

## Rest Web Service on IBM i

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#### Agenda

- Zend Server Update
- Discuss web services in general
- DB2 access
- Product Availability RPG Program
- Q&A





## What's New with Zend Server



## IBM Relationship History

Zend is an IBM strategic business partner

IBM selected Zend to bring PHP to IBM i in 2005

Beta, then Core, then Platform now Server

Thousands of downloads from Zend.com

Zend Server part of IBM i6.1 & i7.1 (distribution media)

Products are always available at Zend.com

#### Zend Server Mobile and Web Application Platform

## IBM Relationship FAQ's

What do we get?

Zend Server Basic (Formerly Community Edition)

Zend Studio (Licensed for IBM only!)

1 year web support and updates (email/web 72 hour response) Phone support & improved SLA available from Zend at a charge

#### What happens after 1 year?

Products will still run as perpetual license

No updates to studio, server at Zend discretion

Forum support only

Support available for purchase from Zend



#### What Is Zend Server?

#### Production quality PHP stack

PHP, ZF2, DB connectivity, debugging extensions, and much more

#### Three Editions with Zend Server 6

Basic Edition - Included with IBM SWMA,

Enjoy Professional & Enterprise features for 7 days, upgrade to 28

Application monitoring and diagnostics (integrated with Zend Studio)

Multi-level performance enhancement capabilities

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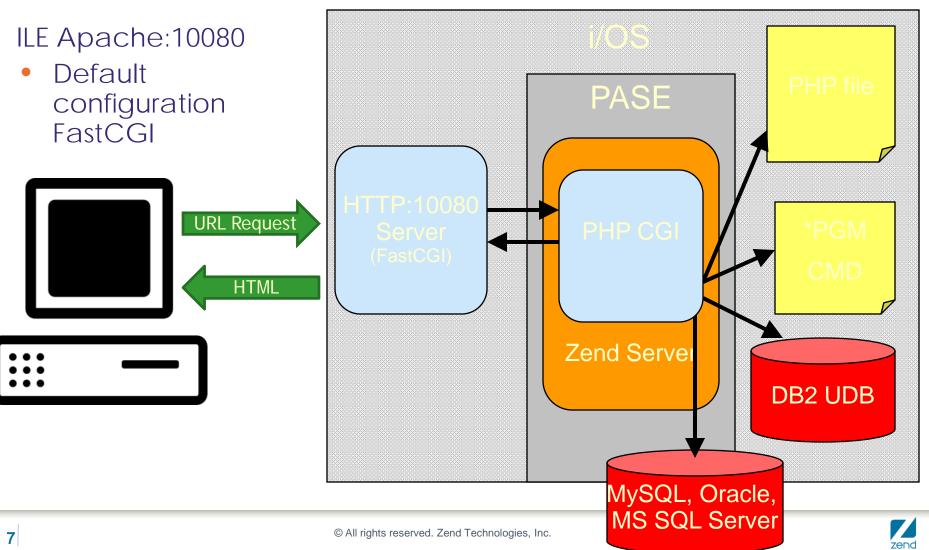
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#### Zend Server Under the Covers

#### IBM i



### Zend Server 5.x Users

Must install Zend Server 6 side by side with 5.x

Uses new directories

Copy your scripts to new directories, or

Use paths in /usr/local and change include path

Uses different port 10080 rather than 10088

Once successfully on Zend Server 6

Remove Zend Server 5.6 - DLTLICPGM (GO LICPGM, Option 12)



## What's up with Web Services



#### **Introduction to Web Services**

- Tightly coupled
  - Mine, mine, mine...I own it all! mwa-ha-ha-ha-ha
  - API program calls
  - Stored procedures and ODBC
- Loosely coupled
  - We don't own all of our business logic
  - Web Services
  - Mash-ups



## **Direct Program Call**



Advantages Compiled code Stable, predictable & efficient Changes required on both sides ensure security Disadvantages Changes require recompile Test, test, test Intersystem calls cumbersome



#### Usher in the new age of computing!

- Books that are the basis for my position
  - > The Cathedral & the Bazaar by Eric Raymond
    - Open Source is OK!
    - Dynamic is in, Monolithic is out
    - But there is room for both...for a while
  - Small Pieces Loosely Joined by David Weinberger
    - Modular is better!
    - Many small pieces around the Internet
    - Scattered amongst the cloud!



