



The PHP Company

(560549) 33ED

Expo Booth # 6

Stop by for Training,  
Books and Buttons

# PHP: Toolkit Examples

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# PHP Sessions

Session 1-9:00

- PHP101

Session 2-10:30

- PHP Arrays for the RPG Programmer

11:45

- Lunch

Session 3-12:30

- PHP Function Junction

Session 4-1:45

- PHP Toolkit Functions

Session 5-3:00

- Build your Intranet on IBM i for Free

4:00

- Goodies!

# Audience

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- New to PHP
- Looking to leverage IBM i resources in web applications
- Seeking business value of PHP

# Agenda

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- **Review Zend Server: Home of the Toolkit**
- **Overview of toolkit functions**
  - ▶ Studio Integration
- **Examples**
  - ▶ Data Area
  - ▶ Data Queue
  - ▶ Program Call
- **Explore 5250 bridge**
  - ▶ Bridge functions
  - ▶ Updated emulator
- **ITK - A new way to do IBM i functions**

# Questions?

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- Let's keep it interactive!

- Follow us!



▶ <http://bit.ly/cjueZg> (Zend Technologies or search for Zend)



▶ <http://twitter.com/zend>

# PHP: Toolkit Examples

[www.zend.com](http://www.zend.com)

Review Zend Server

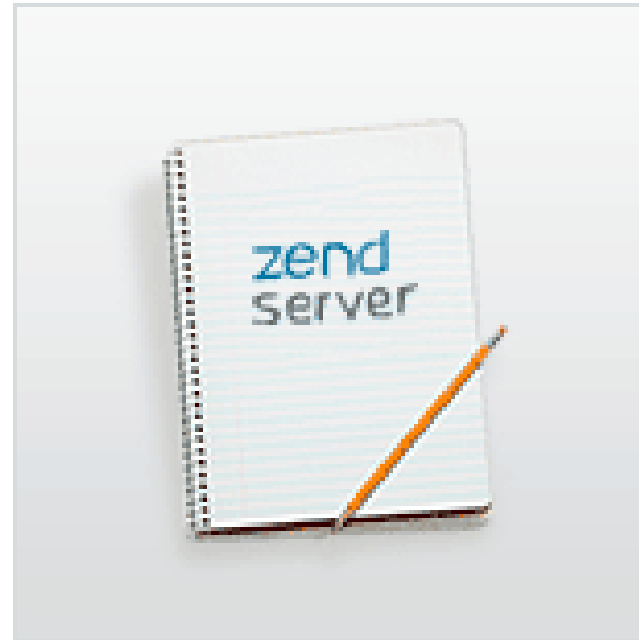
# Review of Zend Server

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- Variables & Data Types
- Functions
- Copybooks

# Zend Server 5.0 GA on 04/12/2010!

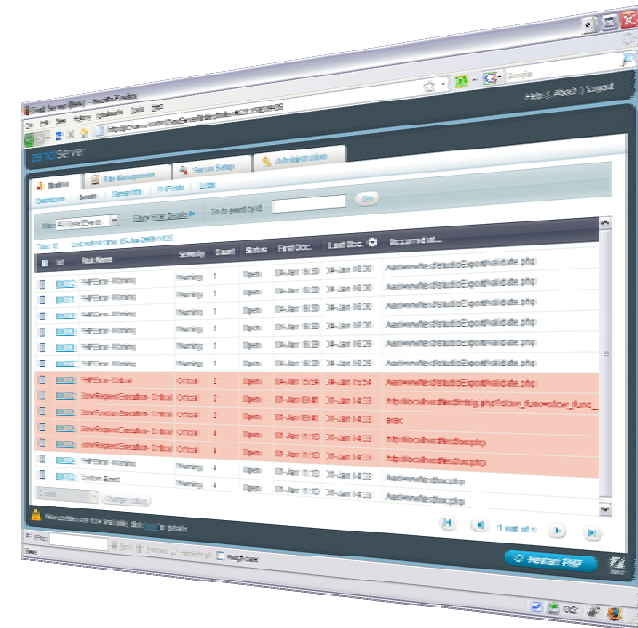
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- The Linux and Windows distributions have been GA since Feb
- Code base consistency is making this gap smaller
- Training class available...see [zend.com/store](http://zend.com/store) for more info

# What Is Zend Server?

- Production quality PHP stack
  - ▶ PHP, ZF, DB connectivity, debugging extension, and more
- Two Editions - Free “Community Edition” provided by IBM & Full commercial edition
  - ▶ Both are production ready
- Application monitoring and diagnostics (integrated with Zend Studio)
- Multi-level performance enhancement capabilities
- Software updates and security hot fixes
- Easy and quick installation
- Zend Framework Integration



# Zend Server for IBM i

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- Next generation of PHP stack for IBM i
- Best of both Zend Core and Zend Platform
- Single Licensed Program Installation
- Two products
  - ▶ Zend Server for IBM i Community Edition
    - Available at no charge per IBM partnership
  - ▶ Zend Server for IBM i
    - Subscription available from Zend
    - High value extra features
    - Higher Support SLAs

