Enterprise PHP on IBM i

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PHP on IBM i Developer / Consultant / Mentor

Strategic Business Systems, Inc.

- **Contributed to IBM's Redbook:** *Zend Core for i5/OS*
- **Certified (first on IBM i !) in Zend Framework**
- **Developed IBM/COMMON's "Best Web Solution" of 2009**

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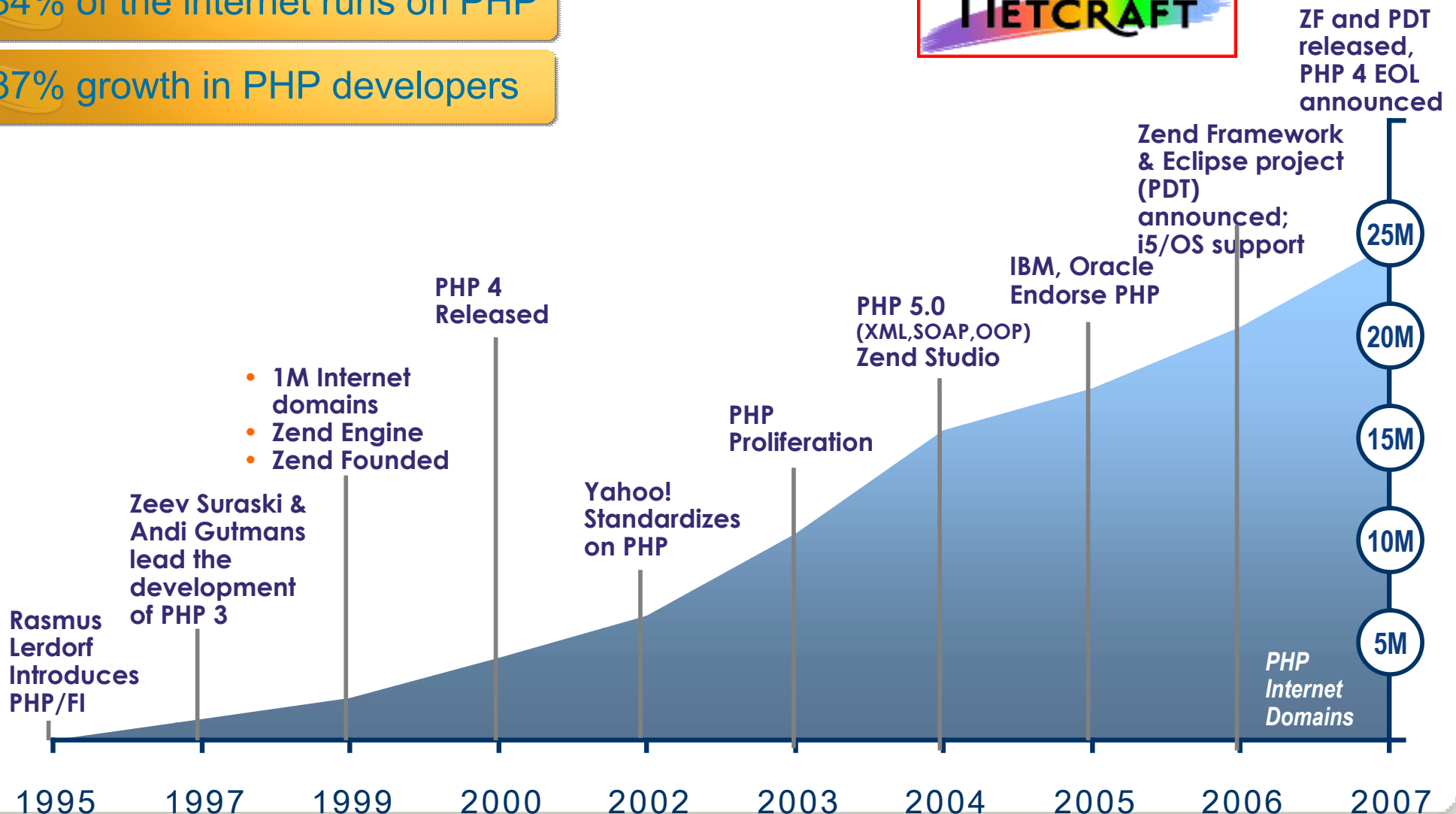
Blog/articles: alanseiden.com

Strategic Business Systems, Inc.

- **IBM partner since 1982**
  - IBM i (AS/400) hardware, software development, consulting
  - Concentration in food & beverage and automotive industries
  - HQ in northern New Jersey

- **Zend ("the PHP company") partner since 2008**
  - PHP's been our preferred web technology for ourselves and clients since 2005
  - In addition to our consulting/development services, we offer Zend's training and software
  - We represent Zend in the northeastern USA

PHP's growth as a web development language

34% of the internet runs on PHP

37% growth in PHP developers

NETCRAFT

ZF and PDT released, PHP 4 EOL announced

Zend Framework & Eclipse project (PDT) announced; i5/OS support

IBM, Oracle Endorse PHP

PHP 4 Released

PHP 5.0 (XML,SOAP,OOP) Zend Studio

25M

20M

15M

- 1M Internet domains
- Zend Engine
- Zend Founded

PHP Proliferation

Yahoo! Standardizes on PHP

Zeev Suraski & Andi Gutmans lead the development of PHP 3

10M

5M

Rasmus Lerdorf Introduces PHP/FI

PHP Internet Domains

1995   1997   1999   2000   2002   2003   2004   2005   2006   2007

Reasons for PHP's success

- **Easy way to get data to Web**
  - Generates ordinary HTML, viewable in any browser

- **Cross-platform**

- **Offers gradual path of mastery**
  - grass roots
  - pilot project
  - Enterprise