#### What is a Web Service?

- W3C says...
  - A software system designed to support interoperable machine to machine interaction over a network.
- Key words
  - Software system
  - Interoperable
  - Machine to machine
  - Network
- It's really just another way to call programs!





### Who uses Web Services?

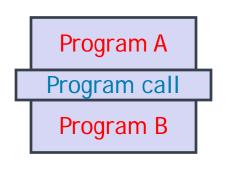
- Web presence today
  - ▶ Google → Maps, Spell checkers, etc.
  - ► Amazon.com → Product availability, Order processing
  - ► Salesforce.com → Application Integration
  - ► TerraServer → Cloud based applications
  - Many, many more
- API layer replacement tomorrow
  - Inter-program communication
  - Inter-system communication

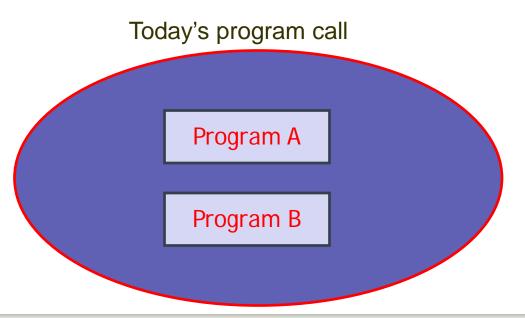


#### Why use Web Services?

- SOA Layer
  - Fancy term for modern program calls!
  - Parts are self defining and self documenting
  - Code is modular from the start
  - Facilitate the upgrade process









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### What types

#### SOAP

Simple Object Access Protocol Self defining

Can be highly complex

#### ReST

**Representational State Transfer** 

Much like API call

**Requires external documentation** 



## Data Access using ReST



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#### One example for two methods

Part 1

Form with drop down info populated by web service Select product and then move to part two No data on local IBM i

Part 2

Take selected item and call web service Remote web service calls RPG program RPG program develops on hand quantity & returns Again, no data on local IBM i



#### Two system setup

- Local & remote both IBM i for this example
- Local system can be ANY platform running PHP
- Remote system can also be any platform
  - In this example is IBM i
  - But must have access to Inventory data
  - Inventory availability is in RPG business logic
  - Simple example, can be VERY complex!



## HTML Form using PHP

WebService Form 2 ×	
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Pro WebService Form 2 ×	
	0088/mpavlak/articles/websvc/WSForm2.php 🔍 🏠 🚰 💩 🌞 🚅
List Product Inform	nation
Produ	
Chair List Products and G	et Details
Look U Product List:	
Stool	
Chair Stool	
Table	



#### Form source

```
1 <html><head><title>WebService Form 2</title></head>
 2⊖<style>
            { color:orange; margin-bottom:3px; }
 3 h1
            { color:red; } h3 { color:green; }
 4 h2
 5 .ValText { width:80px; } .OpText { width:250px; } </style>
 6⊖ <body>
 7 <h1>Product Information</h1><h2>List Products and Get Details</h2>
 8 <?php require_once 'WSCommon.php';</pre>
 9
   // Call the web service to populate the drop down in the form. Then call the client to show detail.
10
11
12 $SERVER URL = $ProductInfo . '?Function=List';
  //get the XML package
14 $response = file get contents($SERVER URL); //Send the request
       //turn it into an object
15
   $productsResponse = simplexml_load_string($response);
16
       //flip it into an array and process.
17
   $response array = json decode(json encode($productsResponse),true);
18
19
20 ?>
21 
   <Form action="WSClient2.php" method="GET">
22
23
       <h3>Product List:</h3>
       <select class="OpText" name="ProductSelected">
24
25
       <?php
       foreach ($response array as $productValue) {
26
27
           print ('<Option value="'. $productValue['prodNum'] . ''>'. $productValue['prodName'] . "</Option>\n\t");
28
       }
29
       >></select>
  /><Input type="submit" value="Look Up"></Form></body></html>
30
```