# Why a new generation?

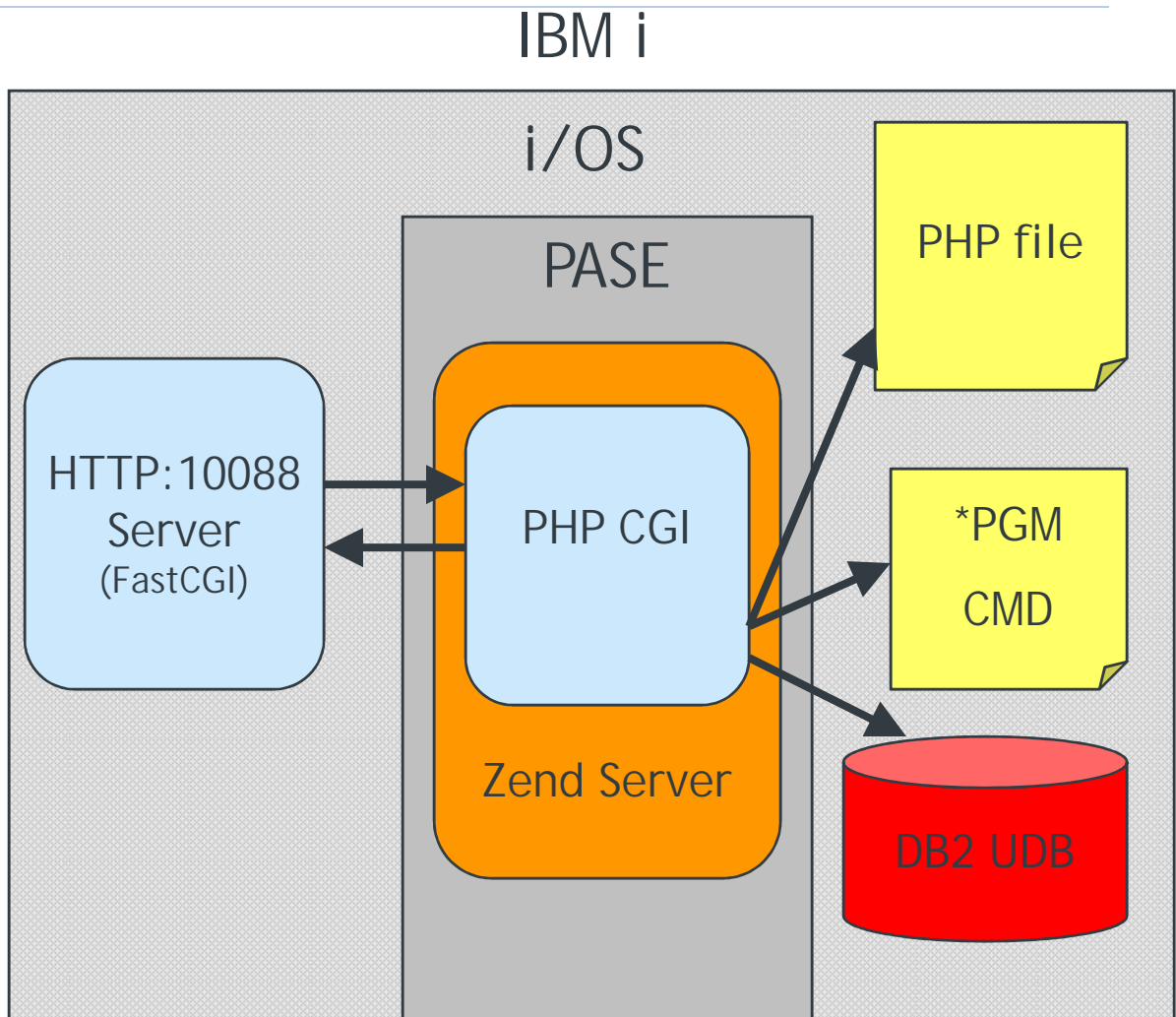
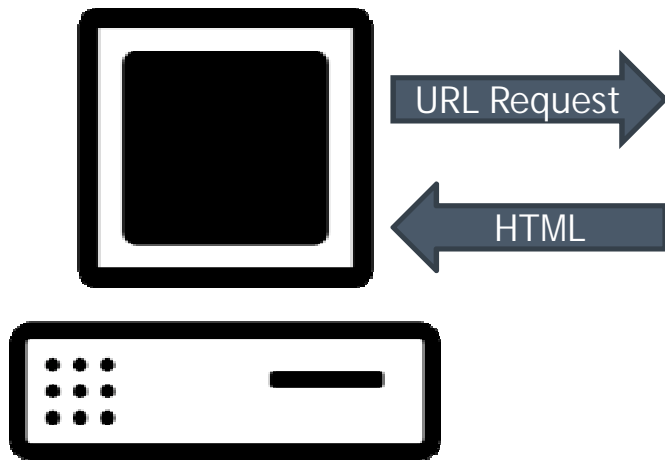
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- **Based on feedback of key areas for Improvement**
- **Improved basic PHP Performance**
  - ▶ 30% to 600% depending on the application
- **New capabilities**
  - ▶ Code Tracing - Faster problem resolution
  - ▶ Job Queue - Performance and scalability
  - ▶ Page Caching - Performance and Scalability
  - ▶ Support for PHP 5.3
- **Easier installation, administration & maintenance**
  - ▶ Single apache server

# Zend Server Under the Covers

ILE Apache:10088

- Default configuration FastCGI



# PHP: Toolkit Examples

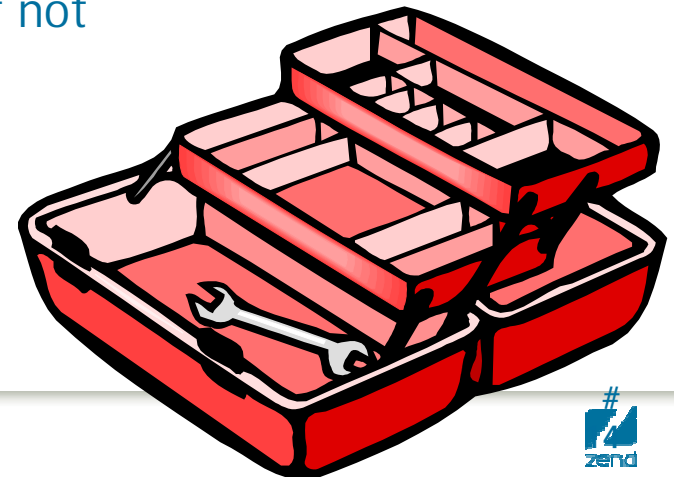
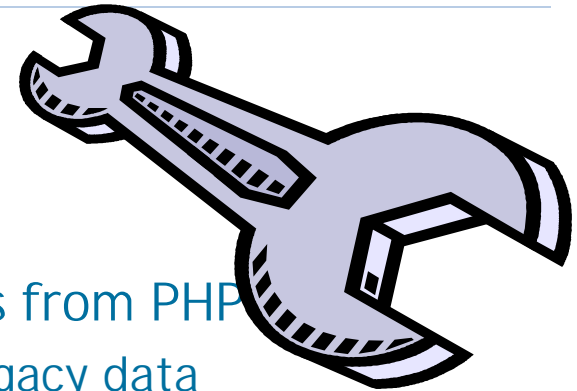
[www.zend.com](http://www.zend.com)

## Overview of Toolkit Functions

# i5 Toolkit APIs

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- Are shipped with Zend products
  - Zend Server for IBM i
  - Documented in the Zend Server User Guide
- Geared for accessing DB2 data & IBM I resources from PHP
  - Simplifies modern application integration with legacy data and applications
- Note: The I5\_COMD job must be running in the ZENDSVR subsystem
  - Use WRKACTJOB SBS(ZENDSVR) to see i5\_COMD job
  - Use the Zend menu to start the i5\_COMMD job if not started:
    - GO ZENDSVR/ZSMENU
    - Option 5 (Service Management menu)
    - Option 8 (Start I5\_COMD service)



# Zend Server Menu

```
Session A - [24 x 80]
File Edit View Communication Actions Window Help
ZSMENU                               Zend Server for IBM i Setup Menu           System:  F5V6R1A
Select one of the following:
  1. Change password for Web Administration Console
  2. Update using Zend Server PTFs menu
  3. Run Support Tool
  5. Service Management menu
  6. MySQL Management menu
  7. 5250 Bridge Management Menu
  9. Reset Zend Server environment
 90. Signoff
Selection or command
==> _
F3=Exit  F4=Prompt  F9=Retrieve  F12=Cancel  F23=WRKUSRJOB
Copyright Zend Technologies LTD (2010)
MA a                                           21/007
I902 - Session successfully started
```

# Zend Server Subsystem

The screenshot displays the Zend Server Subsystem interface. At the top, the window title is "Session A - [24 x 80]". Below the title bar is a menu bar with "File", "Edit", "View", "Communication", "Actions", "Window", and "Help". A toolbar with various icons is located below the menu bar. The main content area is titled "Work with Active Jobs" and shows the following information:

CPU %: .0      Elapsed time: 00:00:00      Active jobs: 278      06/17/10 12:54:15      F5V6R1A

Type options, press Enter.  
2=Change    3=Hold    4=End    5=Work with    6=Release    7=Display message  
8=Work with spooled files    13=Disconnect ...