- **Open source**
  - Managed by Zend, "the PHP company"
  - Contributors from community and corporations

Open source is mainstream

http://www.economist.com/business/displaystory.cfm?STORY_ID=13743278

Economist.com **BUSINESS**

Open-source software in the recession

Born free

May 28th 2009
From The Economist print edition

Open-source software firms are flourishing, but are also becoming less distinctive

MANY technology firms are floundering amid the recession. But many of the ones that offer services tied to open-source software—free programs written by volunteers who collaborate online—are boasting double-digit growth. Sales at Red Hat, the world's biggest independent open-source firm with annual revenues of $653m, grew by 18% year-on-year in the first quarter. More and more firms, particularly in Europe, seem prepared to embrace open source (see chart). "Budgets are tight and we think that is good for open source," said Jim Whitehurst, Red Hat's boss, when announcing the results.

Indeed, open source is so widely accepted that traditional software firms are beginning to dabble in it, while some open-source firms are starting to sell proprietary add-ons to open-source programs instead of charging to provide support to firms using open-source software. If current trends hold, traditional software firms and their open-source rivals will soon be hard to tell apart. "A new pragmatism is rising," says Matt Asay, an open-source advocate and an executive at Alfresco, which makes open-source software that helps firms manage digital content.
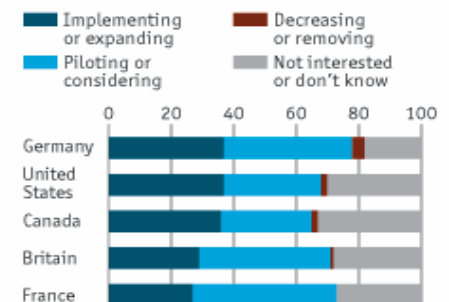
The "free and open-source software" movement, as it is officially called, has come a long way from its anti-establishment origins. Pioneers such as Richard Stallman did not want users to be locked into monolithic products, but to be able to change programs in whatever way they wanted, and to share their modifications.

For years, this software commons was no more than an obscure sideshow. But then the internet provided volunteer programmers with a way to co-operate cheaply. IBM and Oracle, two industry giants, threw their weight behind the Linux operating system, in part to weaken their rival Microsoft. After the dotcom bubble burst in 2001, many firms turned to Linux and other open-source software to save money.

Cost is once again the main reason why companies are turning to open source, says Jeffrey Hammond of Forrester Research, a consultancy. Its success is no longer limited to basic software, such as Linux or

Open minds
Firms' open-source software plans in the next 12 months, % of respondents*

- Implementing or expanding
- Piloting or considering
- Decreasing or removing
- Not interested or don't know

	0	20	40	60	80	100
Germany						
United States						
Canada						
Britain						
France						

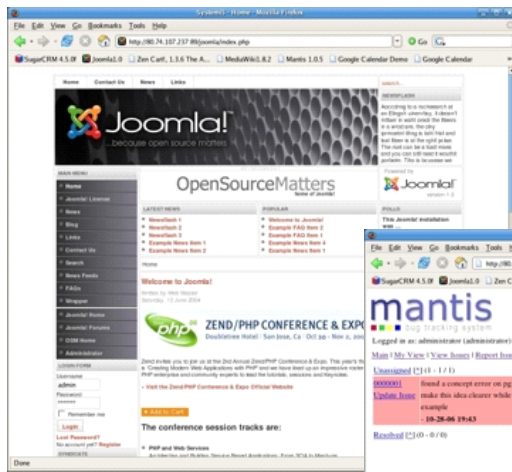*Survey conducted between December 2008 and February 2009

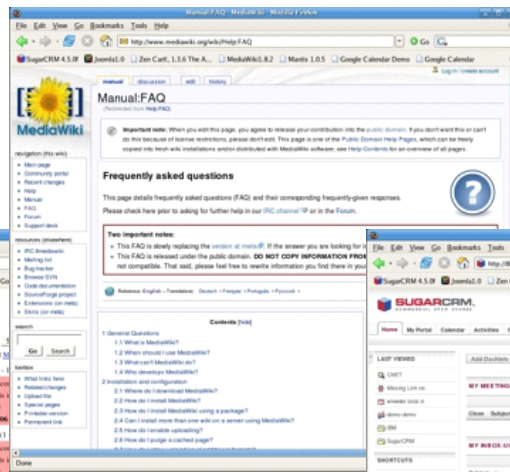Source: Forrester Research

Who uses PHP?

- **Yahoo, eBay, Wikipedia, Mazda, Disney, Facebook**
  - I bet it's used somewhere in your company

- **Open source developers – 10,000+ projects**

- **Strong community worldwide**

- **7 million+ developers**

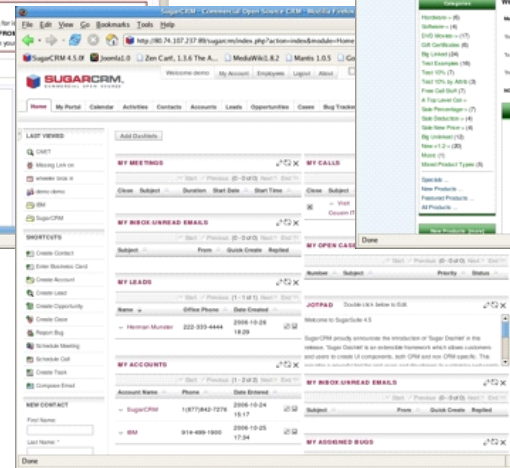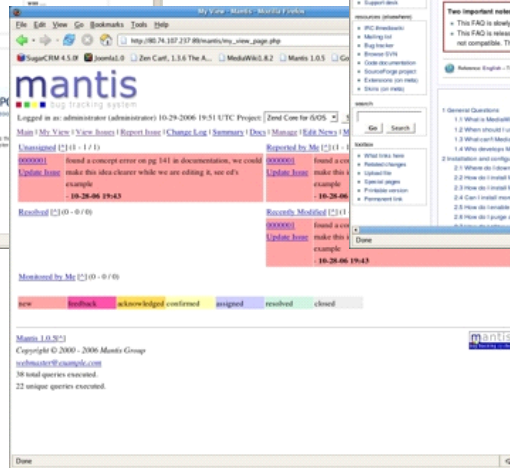# Downloadable applications (fine for i5/OS!)
Most of these use MySQL database

