



DEV-23: Ajax, Dojo, and the OERA; Making Connections

Brian J. White



**DEV-23: Ajax, Dojo and the OERA;
Making Connections**

Brian J. White
SW Development – Project Leader
Keystone Systems, Inc.




Agenda

Ajax, Dojo and the OERA; Making Connections

Introduction

- Connection Components
- Server Side Components
- Client Side Components
- Q&A



Who Are We?

- Keystone Systems, Inc
- Raleigh, North Carolina, USA
- Keystone Library Automation System
- 26 Years of serving Libraries for the Blind
- 67% of National Library Service blind and physically handicapped patrons nationally are served by Libraries using KLAS
- Beginning to expand into Instructional Resource Centers in the US
- Installed in 8 IRCs to date
- Dynamics® GUI & Associated SmartObjects



DEV-23: Ajax, Dojo, and the OERA; Making Connections

Brian J. White

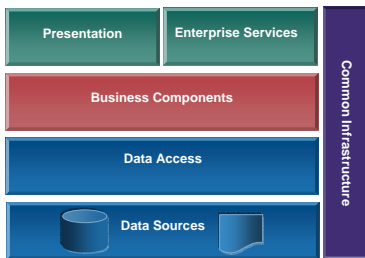
How Did This Project Originate?

- Expanding to additional markets
- Zero or near-zero footprint demand
- Requirement from Indiana Education Resource Center
- Web based entry of requests by Digital Rights Managers for textbooks and equipment

4 DEV-23: Ajax, Dojo and the OERA - Making Connections



Which Version of the OERA?



5 DEV-23: Ajax, Dojo and the OERA - Making Connections



Agenda

Ajax, Dojo and the OERA; Making Connections

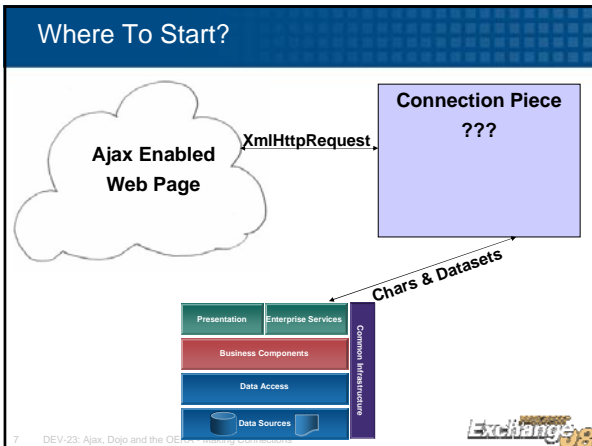
- Introduction
- Connection Components
- Server Side Components
- Client Side Components
- Q&A

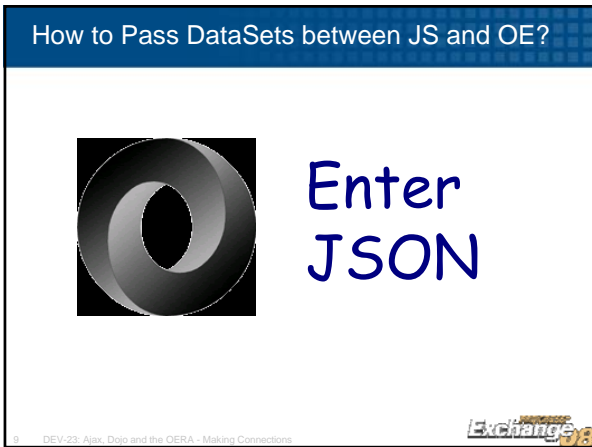
6 DEV-23: Ajax, Dojo and the OERA - Making Connections



DEV-23: Ajax, Dojo, and the OERA; Making Connections

Brian J. White





JSON

JavaScript Object Notation

- Lightweight Data-Interchange Format
- Uses a subset of the JavaScript Programming Language
- Built on 2 Native JavaScript Structures:
 - Collection of Name/Value Pairs (Objects)
 - Ordered List of Values (Arrays)

10 DEV-23: Ajax, Dojo and the OERA - Making Connections Exchange 2008

DEV-23: Ajax, Dojo, and the OERA; Making Connections


Brian J. White

JSON Example

```
{ "menu": {  
  "id": "file",  
  "value": "File",  
  "popup": {  
    "menuitem": [  
      { "value": "New",  
        "onclick": "CreateNewDoc()" },  
      { "value": "Open",  
        "onclick": "OpenDoc()" },  
      { "value": "Close",  
        "onclick": "CloseDoc()" }  
    ]  
  }  
}
```

```
var myMenu = dojo.json.evalJson(response.data);  
// myMenu.menu.id is "file"  
// myMenu.menu.popup.menuitem[1].value is "Open"
```


11 DEV-23: Ajax, Dojo and the OERA - Making Connections



JSON and XML

- XML vs JSON is a continuing discussion
- Heated arguments over the benefits / pitfalls of either format
- More tools exist (especially in Progress) for using XML
- JSON is faster for small payloads of data on the browser side.