Opt	Subsystem/Job	User	Type	CPU %	Function	Status
—	ZENDSVR	QSYS	SBS	.0		DEQW
—	I5_CMD	QTCP	BCH	.0	PGM-EASYCMD	TIMW
—	ZSJOBQMNG	QTMHHTTP	BCI	.0	PGM-watchdog	THDW
—	ZSJOBQMNG	QTMHHTTP	BCI	.0	PGM-jqd	SELW
—	ZSMONMNG	QTMHHTTP	BCI	.0	PGM-watchdog	THDW
—	ZSMONMNG	QTMHHTTP	BCI	.0	PGM-MonitorNod	SELW

Bottom

Parameters or command  
==>

F3=Exit    F5=Refresh    F7=Find    F10=Restart statistics  
F11=Display elapsed data    F12=Cancel    F23=More options    F24=More keys

MA a 10/002

I902 - Session successfully started

# i5 Toolkit APIs

---

- Connection management
  - i5\_connect
  - i5\_close
  - i5\_adopt\_authority
  - i5\_error
  - i5\_errno
  - i5\_errormsg
- Command calls
  - i5\_command
- Program calls
  - i5\_program\_prepare
  - i5\_program\_prepare\_PCML
  - i5\_program\_call
  - i5\_program\_close
- Data retrieval
  - i5\_fetch\_array
  - i5\_fetch\_assoc
  - i5\_fetch\_object
  - i5\_fetch\_row
  - i5\_info
  - i5\_field\_len
  - i5\_field\_name
  - i5\_field\_scale
  - i5\_field\_type
  - i5\_list\_fields
  - i5\_num\_fields
  - i5\_result
- Native file access
  - i5\_open
  - i5\_addnew
  - i5\_edit
  - i5\_delete
  - i5\_cancel\_edit
  - i5\_setvalue
  - i5\_update
  - i5\_range\_from
  - i5\_range\_to
  - i5\_range\_clear
  - i5\_data\_seek
  - i5\_seek
  - i5\_bookmark
  - i5\_free\_file
  - i5\_new\_record
  - i5\_update\_record

# i5 Toolkit APIs

---

- System values
  - i5\_get\_system\_value
- Data areas
  - i5\_data\_area\_prepare
  - i5\_data\_area\_receive
  - i5\_data\_area\_send
  - i5\_data\_area\_close
- Print/Get spooled file
  - i5\_spool\_list
  - i5\_spool\_list\_read
  - i5\_spool\_list\_close
  - i5\_spool\_get\_data
  - i5\_spool\_from\_file
- Job logs
  - i5\_jobLog\_list
  - i5\_jobLog\_list\_read
  - i5\_jobLog\_list\_close
- Active jobs
  - i5\_job\_list
  - i5\_job\_list\_read
  - i5\_job\_list\_close
- Objects list
  - i5\_object\_list
  - i5\_object\_list\_read
  - i5\_object\_list\_close
- User space
  - i5\_userspace\_create
  - i5\_userspace\_prepare
  - i5\_userspace\_get
  - i5\_userspace\_put

# Connection

---

- Must connect to IBM i system to use any of the toolkit APIs
  - Connecting (i5 for i5 functions, db2 for DB2 functions)
    - i5\_connect
      - Need system, user profile name, and password as parameters
      - Can set library list here
    - i5\_close
      - Always close a connection you've opened
    - i5\_adopt\_authority
      - Can adopt other authorities while running
  - Error handling
    - i5\_error
      - Get data about an error
    - i5\_errno
      - Error number
    - i5\_errormsg
      - Error message

# PHP: Toolkit Examples

[www.zend.com](http://www.zend.com)

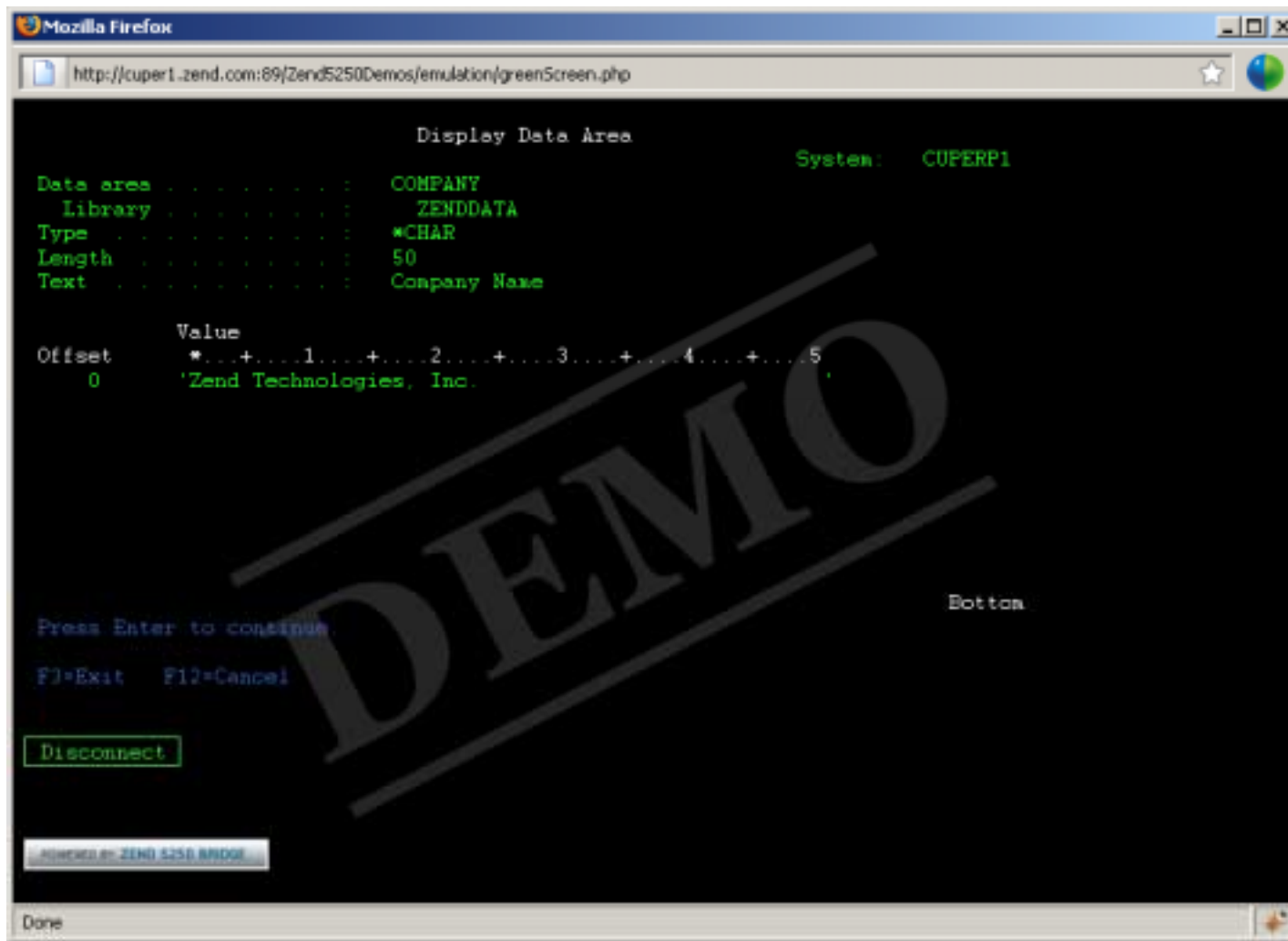
## Examples

# Two toolkit examples

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- Data Area
- System Values
- Program call
- Spooled File Access