Content Management

Wiki

E-Commerce

Bug Tracking/Helpdesk (Mantis400.com)

CRM

Application demo: WordPress blog

PHP on i—a short history

- **2004: i5php.net**
    - Unofficial PHP binary for "i" available online

- **2005: IBM and Zend got together**

- **2006: Zend Core for i5/OS**
    - Official release with help from IBM
    - i5 Toolkit, SMTP (email), Apache module (good performance)
    - Professional technical support from Zend

- **2007: Zend Studio and Platform**
    - Studio: IDE/code editor and debugger
    - Platform: performance enhancer and code/bug profiler

- **2008: Zend Framework v1.7 enhanced for "i"**

Why PHP on i

- **Powerful, flexible, popular**

- **Runs completely on your good old "i"**

- **Backed by IBM**

- **Allows your teams to work together**
  - Re-use RPG logic, called from PHP
  - Consolidate departmental solutions (Excel spreadsheets!) into your reliable db2 database

Typical stages of PHP on i

- **Grass roots**
  - Prove to yourself how well PHP works on i

- **Pilot project(s)**
  - Managers see potential value; project approval

- **Enterprise PHP**
  - Important projects, developed with experience

Grass roots stage

Grass roots stage

- **Go ahead, kick the tires!**
  - Download and install Zend Core (free)
    - Includes MySQL
  - Create a simple web page, reading/writing db2
  - Try open source software. Examples:
    - Mantis/400, mantis400.com
    - WordPress, wordpress.org
  - Prove it to yourself before "selling" to manager

What you must know: grass roots

- **Learn some basic HTML**
  - Try http://w3schools.com/html
  - Tables (<table>,<tr>,<td>) useful for business data
  - "View Source" in browser to borrow bits of HTML

- **Optional: learn as needed**
  - Javascript
    - Adds dynamic functionality to pages

  - Cascading style sheets (CSS)
    - Modern way to specify colors, fonts, and other attibutes of how a site looks

Install Zend Core

- **Check the prerequisites**
  - i5/OS V5R4, V6R1
  - PASE, Qshell, recent cumulative PTF package

- **Get FREE Zend Core for i5/OS**
  - Preloaded as licensed program or
  - Download from http://zend.com/en/products/core/downloads
    - Free account required
  - Choose Windows-based installer or *SAVF

- **Install on your i5**
  - If you need MySQL, can select it, too
  - Start Zend Core: GO ZENDCORE/ZCMENU, Option 5 then 1

Apache PHP jobs run in ZEND

- **Look in Zend subsystem for Apache/PHP jobs**

First script: "Hello, World!"

- Save script in /www/zendcore/htdocs/helloworld.php

- Run in browser URL:
  http://i5system:89/helloworld.php

```php
<?php

    // simple script to test PHP
    echo "Hello, world!";

?>
```
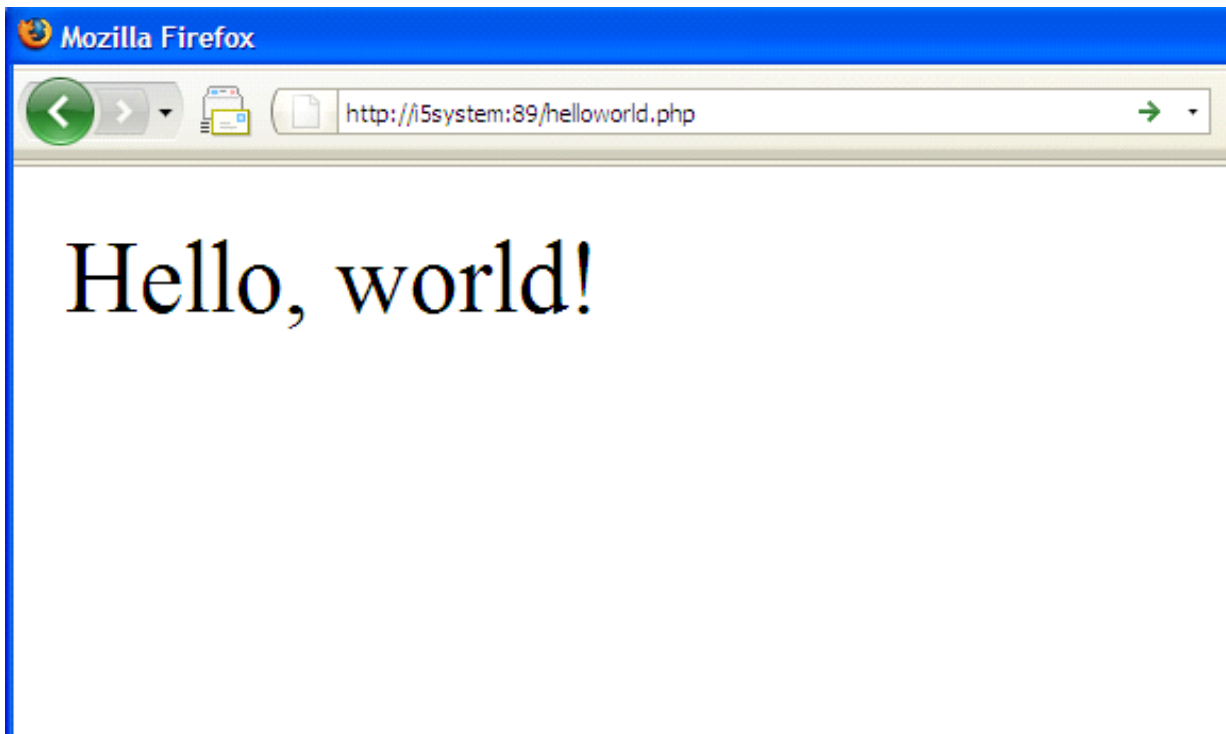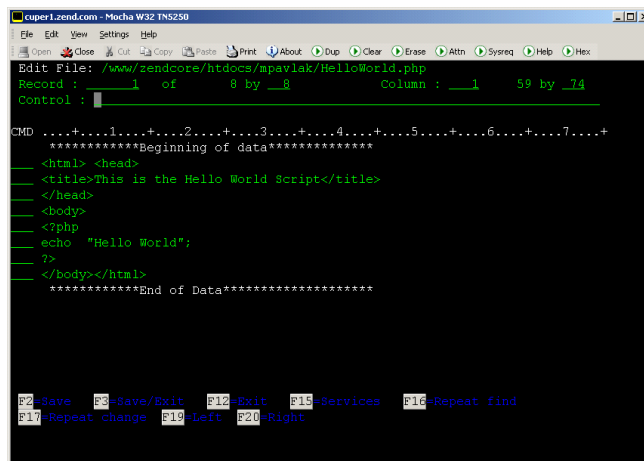
"Hello, world!" in browser