12 DEV-23: Ajax, Dojo and the OERA - Making Connections




XML vs JSON

"Use JSON... if you want to serialize a data structure that's not too text-heavy and all you want is for the receiver to get the same data structure with minimal effort, and you trust the other end to get the i18n right, JSON is hunky-dory.

Use XML if you want to provide general-purpose data that the receiver might want to do unforeseen weird and crazy things with, or if you want to be really paranoid and picky about i18n, or if what you're sending is more like a document than a struct, or if the order of the data matters, or if the data is potentially long-lived (as in, more than seconds) XML is the way to go."

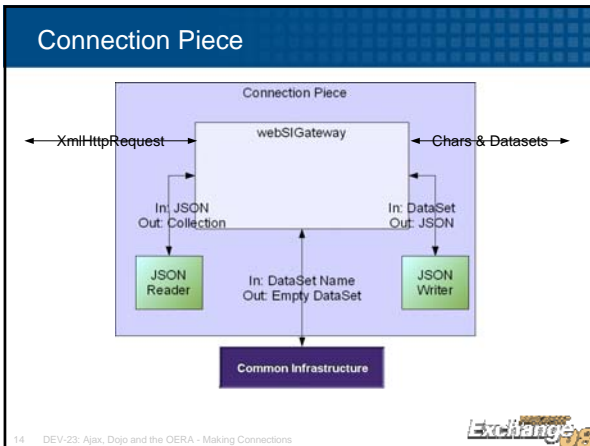
Tim Bray (XML co-inventor) - December 21, 2006

13 DEV-23: Ajax, Dojo and the OERA - Making Connections



DEV-23: Ajax, Dojo, and the OERA; Making Connections

Brian J. White



webSIGGateway

- Single WebSpeed® Program
- Gets Input and Input-Output “parameters” using get-value and get-long-value
- Converts JSON strings to Datasets
- Calls proSIGGateway to execute the request
- Converts Input-Output and Output datasets back to JSON strings
- Adds the “RETURN-VALUE” from proSIGGateway to the returned values
- Assembles a JSON string containing all of the information to be sent back

15 DEV-23: Ajax, Dojo and the OERA - Making Connections

Progress® Dataset JSONWriter

- Straightforward dedicated-use program
- Designed to work with our JavaScript Dataset object (to be discussed later)
- Uses Handles, Attributes, and Methods built into the Dataset object

```
PROCEDURE ipDatasetToJSON:  
  DEFINE INPUT  PARAMETER DATASET-HANDLE phDataSet.  
  DEFINE OUTPUT PARAMETER plcJSON AS LONGCHAR NO-UNDO.
```

16 DEV-23: Ajax, Dojo and the OERA - Making Connections

DEV-23: Ajax, Dojo, and the OERA; Making Connections

Brian J. White

Progress Dataset JSONWriter

- Header
 - Name, LastUsedUniqueID
- List of Tables
 - Array of Temp-Table names in this dataset
- Tables
 - Header Info
 - Name
 - Unique Key Field Name
 - FieldInfo (Array of Objects containing FieldName & Type)
 - Reposition Info
 - Rows
 - Before Image Rows (Empty)

17 DEV-23: Ajax, Dojo and the OERA - Making Connections



Progress Dataset JSONReader

- Create a Class based on a Java™ JSON Parser
 - Load information into a Collection class
 - Navigable data store
 - Used the Collection and List Classes
 - From the OE Hive
 - Written by Thomas Mercer-Hursh
 - Class “wrappers” for primitive types needed
 - Character, Decimal, Logical
 - Added a property to tell the List class to “Delete” the contained object when deleting itself.