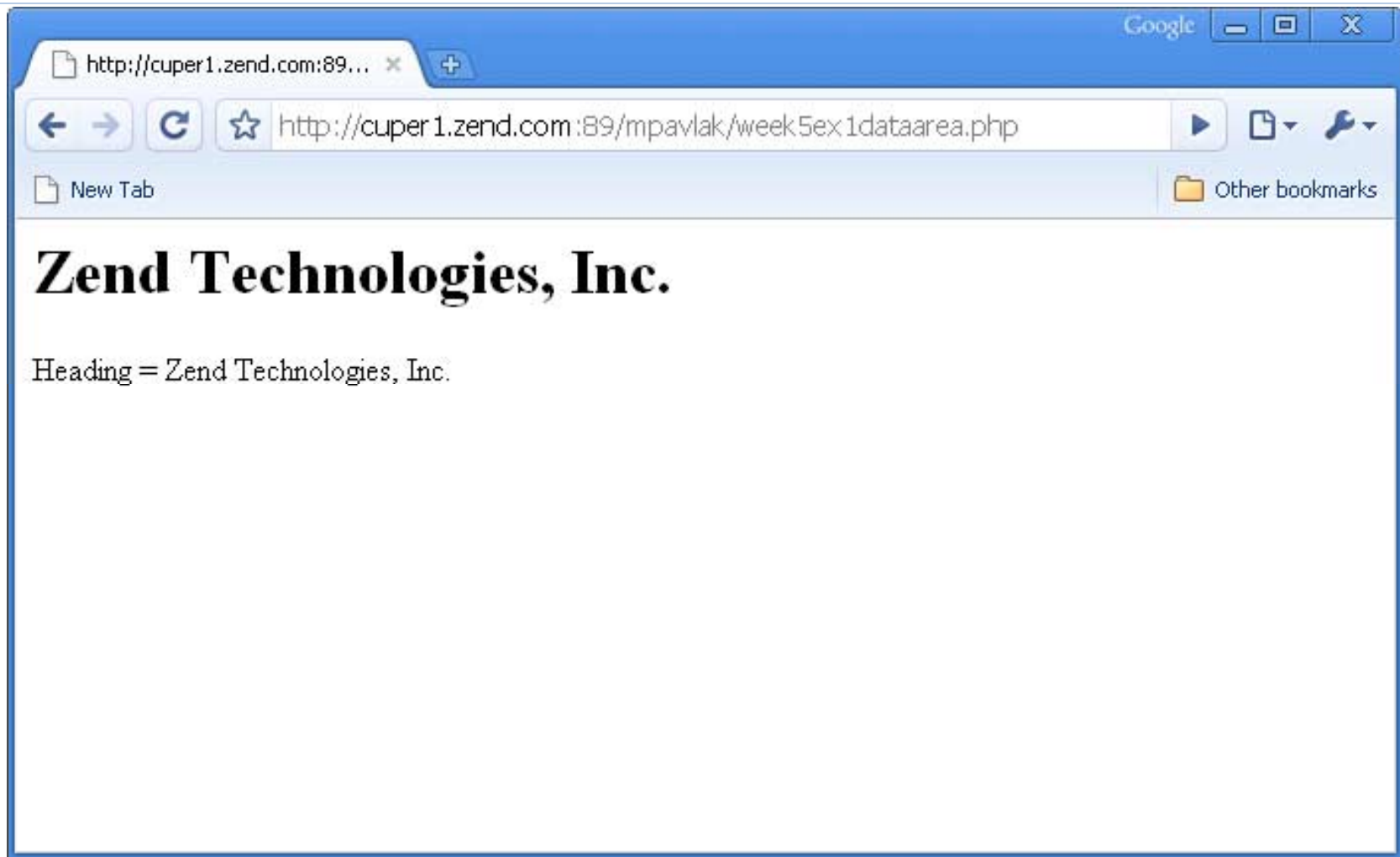
# Data Area Contents



# Data Area Code

```
1 <?php
2
3 include("i5db2connectonly.php");
4 $heading='test';
5
6 $heading = i5_data_area_read("ZENDDATA/COMPANY");
7 if (!$heading)
8 die("<br>data area read failed.");
9
10 echo "<h1>" . $heading . "</h1>";
11
12 echo "Heading = $heading";
13 i5_close($conn);
14
15 ?>
```

# Data Area Output



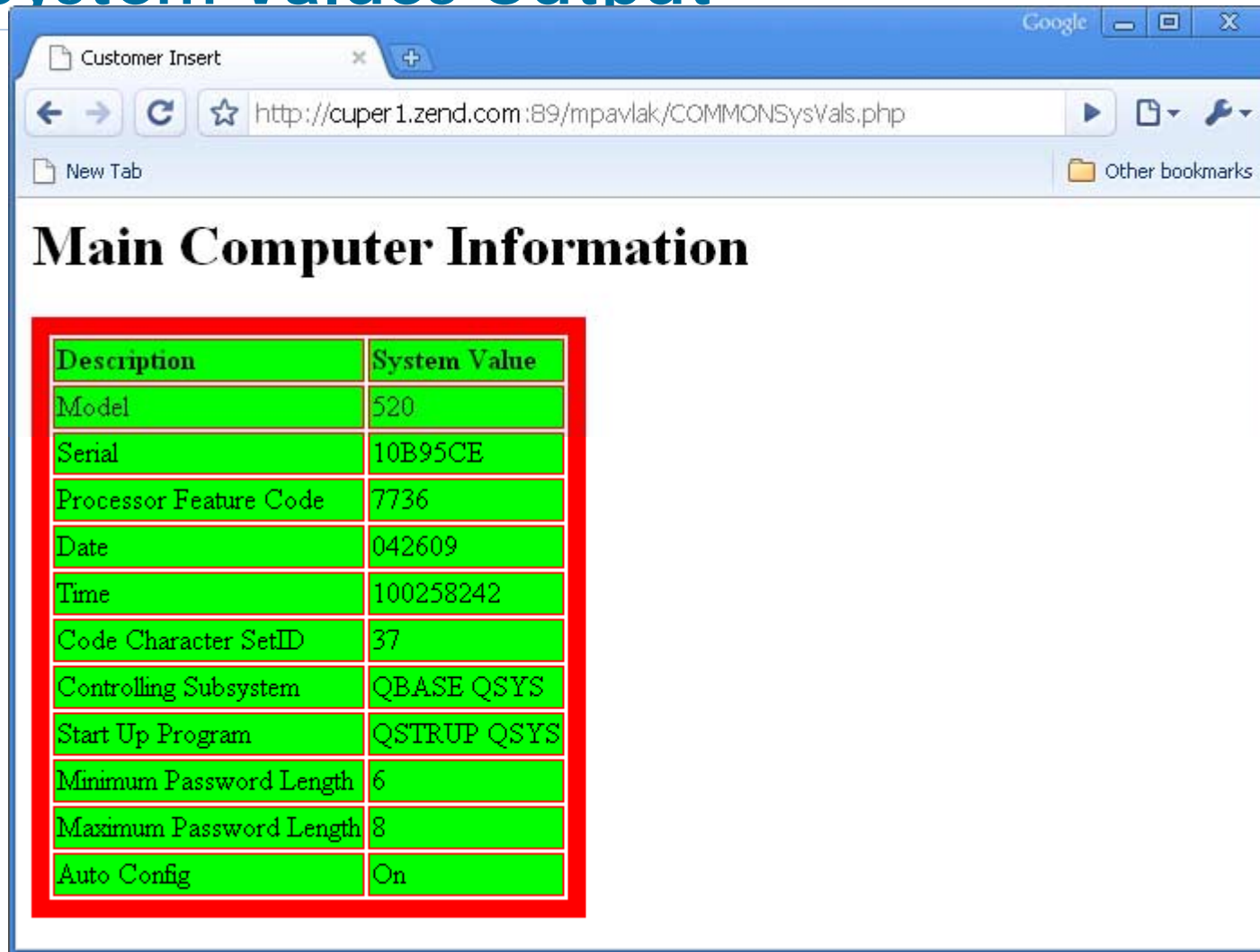
# System Values Code Part 1

```
1 <html> <head><title>Customer Insert</title></head><body>
2
3 <h1>Main Computer Information</h1>
4
5 <?php
6
7 include("i5db2connectonly.php");
8
9 // $conn = i5_connect("localhost", "PHPDEV", "phpdev1");
10
11 //if (!$conn)
12 //die("<br>Connection failed. Error number = " . i5_erro() . " msg = " . i5_errormsg());
13
14 //Define table and start filling rows...
15 echo '<TABLE BORDER="10" BORDERCOLOR="red"><TBODY BGCOLOR="00FF00">';
16 echo '<TR><TD><B>Description</TD><TD><B>System Value</TD></TR>';
17
18 print "<TR><TD>Model</TD><TD>" . i5_get_system_value("QMODEL") . "</TD></TR>";
19
20 print "<TR><TD>Serial</TD><TD>" . i5_get_system_value("QSRLNBR") . "</TD></TR>";
```