- **The output of helloworld.php**

How do I access IFS files?

- **Three methods**
  - Netserver file associations (or a mapped local drive)
    - Can be sluggish, but works in Explorer too
  - FTP / "Remote server"
    - Recommended
  - WRKLNK
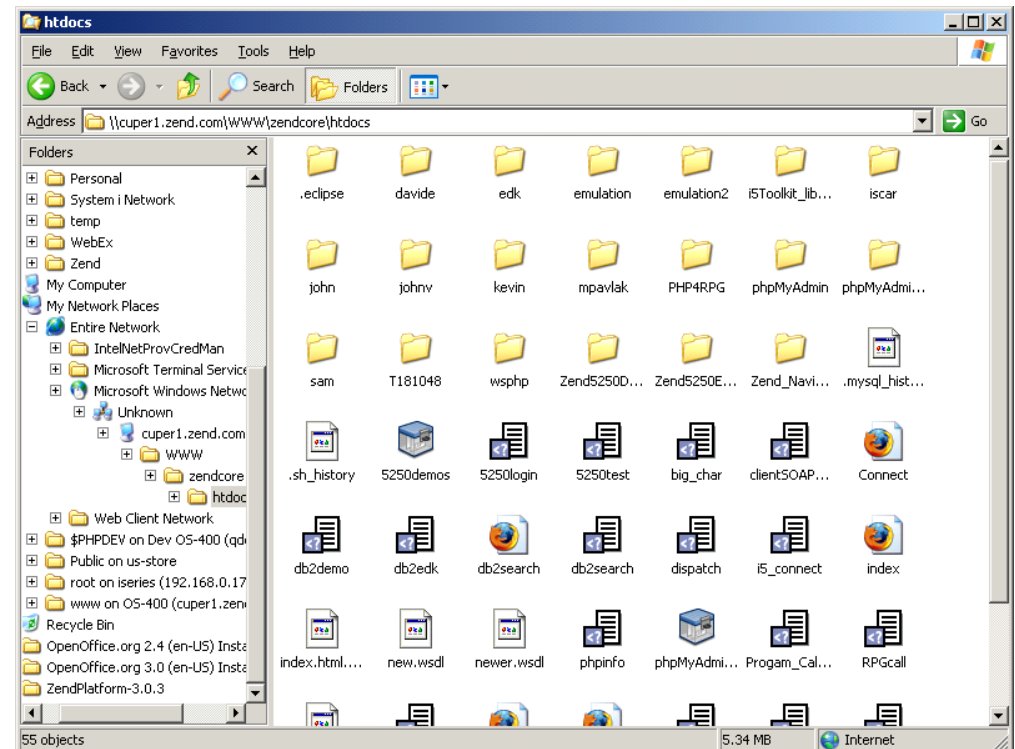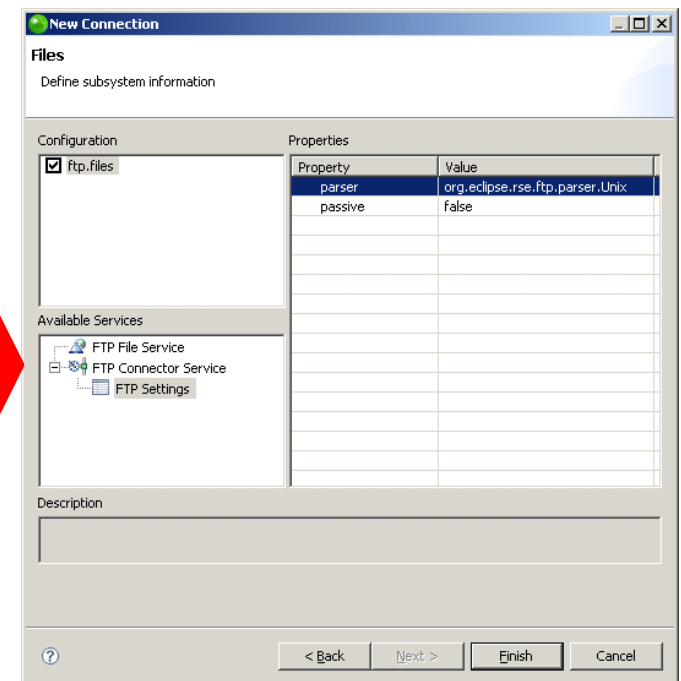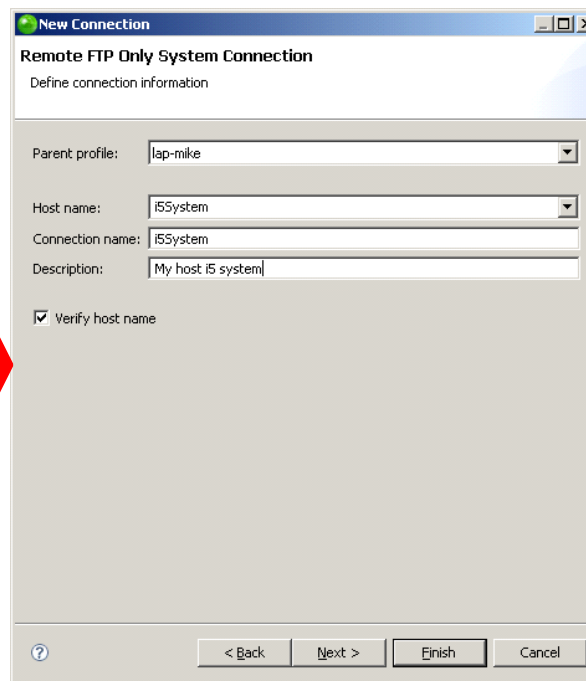   - For emergencies only

