

Diving into JSON



Profound Logic Software

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About Me

- I create Web Application Development and Modernization Tools for IBM i
- Have been doing it for 13 years
- Have been pushing the limits of what is achievable in a browser
- JSON makes what we do possible





Why learn about JSON?

- JSON is becoming very prevalent in Web application development today
- Very simple to learn
- If you are involved in Web development, you should know about JSON



What is JSON?

- Data interchange format
- Light and compact
- Easy to read and understand
- Can be produced by any server-side Web language
- Consumed by JavaScript in the Browser



What does JSON stand for?

- JavaScript Object Notation
 - What is and why JavaScript?
 - Only one of the most popular languages
 - Scripting language of all browsers



JSON is a discovered format

- Not invented
- Discovered while working on Web applications
- Syntactically identical for creating JavaScript objects and arrays
- No Parser is needed for JSON
- Simply eval()



Some JavaScript syntax

- `var attendees = new Array();`
- `var attendees = [ ];`



Some JavaScript syntax

- `var attendees = new Array();`
`attendees[0] = "Alex"`
`attendees[1] = "Laura";`
`attendees[2] = "Jacob";`
- `var attendees = [ "Alex", "Laura", "Jacob" ];`



Some JavaScript syntax

- `var customer = new Object();`
- `var customer = { };`



Some JavaScript syntax

- `var customer = new Object();
customer.name = "Profound Logic";
customer.address = "123 Main Street";`
- `var customer = { name: "Profound Logic",
address: "123 Main Street" };`



JSON vs. XML

- XML
 - Fetch an XML document
 - Parse It
 - JavaScript can help with this, but still have to use XML's Document Object Model to loop through elements to get the information you want
 - Extract values and store in JavaScript variables, arrays, or objects



JSON vs. XML

- JSON
 - Fetch a JSON string
 - `eval()` the string into variables, arrays, or objects



JSON Syntax

- Curly braces denote an object
- Objects contain name / value pairs, separated by commas
- Colon is placed between the name and the value
- Square brackets denote arrays, elements are separated by commas
- No reserved words



Simple values

- Number
- String (enclosed in double quotes)
- Boolean (true or false)



JSON is hierarchical

- Objects can contain other objects
- Objects can contain arrays
- Arrays can contain objects
- Arrays can contain other arrays



Example ... Simple Arrays

- [“Alex”, “Kara”, “Philip”]
- [100.50, 259.00, 999.99]



Example ... Simple Objects (or records)

- {
 “First”: “Alex”,
 “Last”: “Roytman”,
 “Company”: “Profound Logic Software”,
 “Title”: “Hacker”
}



Example ... 3 records

- [
 {
 "First": "Alex",
 "Last": "Roytman",
 "Company": "Profound Logic Software",
 "Title": "Hacker"
 },
 {
 "First": "Kara",
 "Last": "Carnevale",
 "Company": "PH Business Solutions",
 "Title": "Advertising"
 },
 {
 "First": "Roger",
 "Last": "Monte",
 "Company": "Roger Monte Productions",
 "Title": "Producer"
 }
]



Example ... Mixing It Up ... Order Info

```
• {  
  "Order Header": {  
    "Customer Number": 953405,  
    "Ship To Address": {  
      "Address Line 1": "562 Congress Park",  
      "Address Line 2": "Suite 200",  
      "City": "Orlando",  
      "State": "FL",  
      "Zip": "32801"  
    }  
  },  
  "Order Details": [  
    { "Product Id": 848, "Qty": 2 },  
    { "Product Id": 932, "Qty": 1 },  
    { "Product Id": 156, "Qty": 4 }  
  ]  
}
```



Uses for JSON

- Primary usage is for AJAX
- A short-hand way to build objects and arrays in JavaScript
- To define parameters to JavaScript functions
- For defining a user interface
- Embedded in DDS for use with RPG OA
- Cross-domain AJAX (JSONP)