18 DEV-23: Ajax, Dojo and the OERA - Making Connections



webSIGateway – Use of the Collection from the JSONReader

- dsNull Dataset short-circuits the use of the JSON Reader by looking for a specific string in the first few bytes of the incoming JSON string.
- The dsContext Dataset uses a custom process
 - Know where to get a specific dsContext instance
 - Fixed Dataset Layout
- For the IODataSet, Create an Empty Dataset
 - Based on the “Name” Property
 - Service Manager Procedure designed for this purpose.

19 DEV-23: Ajax, Dojo and the OERA - Making Connections



DEV-23: Ajax, Dojo, and the OERA; Making Connections

Brian J. White

Using JSONReader Collection for IODataSet

- Load the Dataset
 - For each Temp Table sub-collection
 - For each Before Image Row
 - If Update, do Update Process
 - If Add, do Add Process
 - If Delete, do Delete Process
- Fills a Dataset like GET-CHANGES Method
 - Preserves the Temp Table, Before Table and Row-State row attributes
 - Used by Business Logic and Data Access Logic processes.
 - NOT performing database updates at this point

20 DEV-23: Ajax, Dojo and the OERA - Making Connections



Using JSONReader Collection for IODataSet

- Update Process
 - Turn off Tracking Changes
 - Create a Row
 - Load the Before Image field values from the collection into the row
 - Release, Refind the Row
 - Turn on Tracking Changes
 - Find the After Image row in the collection
 - Load the After Image field values into the row.
 - Release the Row

21 DEV-23: Ajax, Dojo and the OERA - Making Connections



dsContext DataSet

- Used to communicate parameter information between client & server
 - Can be bidirectional
- Reduces --
 - Query Code on Client
 - SQL Injection Attack Risk
 - Code for connection between Client & Server

22 DEV-23: Ajax, Dojo and the OERA - Making Connections




DEV-23: Ajax, Dojo, and the OERA; Making Connections

Brian J. White

dsContext DataSet

- ttContext Table
 - ContextTaskID
 - ContextName
 - ContextValue
 - ContextTable
 - ContextDataType
 - ContextRelop
 - ContextValueEnd

23 DEV-23: Ajax, Dojo and the OERA - Making Connections




Agenda

Ajax, Dojo and the OERA; Making Connections

- Introduction
- Connection Components
- Server Side Components
- Client Side Components
- Q&A

24 DEV-23: Ajax, Dojo and the OERA - Making Connections




Service Manager

Common Infrastructure

- Create as a new Dynamics Manager
 - Server Side only
- Configured via an XML File
- Convert EntityName → Procedure Filename
- Convert Operation → Internal Proc Name
- Create Dataset from Dataset Name
 - Dataset Name → Procedure Filename
 - "GetEmpty" → Internal Proc Name
- Keep track of currently running Procedures
 - Reuse of procedure handles; avoid having to restart them
 - NOT Reuse of the data

26 DEV-23: Ajax, Dojo and the OERA - Making Connections




DEV-23: Ajax, Dojo, and the OERA; Making Connections

Brian J. White


Business Components

- Business Entity Procedure
 - Service Manager uses RUN VALUE(procname)
- Instantiates a set of Business Entity Objects
 - One per temp-table in the Dataset, but that is not a requirement.
 - Manages interactions between Business Entity Objects
 - Internal procedures corresponding to the OperationNames used in the parameters to proSIGateway
 - We provide a "GetEmpty" operation in each Business Procedure
 - Building Datasets for loading from JSON
 - Provide Dataset Layout for Client Side

27 DEV-23: Ajax, Dojo and the OERA - Making Connections 


Business Components

- Business Entity Object
 - Based on John Sadd's "A Class-Based Implementation of the OpenEdge® Reference Architecture" presented at Exchange 2007 (ARCH-7)
 - Instantiates a corresponding Data Access Object
 - Accomplished via an overridden constructor in the inherited class.

28 DEV-23: Ajax, Dojo and the OERA - Making Connections 

Data Access

- Data Access Object
 - Based on John Sadd's "A Class-Based Implementation of the OpenEdge® Reference Architecture" presented at Exchange 2007 (ARCH-7)
- Concurrent development in both Progress 9.1E and OpenEdge 10.1B
 - Subclassed to an Object containing an existing SmartDataObject
 - Initial step; will break out validation logic to the Business Entity and direct DB access in the Data Access Object.