Zend Studio for Eclipse, i5 Edition

- **Better IDE than "Notepad"**

- **Free for IBM i customers**

- **Can connect to mapped drive ("local") or FTP server ("remote")**

- **Alerts you to any syntax errors or other mistakes; offers interactive debugging and code completion (like the F4 prompt)**

- **For good performance, your PC needs 2GB RAM**

Configure "Remote Server" in Studio

- Start Zend Studio for Eclipse, i5 Edition
- Click the new connection button; select FTP
- Enter domain name or IP address
- Set "FTP Settings/Parser" to Unix
  (org.eclipse.rse.ftp.parser.**Unix)**

Configure FTP on i5

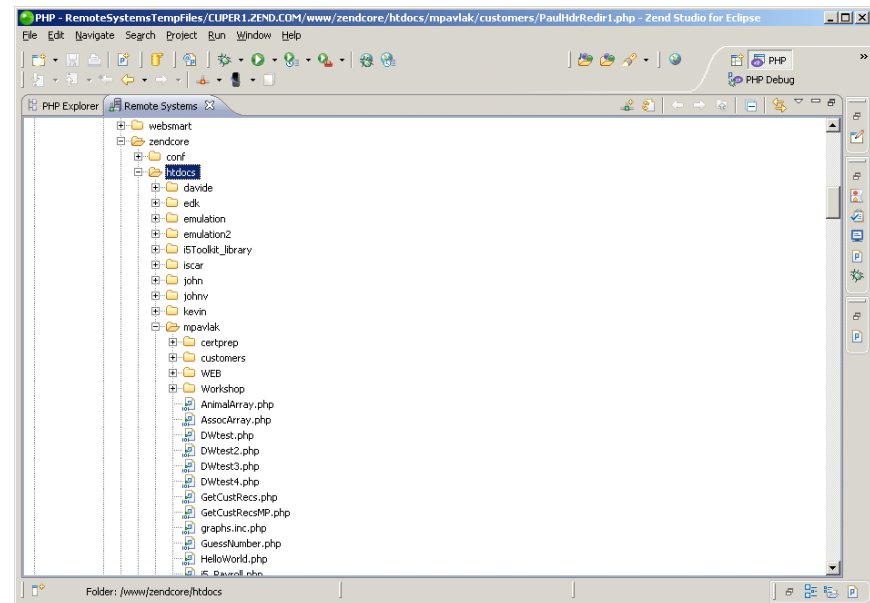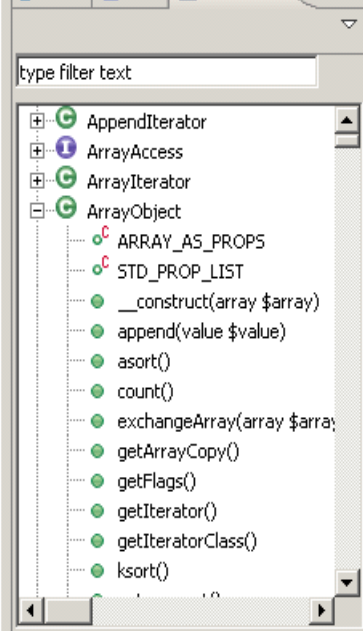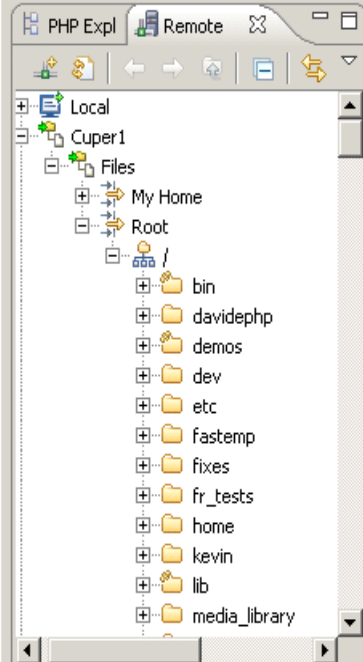- **CHGFTPA NAMEFMT(*PATH) CURDIR(*HOMEDIR) LISTFMT(*UNIX)**
  - This is a more mainstream setting (no QSYS.LIB/QGPL.LIB to confuse FTP clients)

- **Restart FTP server**
  - ENDTCPSVR SERVER(*FTP)
  - STRTCPSVR SERVER(*FTP)

Navigate to files

- Expand the tree for your system
- Navigate to the directory /www/zendcore/htdocs
- Enter user credentials and you're in!