AJAX

- Browser needs some information from server-side PHP or RPG code
- Sends requests via AJAX
- Response is a JSON string
- JavaScript code receives response and uses it directly to update the current page



Function Parameters

- ```
function createButton(text) {
 // ...button creation code goes here ...
}
```

```
createButton("Click Here");
```



# Function Parameters

- ```
function createButton(text, x, y, height,  
width) {  
    // ...button creation code goes here ...  
}
```

```
createButton("Click Here", 10, 10, 50,  
200);
```



Function Parameters

- ```
function createButton(parms) {
 var text = parms;
 var x = parms.x;
 var y = parms.y;
 var height = parms.height;
 var width = parms.width;
 // ...button creation code goes here ...
}
```



# Function Parameters

- `createButton({  
    text: "Click Here",  
    x: 10, y: 10,  
    height: 50, width: 200  
});`



# Using JSON instead of HTML to represent a UI

- Use of raw HTML for Web application is diminishing
- Instead DHTML frameworks are being utilized
- UI definitions can be saved to files with .json extension, and later fetched by framework
- Embedded into JavaScript code with a call to some framework's rendering function



# Example ... Representing a UI Using JSON instead of HTML

- framework.createForm (

```
{
 "width": "95%"
 "elements": [
 {
 "type": "textbox",
 "id": "OrdNum",
 "label": "Order Number"
 },
 {
 "type": "dropdown",
 "id": "Qty",
 "options": [10, 25, 50, 75, 100],
 "label": "Qty"
 },
 {
 "type": "button",
 "id": "Submit",
 "text": "Submit Order"
 }
]
}
```

);



# JSON in DDS for RPG OA

- What is RPG Open Access
  - Allows a HANDLER to override I/O operations like READ, WRITE, and EXFMT
  - Overriding can mean providing a Web interface
  - HTML too simple to represent the interface – JSON is used needed to provide a Rich UI
- DDS is necessary to define the record



- ```
A      R SEARCHFMT
A
A      HTML('{"screen":{"record format nam-
A      e":"SEARCHFMT","description":"Order-
A      Search"},"items":[{"id":"Panel1",-
A      field type":"panel","value":"Search-
A      Orders","left":"20px","top":"20px"-
A      ,"width":"445px","height":"250px",-
A      panel style":"Simple","z index":"8"-
A      ,"color":"#ffffff","text align":"ce-
A      nter"}, {"id":"OutputField1","field -
A      type":"output field","value":"Start-
A      ing Date:","left":"40px","top":"65p-
A      x","font weight":"bold","text align-
```



JSONP

- P stands for “with padding”
- Makes cross-domain AJAX through `<script>` tag
- Request url passes a function name
- You must define the function to accept the response



JSONP Example

- Yahoo provides the YQL platform
- Make request to yahoo servers using a url like this:

`http://query.yahooapis.com/v1/public/yql?q=select+*+from+finance.yahoo.quotes+where+symbol%22IBM&callback=myOwnFunction`



JSONP Example

- The response may look like this:

```
myOwnFunction({  
  price: 207,  
  volume: 4024251,  
  PERatio: 15.29,  
  headlines: [  
    ...  
  ],  
  ...  
})
```



JSONP Example

- Process the response with your function:

```
function myOwnFunction(data) {  
    alert(data.PERatio);  
}
```



Debugging JSON

- Get Firefox
- Get Firebug, a Firefox Plugin
- Extremely useful in debugging Web applications
- Free



Validating JSON

- JSLint
- <http://www.jshint.com/>



JSON Resources

- <http://www.json.org>
- <http://www.jsonlint.com>



Examples

- Customer Lookup
 - JavaScript AJAX code
 - RPG code
 - PHP code
- JSON in a 5250 emulator
- JSON files in Profound UI with PHP
- DDS files with Profound UI RPG OA Handler



Thank You

For comments/questions, please send to:

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