## System Value Code Part 2

```
34 print "<TR><TD>Minimum Password Length</TD><TD>" . i5_get_system_value("QPWDMINLEN") . "</TD></TR>";
35
36 print "<TR><TD>Maximum Password Length</TD><TD>" . i5_get_system_value("QPWDMAXLEN") . "</TD></TR>";
37
38 print "<TR><TD>Auto Config</TD><TD>";
39
40 if(i5_get_system_value("QAUTOCFG") == 1) {
41     echo "On";
42 }
43 else {
44     echo "Off";
45 }
46
47 print "</TD></TR>";
48
49
50 echo '</table>';
51 i5_close($conn);
52 ?>
```

# System Values Output



The screenshot shows a web browser window with the address bar containing the URL `http://cuper1.zend.com:89/mpavlak/COMMONSysVals.php`. The page title is "Customer Insert". The main content of the page is titled "Main Computer Information" and contains a table with the following data:

Description	System Value
Model	520
Serial	10B95CE
Processor Feature Code	7736
Date	042609
Time	100258242
Code Character SetID	37
Controlling Subsystem	QBASE QSYS
Start Up Program	QSTRUP QSYS
Minimum Password Length	6
Maximum Password Length	8
Auto Config	On

# Program Call...

---

- Most popular use of the API Toolkit
- Can call ANY IBM i program
- Our example will show CL
- Three parameters
- Concatenate a string
- Six steps:
  - Parameter setup
  - Prepare the program
  - Load the i/o array of parameters
  - Call the program
  - Retrieve values

# Program Call, script...Parameters

---

```
<h1>Village Water Billing System</h1>
<h2>Program Call</h2>
<?php

include("i5db2connectlib.php");

// Setup parameters in associative array...
$desc = array (
array ("name"=>"string1", "io"=>I5_INOUT, "type" => I5_TYPE_CHAR,
"length"=> "10"),
array ("name"=>"string2", "io"=>I5_INOUT, "type" => I5_TYPE_CHAR,
"length"=> "10"),
array ("name"=>"string3", "io"=>I5_INOUT, "type" => I5_TYPE_CHAR,
"length"=> "20"),
);
```

# Program Call, script...Prepare

---

```
// Prepare the program, similar to prototype in ILE...
$prog = i5_program_prepare("clp1", $desc);
if ($prog === FALSE)
{
    $errorTab = i5_error();
    echo "Program prepare failed <br>";
    var_dump($errorTab);
    die();
}
```

# Program Call, script...Load parms

---

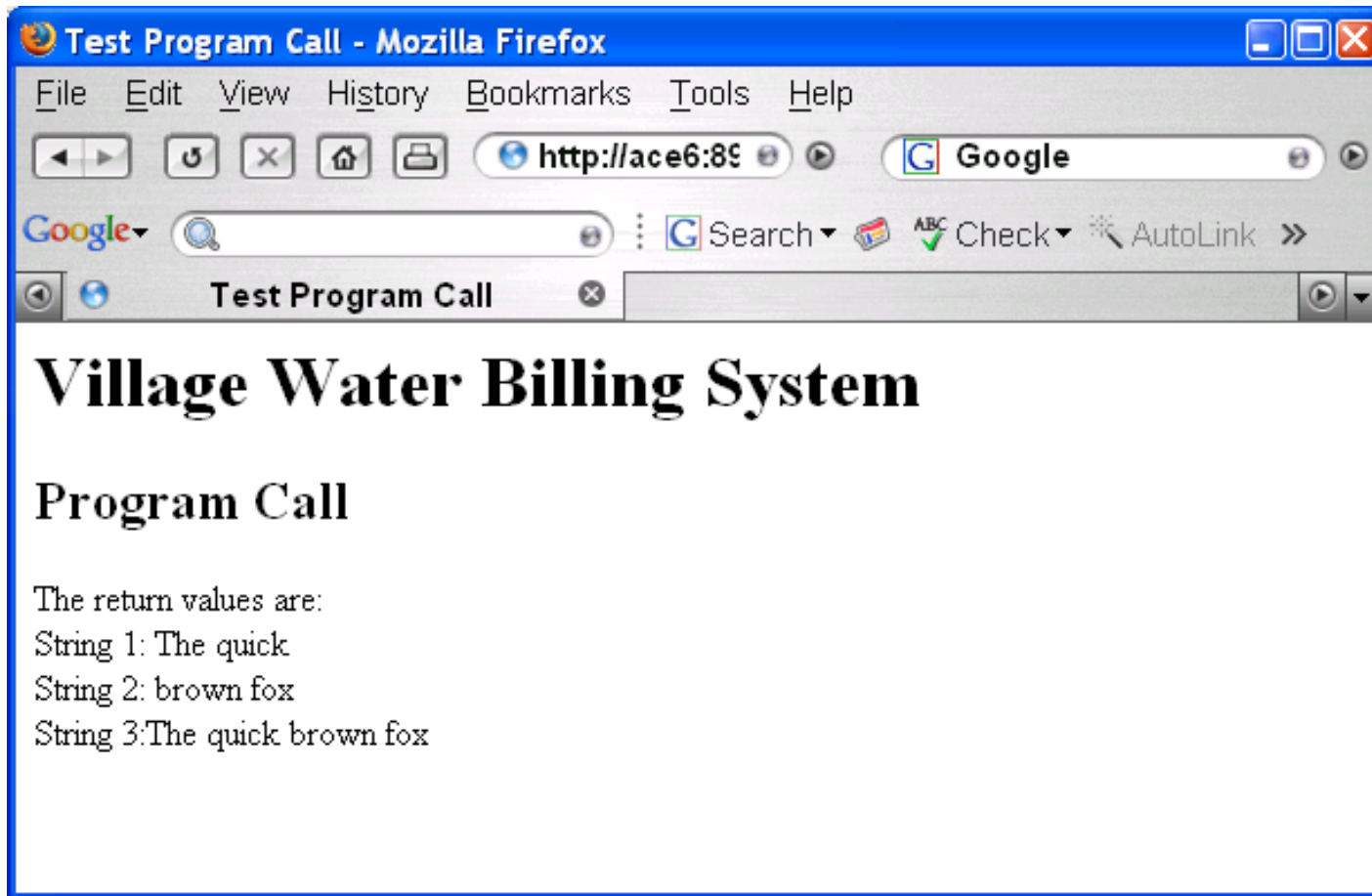
```
// Load parameters...
$params = array ("string1"=>"The quick ", "string2"=>"brown fox ", "string3"=>"
");

// Map parameters to variables...
$retvals =
array("string1"=>"string1", "string2"=>"string2", "string3"=>"string3");
```