File Edit Refactor Source Navigate Search Project Run Window Help

PHP Expl | Remote ≈

Local
Cuper1
  Files
    My Home
    Root
      /
        bin
        davidephp
        demos
        dev
        etc
        fastemp
        fixes
        fr_tests
        home
        kevin
        lib
        media_library

*ZendCustList1.php ≈

```php
1  <?php
2
3  // Standard DB connection to DB2...
4  $conn = "*LOCAL"; $name = "";    $pwd = "";
5  $i5link = db2_connect($conn, $name, $pwd);
6  if (!$i5link)
7      echo 'Connection failed: '.db2_stmt_error().' : '
8  i5_
9  $sq
10 $st
11   or                                          .db2_stmt
12 //
13 //
14 ech
15 ech                                     er Name</
16        <TD>Address Line 2</TD><TD>City</TD><TD>State
17 // loop di loop through customer recs...
18 while($row=db2_fetch_array($stmt)){
19 list( $CUSTOMER_NUMBER, $CUSTOMER_NAME, $CUSTOMER_ADD
20        $CUSTOMER_CITY, $CUSTOMER_STATE, $CUSTOMER_ZI
21 echo("<TR><TD> $CUSTOMER_NUMBER</TD> <TD>$CUSTOMER_NA
22        <TD>$CUSTOMER_ADDRESS_LINE2</TD><TD>$CUSTOMEF
23        <TD> $CUSTOMER_ZIP</TD></TR>");
```

Autocomplete popup:
- i5_errormsg(resource[optional] $connection =
- i5_execute(resource $stmt, array[optional] $p
- i5_fetch_array(resource $result, int[optional]
- i5_fetch_assoc(resource $result, int[optional]
- i5_fetch_object(resource $result, int[optional]
- i5_fetch_row(resource $result, int[optional] $
- i5_field_len(resource $result, mixed[optional]
- i5_field_name(resource $result, integer $field)
- i5_field_scale(resource $result, mixed $field)

Description
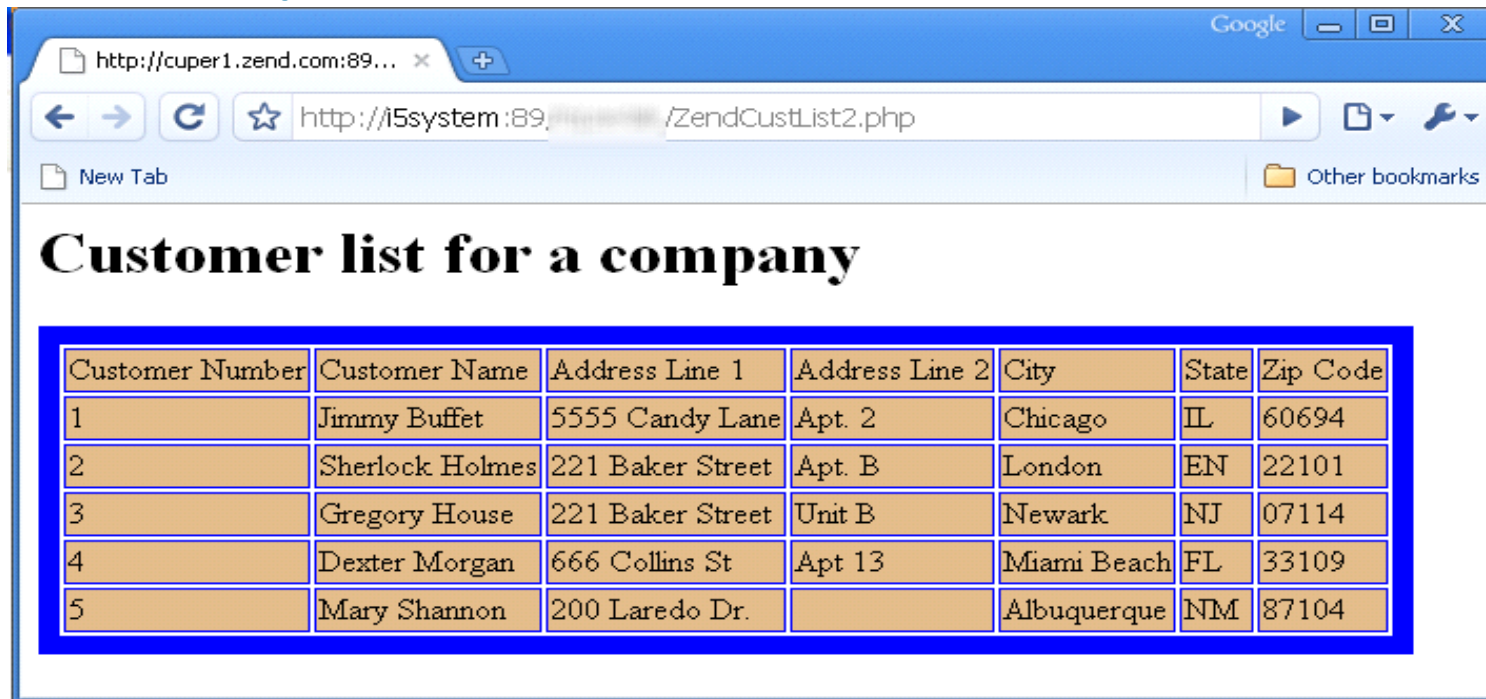Fetch a row of data from the resource.