29 DEV-23: Ajax, Dojo and the OERA - Making Connections 


DEV-23: Ajax, Dojo, and the OERA; Making Connections

Brian J. White

Agenda


Ajax, Dojo and the OERA; Making Connections

- Introduction
- Connection Components
- Server Side Components
- Client Side Components**
- Q&A

30 DEV-23: Ajax, Dojo and the OERA - Making Connections 


JavaScript

- Case-Sensitive**
- Multi-Threaded**
- Interpreted; Follow the Tamarin project for in-browser [JIT] compiler progress.
- Somewhat Resembles C, C++, Java
- Loosely Typed Language
- Primitive datatypes are strings, numbers and booleans.
- Objects map property names
 - Like Hash Tables or Associative Arrays
- OO Inheritance mechanism is prototype based
 - Quite different from C++ and Java

31 DEV-23: Ajax, Dojo and the OERA - Making Connections 

JavaScript Toolkits

- Why use a Toolkit?**
 - Easier DOM / CSS access & manipulation
 - Easier Cross-Browser compatibility
 - Easier Event Handling
 - Easier Inheritance
- Major Toolkits (12/2007)**
 - Prototype / Script.aculo.us
 - jQuery
 - Ext JS - JavaScript Library
 - Mootools
 - Yahoo! User Interface Library
 - Dojo**
 - Backbase
 - Django
 - Moo.fx
 - DWR
 - Ruby on Rails
 - ASP.NET Ajax
 - Google Web Toolkit

32 DEV-23: Ajax, Dojo and the OERA - Making Connections 

DEV-23: Ajax, Dojo, and the OERA; Making Connections

Brian J. White

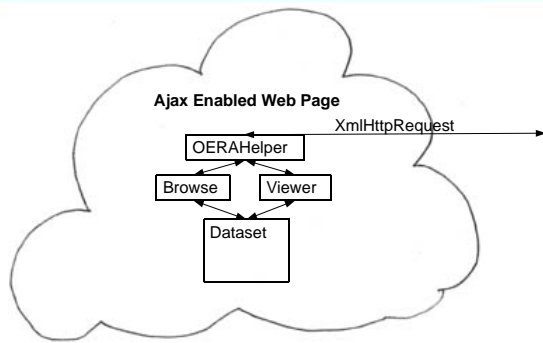
JavaScript Toolkit Caveats

- Time-Consuming to Switch Toolkits
 - Specific Syntax
 - Widget Instantiation & Attributes
 - Inheritance
 - Publish / Subscribe
 - DOM Searching
- Prescribed Directory Structure
- All are relatively new
 - Expect [breaking] changes
 - Occasional corner case bugs

33 DEV-23: Ajax, Dojo and the OERA - Making Connections



Client Side Flow Diagram



34 DEV-23: Ajax, Dojo and the OERA - Making Connections



OERHelper



- Connects a Request to a Response Handler
- POSTs a defined set of Variables
 - Entity, Operation, Context, IODataSet
 - Sets response mime type as "text/json"
- Creates an XMLHttpRequest
- Directs the results to a specified handler
 - Dojo converts the JSON strings to JavaScript objects automatically

35 DEV-23: Ajax, Dojo and the OERA - Making Connections




DEV-23: Ajax, Dojo, and the OERA; Making Connections

Brian J. White

Datasets


- Based on ProDataSet™
- Designed to Load via a simple assignment statement
- SubClassed version for dsContext & dsNull
- Load Structure via a "GetEmpty" OERA call
- getChangeSummary creates a stripped down version of a DataSet
 - Contains Before Image
 - Contains After Image changed fields only
 - Less header info



36 DEV-23: Ajax, Dojo and the OERA - Making Connections

Tables


- Subset of a DataSet
 - Points to data within the DataSet
 - Not a copy of the data
- Methods to retrieve arrays of rows, or a single row
- Mark a record for update → Creates before image
- AddRow → Creates a row with all fields & an empty before image
- DeleteRow → Creates before image and removes the row
- Merge rows from update results and/or next "batch"
- getChangedRows called from DataSet
- getChangeSummary



