWebHandler: /SmartMessage/{MessageGroup}/{MessageN
```

WebHandler based Backend

- WebHandler URI mapping allows to setup same structure as Data Object Service with REST Adapter
- WebHandler allow easy mixing of JSDO Resource requests with other REST requests
- Programming model around WebHandlers provides data as JSON “Entity” (request body)

Dynamic JSDO Backend implementation

- Our WebHandler are providing an interface to the same Service.cls class that serves REST requests
- Input/output to actual worker methods are JsonObject's retrieved from or returned to WebRequest/WebRequest as the "Entity" (update) or Dataset-Handle (read)

```
/*------------------------------------------------------------------------------
    Purpose: Default handler for the HTTP GET method. The request being
             serviced and an optional status code is returned. A zero or
             null value means this method will deal with all errors.
    Notes:
    @param poRequest The IWebRequest instance representing the call
    @return StatusCode of the response sent to the client
------------------------------------------------------------------------------*/
METHOD OVERRIDE PROTECTED INTEGER HandleGet (poRequest AS IWebRequest):

    DEFINE VARIABLE oResponse        AS IHttpResponse       NO-UNDO.

    DEFINE VARIABLE oParamDictionary AS CharacterDictionary NO-UNDO.
    DEFINE VARIABLE oService         AS Service             NO-UNDO.
    DEFINE VARIABLE cEntityName      AS CHARACTER           NO-UNDO.
    DEFINE VARIABLE cFilter          AS CHARACTER           NO-UNDO.
    DEFINE VARIABLE cNumRecords      AS CHARACTER           NO-UNDO INIT ? .
    DEFINE VARIABLE cStopAfter       AS CHARACTER           NO-UNDO INIT ? .
    DEFINE VARIABLE hDataset         AS HANDLE              NO-UNDO.

    ASSIGN
        oResponse              = NEW WebResponse ()
        /* HTTP messages require a content type */
        oResponse:ContentType = 'application/json':U
        .
```

```
/*------------------------------------------------------------------------------
    Purpose: Generic GetData (get/read) Service Interface
    Notes:
    @param pcEntityName The name of the Business Entity
    @param pcFilter The filter parameter
    @param pcNumRecords The numRecords value from the http client, see method ParseNumRecords
    @param pcStopAfter The stopAfter value from the http client, see method ParseStopAfter
    @param phDataset The Dataset to return to the client
------------------------------------------------------------------------------*/
@openapi.openedge.export(type="REST", useReturnValue="false", writeDataSetBeforeImage="true").
METHOD PUBLIC VOID GetData (pcEntityName AS CHARACTER,
                            pcFilter AS CHARACTER,
                            pcNumRecords AS CHARACTER,
                            pcStopAfter AS CHARACTER,
                            OUTPUT DATASET-HANDLE phDataset):
```

```
IF pcFilter BEGINS "~{":U THEN
    THIS-OBJECT:FetchDataRequestFromFilter (oFetchDataRequest, pcFilter, cBufferName, OUTPUT cOrderBy)
```

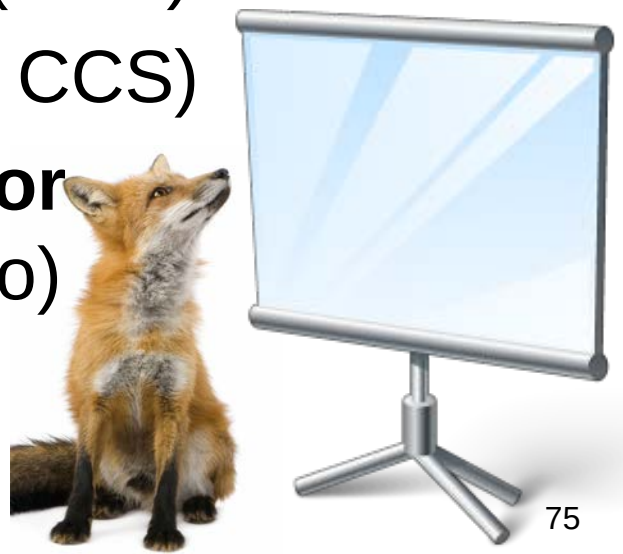
```
/*------------------------------------------------------------------------------
    Purpose: Assigns the properties of the given FetchDataRequest instance from
             a character string representing an ABL Filter
    Notes:
    @param poFetchDataRequest The FetchDataRequest instance to assign values to
    @param pcFilter The characcter string representing the ABL Filter instance
    @param pcBufferName The Buffer name for the query string
    @param pcOrderBy OUTPUT The order by value
------------------------------------------------------------------------------*/
METHOD PROTECTED VOID FetchDataRequestFromFilter (poFetchDataRequest AS FetchDataRequest,
                                                  pcFilter AS CHARACTER,
                                                  pcBufferName AS CHARACTER,
                                                  OUTPUT pcOrderBy AS CHARACTER):

    DEFINE VARIABLE oFilterParameter  AS FilterParameter   NO-UNDO .
    DEFINE VARIABLE oQueryParser      AS QueryParser       NO-UNDO .
    DEFINE VARIABLE lcFilter          AS LONGCHAR          NO-UNDO .
    DEFINE VARIABLE i                 AS INTEGER           NO-UNDO .
    DEFINE VARIABLE cFilterTable      AS CHARACTER         NO-UNDO .
    DEFINE VARIABLE oJsonObject       AS JsonObject        NO-UNDO .
    DEFINE VARIABLE oObjectModel      AS ObjectModelParser NO-UNDO .
    DEFINE VARIABLE oFormat           AS NumericFormat     NO-UNDO .
    DEFINE VARIABLE iEntry            AS INTEGER           NO-UNDO .
    DEFINE VARIABLE cNames            AS CHARACTER         NO-UNDO .

    FIX-CODEPAGE (lcFilter) = Codepages:UTF-8 .

    /* SCL-415: Perform JSON Serialization/Deserialization with AMERICAN
                numeric format to avoid issues with decimal point interpretation */
    oFormat = SessionHelper:GetNumericFormat() .
    SessionHelper:SetDefaultNumericFormat() .

    lcFilter = pcFilter .

    oObjectModel = NEW ObjectModelParser () .

    oJsonObject = CAST (oObjectModel:Parse (lcFilter), JsonObject).
```

Demo

- Walk through Resource access WebHandler

Don‘t miss our other presentations

- Monday 11:00: **CCS Deep Dive** (Mike)
- Tuesday 11:00: **OO-Oh** (Mike)
- Tuesday 13:00: **Application Modernization using the SmartComponent Library** (Mike and Marko)
- Tuesday 16:45: **REST in peace** (Mike)
- Wednesday 11:00: **CCS BoF** (all CCS)
- Wednesday 11:00: **Angular JS for OpenEdge programmers** (Marko)



Questions