## Program Call, script...Execute!

```
$ret = i5_program_call($prog, $params, $retvals);
if ($ret === FALSE)
{
    $errorTab = i5_error();
    echo "FAIL : i5_program_call failure code <br>";
    var_dump($errorTab);
    die();
}
```

# Program Call, example...

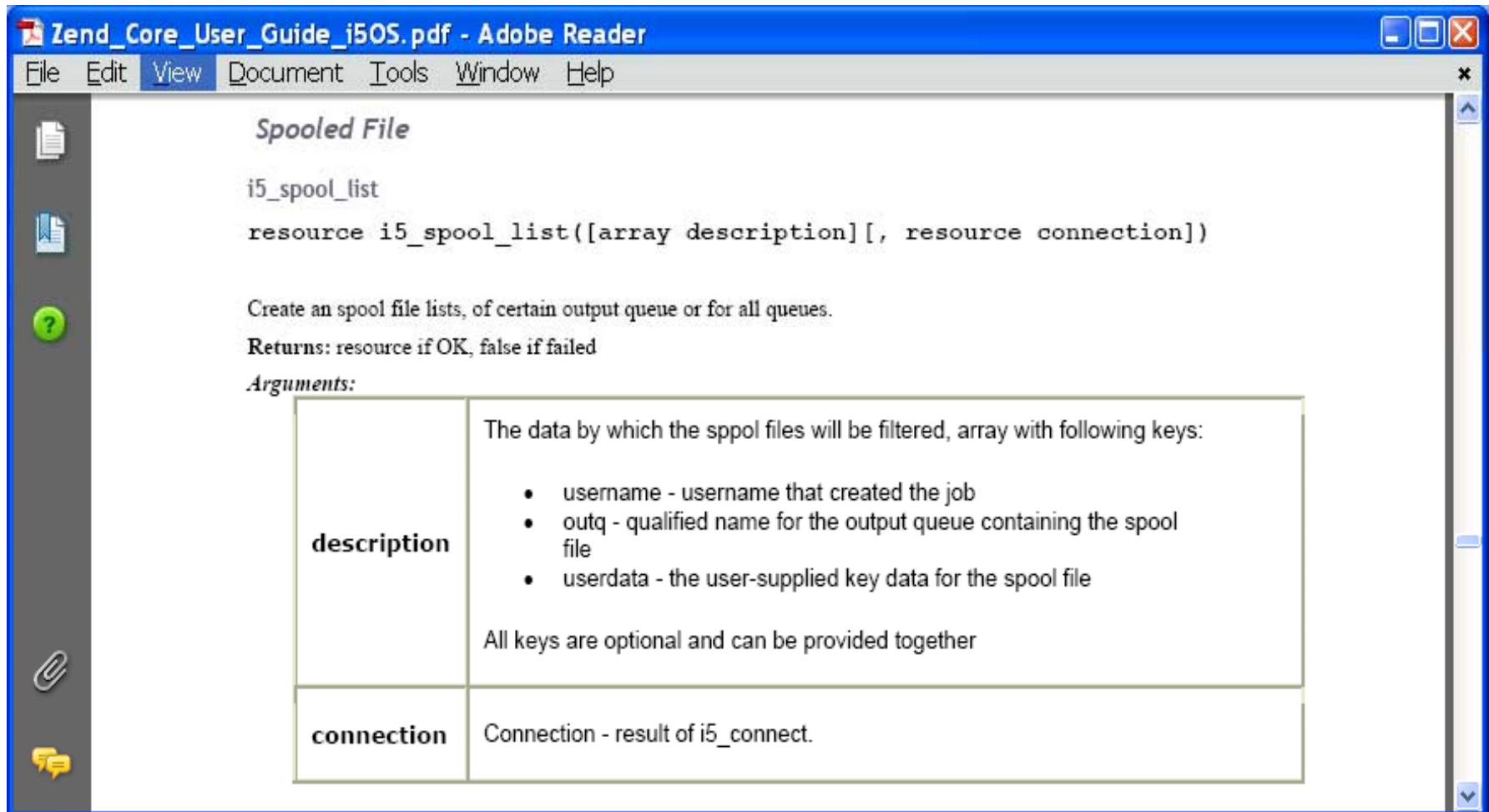


## Spooled file listing...

---

- Everybody has them
- Used to print miles of standard reports
- Many utilities to make them “pretty”
- List them
- Maybe do something more

# Spooled file listing...



**Spooled File**

i5\_spool\_list

```
resource i5_spool_list([array description][, resource connection])
```

Create an spool file lists, of certain output queue or for all queues.

**Returns:** resource if OK, false if failed

**Arguments:**

<b>description</b>	<p>The data by which the spool files will be filtered, array with following keys:</p> <ul style="list-style-type: none"><li>• username - username that created the job</li><li>• outq - qualified name for the output queue containing the spool file</li><li>• userdata - the user-supplied key data for the spool file</li></ul> <p>All keys are optional and can be provided together</p>
<b>connection</b>	Connection - result of i5_connect.

# Spooled file listing...

**Village Water Billing System**

**Spooled Files for MPAVLAK**

Job Name	User Name	File Name	Date	OUTQ	Number
DSP04	MPAVLAK	QPEZBCKUP	1070121	MPAVLAK	1
DSP04	MPAVLAK	QPEZBCKUP	1070121	MPAVLAK	2
DSP04	MPAVLAK	QSYSVRT	1070121	MPAVLAK	3
DSP04	MPAVLAK	QPDSNET	1070121	MPAVLAK	4
DSP04	MPAVLAK	QSYSVRT	1070121	MPAVLAK	10
DSP04	MPAVLAK	QSYSVRT	1070121	MPAVLAK	67
DSP04	MPAVLAK	QPUSRPRF	1070121	MPAVLAK	96
MPAVLAKA	MPAVLAK	QPDSPLIB	1070127	MPAVLAK	1
MPAVLAKA	MPAVLAK	QSYSVRT	1070221	MPAVLAK	1
MPAVLAKA	MPAVLAK	QPSRVDMP	1070620	QEZDEBUG	1

Find:   Next  Previous  Highlight all  Match case  Phrase

Done

# Spooled file listing...

---

- **Need some particulars**
  - User
  - Output Queue
  - User data
- **Break code and conquer!**
  - Create the handle
  - Read through the table