### WSCommon.php

**Common routines and standard locations** 

Here I store the location of my services

Easy to adjust and I can scan for common services

I'm using hardcoded IPs, but recommend DNS

```
<?php
 1
 2
 3
   // Common routines among the scripts...
 4
   // Formulas array used in drop down and validation...
 5
   $Formulas = array( 'AreaRectangle'=>'Area of a Rectangle',
6
7
                        'Pythgorean'=>'Length of the hypotenuse of right triangle',
                        'VolumeCone'=>'Volume of a Cone');
8
9
10
   $MathFormulaURLLocal = 'http://localhost:10088/mpavlak/articles/websvc/WSServer1.php';
   $MathFormulaURLRemote = 'http://192.168.15.112:10088/mpavlak/articles/websvc/WSServer1.php';
11
   $ProductInfo = 'http://192.168.15.112:10088/mpavlak/articles/websvc/WSServer2.php';
```



### Target LPAR and host service, part 1

```
<?php
  1
  2
  3
      require_once 'ServerUtils.php';
  4
  5
       // Listing function and XML Builder
  6
  7
       if ($ GET ['Function'] == 'List') {
  8
               $products = listprod ();
  9
10
11
               print '<?xml version="1.0"?>';
12
               print ("<products>\n");
13
14
               If (is array ( $products )) {
                       foreach ( $products as $prod_array ) {
15
16
                                $productNumber = $prod array ['PRODUCTNUMBER'];
17
                                $productName = $prod array ['PRODUCTNAME'];
18
                                print ("<prod$productNumber>");
19
                                print ("<predNum>$productNumber</predNum><predName>$productName</predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName></predName>
20
                        }
21
                       print '</products>';
22
               } else {
23
                       print ("<error>Product List not Available</error>");
24
                }
25
```



#### Server Utils Part 1

```
39<sup>©</sup> function listProd() {
40
41
       $IBMiLink = Connect();
42
       $sq1 = 'SELECT productnumber, productname FROM zenddata.product';
43
       //$sql = 'SELECT CUSTOMER NUMBER, CUSTOMER NAME FROM zenddata.customer';
       $stmt = getdata($IBMiLink,$sql);
44
       while($row=db2 fetch assoc($stmt)) {
45
            //print r($row); echo "<BR>";
46
            $products[] = ($row);
47
48
        }
49
       if (is_array($products))
50
51
            return $products;
52
       else
53
            return "Error retrieving products";
54 }
```



## Call RPG using ReST



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#### Remote service calls RPG

Review

- Created form to display products
- Products available listed on remote system
- Have product ID
- Now look up remote system for availability



### Select product from form

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WebService Form 2 ×
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Product Information
List Products and Get Details
Product List:
Stool
Chair Stool
Table



#### Form source

```
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   // Call the web service to populate the drop down in the form. Then call the client to show detail.
10
11
12
   $SERVER URL = $ProductInfo . '?Function=List';
       //get the XML package
13
   $response = file_get_contents($SERVER_URL); //Send the request
14
       //turn it into an object
15
   $productsResponse = simplexml load string($response);
16
       //flip it into an array and process.
17
18 $response array = json decode(json encode($productsResponse),true);
19
21 
22 <Form action="WSClient2.php" method="GET">
       <h3>Product List:</h3>
23
      <select class="OpText" name="PreductSelected">
24
25
       <?php
       foreach ($response array as $productValue) {
26
27
           print ('<Option value="'. $productValue['prodNum'] . ''>'. $productValue['prodName'] . "</Option>\n\t");
28
       }
29
       >></select>
  <br/><sinput type="submit" value="Look Up"></Form></body></html>
30
```



## Now call WSClient2.php

```
10<html><head><title>Formla web service</title>
2⊖ <style>
3 h1
           { color:orange; margin-bottom:3px; }
4 h2 { color:red;}
5 h3 { color:green;}
6 pre { background-color:lightgreen; padding:5px; border:10px solid red; width:250px }
7⊖</style></head><body>
8 <h1>On Hand Quantity</h1>
9 <?php
  require_once("WSCommon.php");
10
11
12 //Build request
   $prod = $ GET['ProductSelected'];
13
14
  // Call the web service to determine on hand quantity or error.
16 $SERVER URL = $ProductInfo . "?Function=onHand&Prod=$prod";
17
18 //get the XML package
19 $response = file_get_contents($SERVER_URL); //Send the request
20 //turn it into an object
21 $productsResponse = simplexml_load_string($response);
22 //flip it into an array and process.
23
   $response array = json decode(json encode($productsResponse),true);
24
25
   print "here is the reponse: "; print r($response array). "<br /><br />";
26
27
   $xml = simplexml load string($response); //Parse the response and display
28 echo '<br/>><br />' . $xml->Parm1;
29 ?><b><a href="WSForm2.php">Start Over</a></b></body></html>
```