37 DEV-23: Ajax, Dojo and the OERA - Making Connections

Widgets

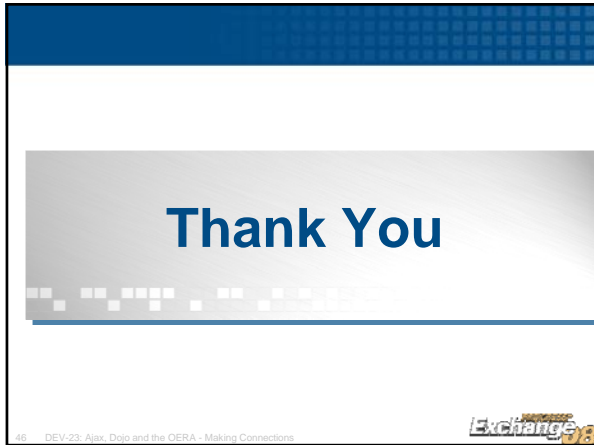
- Browse**
 - Contains an OERA Helper instance
 - Based on Dojo FilteringTable
 - Backed by a Dojo datastore compatible with the rows in our Table
 - Uses the Scrolling HTML Table script from WebToolkit.info
- Viewer**
 - Contains an OERA Helper instance
 - Based on Dojo ContentPane
 - Tied to a row in a Table instance
 - KLAS Adds TableIO functionality
 - Automatically displays fields when the DataRow is set.

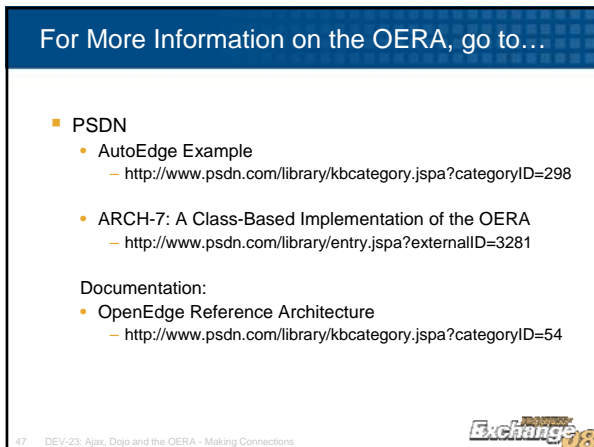


38 DEV-23: Ajax, Dojo and the OERA - Making Connections

DEV-23: Ajax, Dojo, and the OERA; Making Connections
Brian J. White







DEV-23: Ajax, Dojo, and the OERA; Making Connections

Brian J. White

For More Information on the OERA, go to...

- OE Hive
 - Collection and Map Classes for OOABL
 - <http://www.oehive.org/CollectionClasses>
 - OERA Reference Implementations
 - <http://www.oehive.org/taxonomy/term/224>
 - OERA Framework
 - <http://www.oehive.org/taxonomy/term/127>

48 DEV-23: Ajax, Dojo and the OERA - Making Connections



For More Information on JSON, go to...

- Websites
 - Introducing JSON
 - <http://www.json.org>
 - StringTree JSON (JSON To/From Collections)
 - <http://stringtree.org/stringtree-json.html>
 - JSON vs. XML: The Debate
 - <http://ajaxian.com/archives/json-vs-xml-the-debate>
 - JSONLint
 - <http://www.jsonlint.com/>

49 DEV-23: Ajax, Dojo and the OERA - Making Connections



For More Information on Dojo, go to...

- Websites
 - The Dojo Toolkit
 - <http://www.dojotoolkit.org>
 - Simple Dojo Tutorial
 - <http://www.scribd.com/doc/2211429/Dojo-tutorial>

50 DEV-23: Ajax, Dojo and the OERA - Making Connections



DEV-23: Ajax, Dojo, and the OERA; Making Connections

Brian J. White

For More Information on JavaScript, go to...

- JavaScript
 - JavaScript 101 - Part 1
 - <http://www.sitepoint.com/article/javascript-101-1>
 - Douglas Crockford's JavaScript "Portal"
 - <http://javascript.crockford.com/>
 - Scrollable HTML Table
 - <http://www.webtoolkit.info/scrollable-html-table.html>
 - JSLint
 - <http://www.jshint.com/>
- JavaScript Toolkits
 - JavaScript Libraries By Comparison
 - <http://javascriptant.com/articles/24/javascript-libraries-by-comparison>
 - How to choose a JavaScript framework
 - <http://blog.reindiel.com/2007/10/30/how-to-choose-a-javascript-framework/>

51 DEV-23: Ajax, Dojo and the OERA - Making Connections



For More Information on Debugging JavaScript, go to...

- Debugging
 - Firebug
 - <http://www.getfirebug.com/js.html>
 - The JavaScript Debugging Guide
 - <http://javascript.internet.com/debug-guide.html>
 - Web Development Helper
 - <http://projects.nikhilk.net/WebDevHelper/Default.aspx>
- Testing
 - Selenium
 - <http://selenium.openqa.org/>

52 DEV-23: Ajax, Dojo and the OERA - Making Connections