# Spooled file listing...

```
<html> <head><title>Spooled File List</title></head><body>

<h1>Village Water Billing System</h1>

<?php
$userName="MPAVLAK";

echo "<h2>Spooled Files for " . $userName . " </h2>";
include("i5db2connectonly.php");

$HdlSpl = i5_spool_list(array(I5_USERNAME=>$userName));
if (!$HdlSpl){
    $ret = i5_errno();
    print_r($ret);
}

echo '<TABLE BORDER="10" BORDERCOLOR="red"><TBODY BGCOLOR="00FF00">';
echo '<TR><TD><B>Job Name</TD><TD><B>User Name</TD><TD><B>File Name</TD>
      <TD><B>Date</TD><TD><B>OUTQ</TD><TD><B>Number</TD></TR>';
```

# Spooled file listing...

```
$continue=true;
while ($continue){
    $ret = i5_spool_list_read($HdISpl);
    if (!$ret){
        $erreur = i5_error();
        if ($erreur["num"] != 14){
            // error code here...
        }
        $continue = false;
        break;
    }
}
?>
<tr><td width="20%"><?php echo $ret["JOBNAME"]; ?> </td>
    <td width="20%"><?php echo $ret["USERNAME"]; ?> </td>
    <td width="20%"><?php echo $ret["SPLFNAME"]; ?> </td>
    <td width="10%"><?php echo $ret["DATEOPEN"]; ?> </td>
    <td width="20%"><?php echo $ret["OUTQNAME"]; ?> </td>
    <td width="20%"><?php echo $ret["SPLFNBR"]; ?> </td></tr>
<?php
}
```

# PHP: Toolkit Examples

[www.zend.com](http://www.zend.com)

## 5250 Bridge & Emulator

# What is the "Bridge"

---

- Three sets of APIs that allow a PHP script to drive a 5250 session
  - ▶ Green Screen Simulator
  - ▶ Object Oriented APIs
  - ▶ Procedural APIs
    - During the session these are the ones we will be focusing on
- **Multiple 5250 sessions can be connected to a single script**
  - ▶ So you could combine the data from several green screen applications in a single browser window!
- **Bridge is available as part of Zend Platform App Server**

# Product Definition

- ▶ The 5250 Bridge is a PHP based solution for running interactive applications in the i5/OS environment

```
Model: 5250 Bridge User: root@zend Zend Technologies
Time: 00:57:00 5250 Bridge Version 1.0

Position is: _____

Type options, press Enter.
5:display

Opr  User ID      Serial      Application  Status
---  ---
---  BENJAMIN    1040142    BRIDGE      1 ACTIVE
---  BENJAMIN    0532072    MEDICAL     1 ACTIVE
---  JAMES       0532072    MEDICAL     1 ACTIVE
---  JAMES       1040142    BRIDGE      1 ACTIVE
---  JOHN        2114748    STAFF       1 ACTIVE
---  NATE        1040142    BRIDGE      1 ACTIVE
---  MICHAEL    2114748    STAFF       1 ACTIVE
---  WILLIAM    7040152    TACTICAL    1 ACTIVE

Button

F3=Exit
Response

© Copyright Zend Technologies 2009.
```



PHP Application for i5/OS 29 Jan 2006, Tuesday 00:27:00 Coax20062

User Maintenance - demo program ZEND5250/ZM1001R

User ID	Serial No.	Status
BENJAMIN	1040142	ACTIVE
BENJAMIN	0532072	ACTIVE
JAMES	0532072	ACTIVE
JAMES	1040142	ACTIVE
JOHN	2114748	ACTIVE
NATE	1040142	ACTIVE
MICHAEL	2114748	ACTIVE
WILLIAM	7040152	ACTIVE

**BENJAMIN**

Serial #1040142

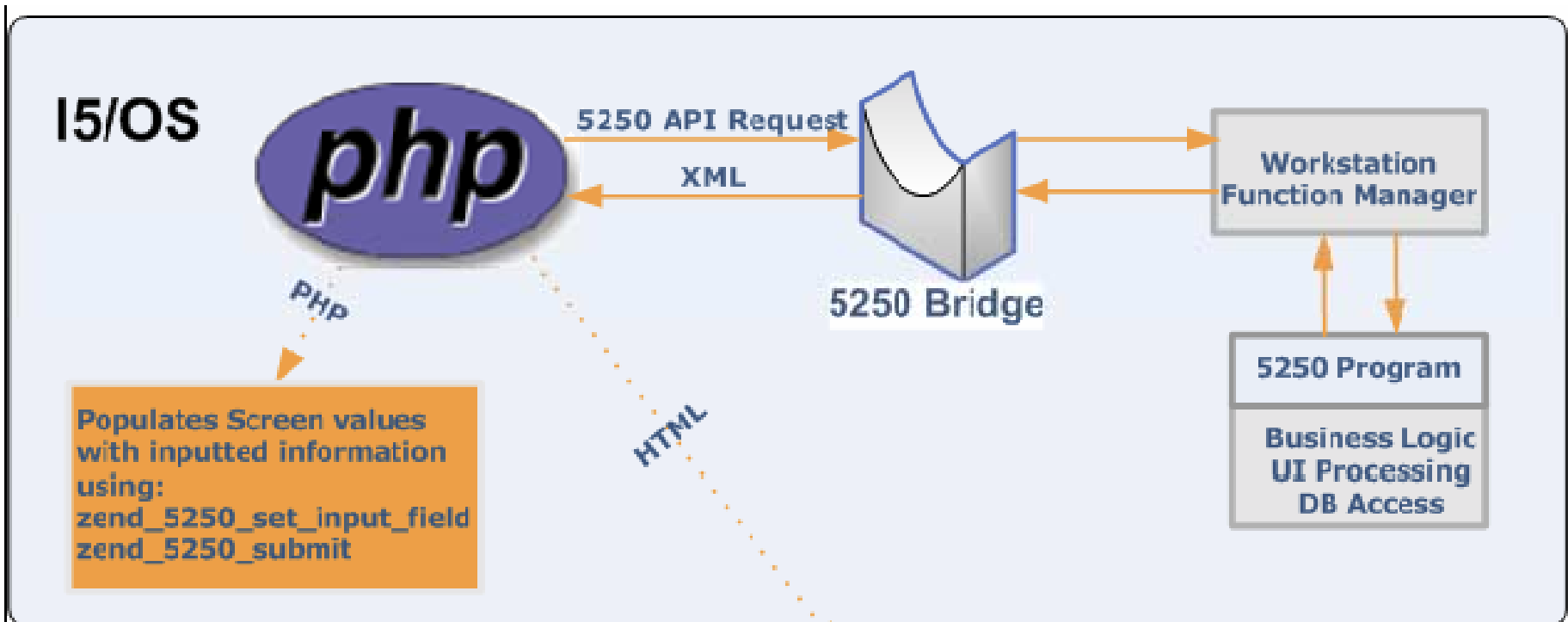
Application BRIDGE

Status: Active

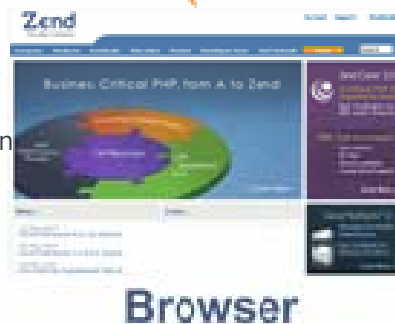
Number of Sign On: 3

© 2005 Zend Technologies

# 5250 Bridge Diagram



1. PHP sends a 'start session' request to the 5250 Program using the 5250 Bridge.
2. The 5250 Bridge returns a confirmation to PHP that the session has started.
3. The 5250 Bridge sends current screen information in XML format to PHP (e.g. format name, input and output fields and current cursor position).
4. The input values can be automatically entered into the program or sent on in an html format for user input.