Parameters
result resource resource resulting from
operation returning data
option int[optional] flag specifying which
record to fetch (I5_READ_SEEK - Current record,
I5_READ_NEXT - Next record, I5_READ_PREV -
Previous record, I5_READ_FIRST- First record,
I5_READ_LAST - Last record).

Debug Output ≈

Outli | PHP | PHP ≈

type filter text

AppendIterator
ArrayAccess
ArrayIterator
ArrayObject
  ARRAY_AS_PROPS
  STD_PROP_LIST
  __construct(array $array)
  append(value $value)
  asort()
  count()
  exchangeArray(array $array
  getArrayCopy()
  getFlags()
  getIterator()
  getIteratorClass()
  ksort()

Problems ≈ | Tasks | Console

0 errors, 3 warnings, 0 others

Description ▲	Resource	Path	Location	Type
⊟ Warnings (3 items)				
bool-assign : Assignment in condition	ZendCustList1...	RemoteSystemsTe...	line 18	Code Analyzer...
expr-unused : Expression result is never u	ZendCustList1...	RemoteSystemsTe...	line 11	Code Analyzer...
var-use-before-def-global : Global variable	DebugDemo.php	ExampleProject	line 61	Code Analyzer...

PHP   Writable   Smart Insert   8 : 4

Basic file listing script

- Connect to DB2 i
- Select records from a DB2 table
- Load the records in an HTML table
- Display the output

Connection to DB2 for i

- Need three things:
    - System
    - User ID
    - Password

```
// Standard DB connection to DB2...
$conn = "*LOCAL"; $name = "";$pwd = "";

$i5link = db2_connect($conn, $name, $pwd);
if (!$i5link)
echo 'Connection failed: '.db2_stmt_error().' : '.db2_stmt_errormsg();

$sql = "SELECT * from zenddata.customer";

$stmt = db2_exec($i5link,$sql)
 or die("Failed query:".db2_stmt_error().":".db2_stmt_errormsg());

?>
```

Reading data...

Loop through record set

```
<h1> Customer list for a company</h1>
<TABLE BORDER="10" BORDERCOLOR="blue"><TBODY BGCOLOR="DEB887">
<TR><TD>Customer Number</TD><TD>Customer Name</TD><TD>Address Line 1</TD>
<TD>Address Line 2</TD><TD>City</TD><TD>State</TD><TD>Zip Code</TD></TR>

<?php

while($row=db2_fetch_array($stmt)){
list( $CUSTOMER_NUMBER, $CUSTOMER_NAME, $CUSTOMER_ADDRESS_LINE1,
      $CUSTOMER_ADDRESS_LINE2, $CUSTOMER_CITY, $CUSTOMER_STATE,
      $CUSTOMER_ZIP)= $row;

echo(" <TR><TD> $CUSTOMER_NUMBER </TD><TD> $CUSTOMER_NAME </TD>
     <TD> $CUSTOMER_ADDRESS_LINE1 </TD><TD>$CUSTOMER_ADDRESS_LINE2 </TD>
     <TD> $CUSTOMER_CITY</TD><TD> $CUSTOMER_STATE </TD>
     <TD> $CUSTOMER_ZIP </TD></TR> ");
}
echo ' </table> ';
db2_close($i5link);

?>
```

i5 Toolkit

- **Included with Zend Core**

- **Allows a PHP application to:**
  - **run i5/OS commands and programs**
  - **access DB2 for i5 natively or in SQL**
  - **access DTAARA, DTAQ, User Spaces**
  - **read system values**
  - **read/list/create spool files**
  - **list system objects**

- **Example coming up…**

i5 Toolkit Example: Retrieve Job Attributes

```php
<?php

// rtvjoba.php: connect to i5, call command via Zend's i5 Toolkit
// two functions: i5_connect, i5_command

$conn = i5_connect("localhost", "ASEIDEN", "password");

$ret = i5_command(
"rtvjoba",
array(),
array(
"user" => "user",
"curlib" => "curl",
"usrlibl" => "userlib",
"syslibl" => array("syslib", "char(165)"))
);

echo "User: $user<br>";
echo "Current library: $curl<br>";
echo "User library: $userlib<br>";
echo "System libs list: $syslib<br>";

?>
```
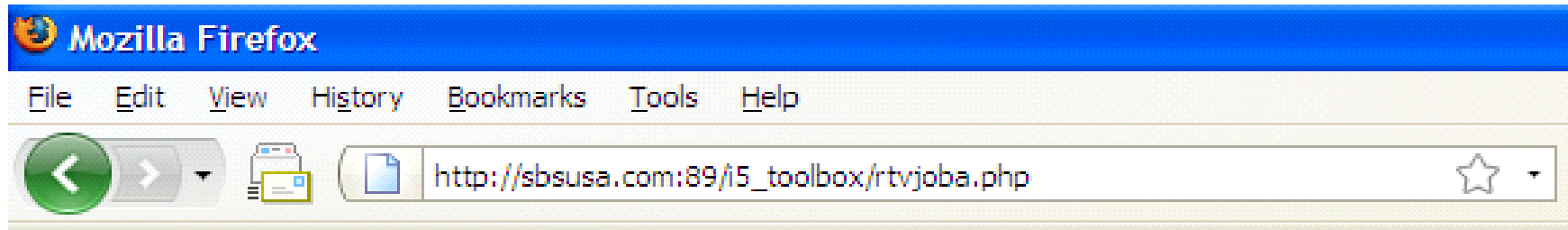
Results of rtvjoba.php