#### Target LPAR and host service, part 2

```
56 function listOnHand($prod) {
57
       $sess = getSessions ();
       // Call the open source toolkit for product info...
58
59
       $db = 'V7R1GOLD'; $user = ''; $pass = ''; $extension = 'ibm db2'; $ohQty = 0; $error = '';
60
61
62
       $ToolkitServiceObj = ToolkitService::getInstance ( $db, $user, $pass, $extension );
63
       $ToolkitServiceObj->setToolkitServiceParams ( array (
64
                'InternalKey' => "/tmp/$sess"
65
       ));
66
67
       $param [] = $ToolkitServiceObj->AddParameterPackDec ( 'both', 9, 0, 'PRODUCT', 'PRODUCT', $prod );
68
       $param [] = $ToolkitServiceObj->AddParameterPackDec ( 'both', 10, 0, 'ONHQTY', 'ONHQTY', $ohQty );
69
       $param [] = $ToolkitServiceObj->AddParameterChar ( 'both', 256, 'ERROR', 'ERROR', $error );
70
       $result = $ToolkitServiceObj->CLCommand ( "RMVLIBLE ZENDDATA" );
71
       $result = $ToolkitServiceObj->CLCommand ( "ADDLIBLE ZENDDATA" );
72
       $result = $ToolkitServiceObj->PgmCall ( "PRODAVAIL", "ZENDDATA", $param, null, null );
73
74
       if ($result) {
75
           return $result ['io param'];
76
       } else
77
           return "Execution failed.";
78
       echo 'Hello Mike<br />';
79
80
       $ToolkitServiceObj->disconnect ();
81
```



#### **RPG code**

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C *ENTRY	PLIST									
С	PARM	Prodin	9 0							
С	PARM	QtyAvail	100							
С	PARM	Error	256							
/free chain Prod if %found;	in PRODINVR;									
QtyAvail = ProdONH - ProdALC;										
Error = 'Order Inventory Successful';										
else;										
Error =	Error = 'Order Item not found';									
endif;										
<pre>#InLR = #On;</pre>										



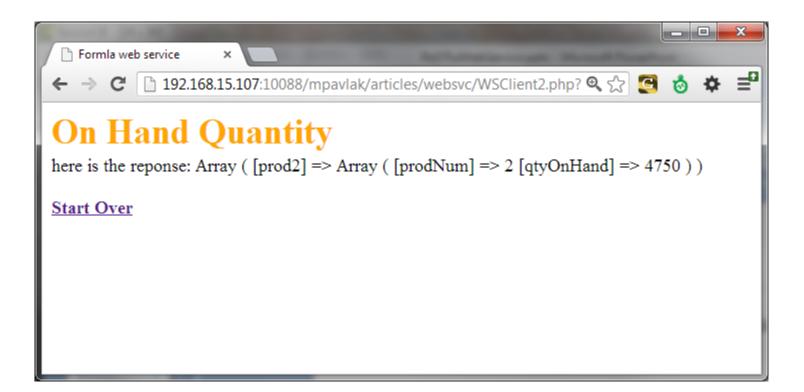
#### WSClient2.php receieves info and presents

```
10<html><head><title>Formla web service</title>
2⊖ <style>
3 h1
           { color:orange; margin-bottom:3px; }
4 h2 { color:red;}
5 h3 { color:green;}
6 pre { background-color:lightgreen; padding:5px; border:10px solid red; width:250px }
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10
11
12 //Build request
   $prod = $ GET['ProductSelected'];
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14
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16 $SERVER URL = $ProductInfo . "?Function=onHand&Prod=$prod":
17
18 //get the XML package
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26
27
   $xml = simplexml load string($response); //Parse the response and display
   echo '<br/>
<br/>
br/>
<br />' . $xml->Parm1;
28
29 ?><b><a href="WSForm2.php">Start Over</a></b></body></html>
```



### **Final output**

#### Not pretty, but would be used in finished application Shows on hand quantity for product selected





### Feature article at iProDeveloper

#### With your subscription

#### Can read article and download code



## Wrap it up!



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**Q&A** 

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