# ARRAY DUMP OF RETURN SET

```
1. array(5)
2. { [0]= array(8) { ["id"]= int(0) ["row"]= int(6)
3. ["column"]= int(53) ["length"]= int(10) ["value"]=
4. string(10) " " ["type"]= string(11) "Alpha shift" ["font"]=
5. string(11) "Not defined" ["format"]= string(11) "Not Defined" }

6. [1]= array(8){ ["id"]= int(1) ["row"]= int(7)
7. ["column"]= int(53) ["length"]= int(10) ["value"]=
8. string(10) " " ["type"]= string(11) "Alpha shift" ["font"]=
9. string(11) "Not defined" ["format"]= string(11) "Not Defined" }

10. [2]= array(8) { ["id"]= int(2) ["row"]= int(8)
11. ["column"]= int(53) ["length"]= int(10) ["value"]= string(10) " " ["type"]= string(11) "Alpha shift"
    ["font"]=
12. string(11) "Not defined" ["format"]= string(11) "Not Defined" }

13. [3]= array(8) { ["id"]= int(3) ["row"]= int(9)
14. ["column"]= int(53) ["length"]= int(10) ["value"]=
15. string(10) " " ["type"]= string(11) "Alpha shift" ["font"]=
16. string(11) "Not defined" ["format"]= string(11) "Not Defined" }

17. [4]= array(8) { ["id"]= int(4) ["row"]= int(10)
18. ["column"]= int(53) ["length"]= int(10) ["value"]= string(10) " " ["type"]= string(11) "Alpha shift"
    ["font"]=
19. string(11) "Not defined" ["format"]= string(11) "Not Defined" } }
```

# Function Junction

ITK Class Library - Kevin Schroeder

# A bit about me

---

- Kevin Schroeder
  - ▶ Technology Evangelist - Zend Technologies
  - ▶ Blog: <http://www.eschrade.com>
  - ▶ Email: [kevin@zend.com](mailto:kevin@zend.com)

# ITK

---

- **What is it?**
  - ▶ An easy to use interface into the i5 PHP Toolkit
  - ▶ Fully unit tested
- **Why use it?**
  - ▶ It drastically simplifies accessing RPG functionality in PHP
- **What's it cost?**
  - ▶ Nothing
- **Where do I get it?**
  - ▶ <http://www.github.com/...>

---

# How does one currently access RPG functionality in PHP?

---

# How can one now access RPG functionality in PHP?

# Concepts

---

- **Adapters**
  - ▶ Represents the interface to the functionality be accessed
- **Programs**
  - ▶ Represents the program definition
- **Unit Tests**
  - ▶ Mechanisms for testing whether or not program functions are properly handling RPG-based data

# Adapters

---

- **Two adapters are included**
  - ▶ Live
    - Represents an individual connection to the PHP Toolkit implementation
    - Used in production scenarios
  - ▶ Mock
    - Used for Unit Testing
    - Will return specific results for specific calls
    - Allows you to test that your class is properly handling data
- **A Program class can be called regardless of the adapter being used**
- **Additional adapters can easily be written w**

# Programs

---

- Based off of the `Itk_PgmAbstract` class
- Definitions required

- ▶ Program Name

- The name of the RPG program being called

```
protected $_programName = 'ZENDSVR/COMMONPGM';
```

- ▶ Description

- Describes the input/output parameters

```
protected $_description = array(  
    'CODE'=> array(  
        self::DESC_IO=> I5_INOUT,  
        self::DESC_TYPE=> I5_TYPE_CHAR,  
        self::DESC_LENGTH=> "10"  
    )  
);
```

# Unit Testing

---

- **The entire library is designed to be easily testable**
  - ▶ Repeatability in testing is KEY to not losing your hair
  - ▶ Well written tests ensure that changes to not break compatibility
- **Unit Tests can be run using**
  - ▶ Live adapter on i Series machines
  - ▶ Mock adapter on either
    - i Series machines (if you don't want to change data)
    - Linux/Windows workstations
- **Unit Tests are run using PHPUnit**

# Recommendations

---

- Use a bootstrap to define the adapter at the front of the request
- Keep as much code out of your HTML as possible
- If you are not familiar with OOP this is a good place to start
  - ▶ Small example
  - ▶ Follows good practices
  - ▶ Demonstrates the benefits on a small scale

# Resources

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- Recorded Webinars

- ▶ <http://www.zend.com/en/resources/webinars/i5-os>

- Zend Server for IBM i main page, link to downloads

- ▶ <http://www.zend.com/en/products/server/zend-server-ibm-i>

- Zend Server manual:

- ▶ PDF: <http://www.zend.com/topics/Zend-Server-5-for-IBMi-Reference-Manual.pdf>

- ▶ Online: [http://files.zend.com/help/Zend-Server-5/zend-server.htm#installation\\_guide.htm](http://files.zend.com/help/Zend-Server-5/zend-server.htm#installation_guide.htm)

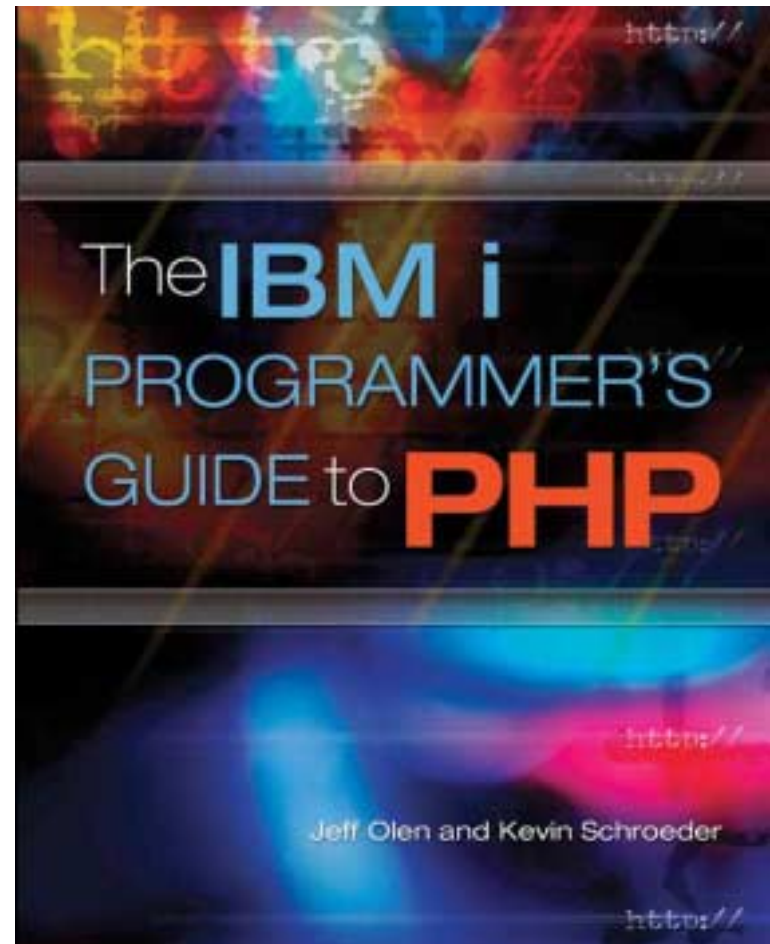
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# Q&A

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