Mozilla Firefox

File   Edit   View   History   Bookmarks   Tools   Help

http://sbsusa.com:89/i5_toolbox/rtvjoba.php

User: ASEIDEN
User library: QTEMP QGPL SBSUTIL ALAN ZENDCORE
System libs list: QSYS QSYS2 QHLPSYS QUSRSYS DBU80 QSYS38
Current library: *NONE

Grass roots resources

- **Support: Zend Core includes one year of "silver" support**

- **Forums and lists**
  - forums.zend.com (look for i5 forums)
  - lists.nyphp.org (general PHP questions)

- **Books (online and print)**
  - PHP Manual: http://php.net
  - *Zend Core for i5/OS* Redbook
  - PHP/i book by Jeff Olen & Kevin Schroeder (MC Press)

- **PHP User Groups: Boston's is active**
  - Bostonphp.org

Pilot project

Pilot project: how to pick one

- **Well defined, useful, with modest scope**

- **Accesses IBM i resources**
  - db2
  - RPG calls (optional)

- **Could be a new application or extension of an existing one to the web**

Pilot project: "AE" demo

| 1. Start | 2. Transferee Info | 3. Services | 4. Crating/Uncrating | 5. Special Instructions | 6. Review and Submit |

Select tabs above by clicking on the tab names (or by pressing Alt and the tab number).
See a summary of your order, and submit it, on Tab 6.

Pilot project: goals and resources

- **Small scale lets you do it right**
  - Set standards for future
  - Safe space to get experience

- **You need these free tools**
  - Zend Core
  - Zend Studio

- **And consider one or more of these:**
  - Training/Support
  - A PHP framework (e.g. Zend Framework, which is free)
  - Mentoring, coached development
    - Greatly accelerate progress, save staff time
    - Especially when starting with a framework
  - Zend Platform (try 60-day trial)

A pilot project using Zend Framework

- **FIDM: student course configuration system**

  - Goals: Set standards for future. Do it "right." Work as a team.

  - Training
    - "PHP for RPG programmers"
    - Zend Framework introduction

  - Mentoring in Zend Framework
    - Invited certified consultant (me)
    - They invited me after doing some development, which generated good questions
    - "What we did together in 3 days, we couldn't have done alone in 3 months."

But what is Enterprise PHP?

Enterprise PHP is:

- **Grown-up development**

- **Think of your mature RPG processes**
  - Consistent
  - Reliable

- **You know how to do that**

Zend Framework helps you do it right

- **A starting point for your applications, providing**
  - Security features
  - Modular design

- **A collection of over 70 PHP components to simplify common tasks, including some for:**
  - Form creation (and reuse)
  - Logging
  - Database access

- **A demonstration of PHP 5 best practices**

- **It provides standards and great functionality but will not cramp your style. Your development is not limited in any way**

Zend Framework

- **Like the "i," it has everything you need**
- **You don't have to integrate lots of pieces (template system, emailer, etc.)**
- **It's all tested for you**

Zend Framework's Model, View, Controller

- **M, V, and C separate parts of application for you**

- **Model contains most of your business logic**

- **View: If you have HTML you want to use, just plunk it in the "view" without worrying about overwriting your mainline PHP code**

- **Controller handles the application's flow**

Zend Framework "Model": example

```php
<?php
// model: Busyflag.php

class Busyflag
{
    // The table name
    protected $name = 'SYSFLAGS'; // old-fashioned "System 36" table

    // isSiteUp: return true if up, false if down
    public function isSiteUp() {

        // one record, with key "B"
        $sql = "select BZYFLG from {$this->name} where RECID = 'B'";
        $row = SBSDbhelp::getOneRow($sql);

        // true if Y, false otherwise.
        return $row['BZYFLG'] == 'Y';

    } //(public function isSiteUp())
} //(class Busyflag)
```

```php
// usage (from a preDispatch front controller plugin)

$busyFlag = new Busyflag();

if (!$busyFlag->isSiteUp()) {

    // Take user to "site down" page.

    $request->setControllerName("Down");

    $request->setActionName("index");

} //(if (!$busyFlag->isSiteUp()))
```

```
demo
    application
        default
            controllers
            helpers
            layouts
                main.phtml
            models
                Busyflag.php
            views
                filters
                helpers
                scripts
        bootstrap.php
        Initializer.php
    library
    public
    test
```
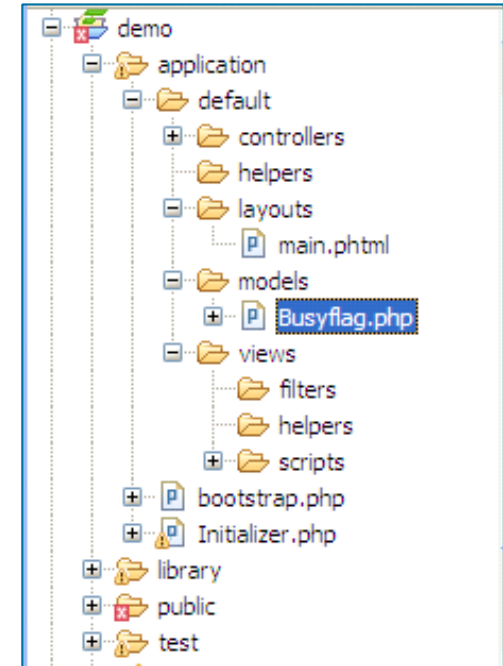
Controller Routes "friendly" URL request

- ## Default routing convention:
  - http://example.com/controller/action/param1/value1...

Controller maps to class name

Action maps to method name

Param/value pairs are passed to action

http request

Bootstrap: index.php

Front Controller

Controller1
action1()
action2()

Controller2
action1()
action2()
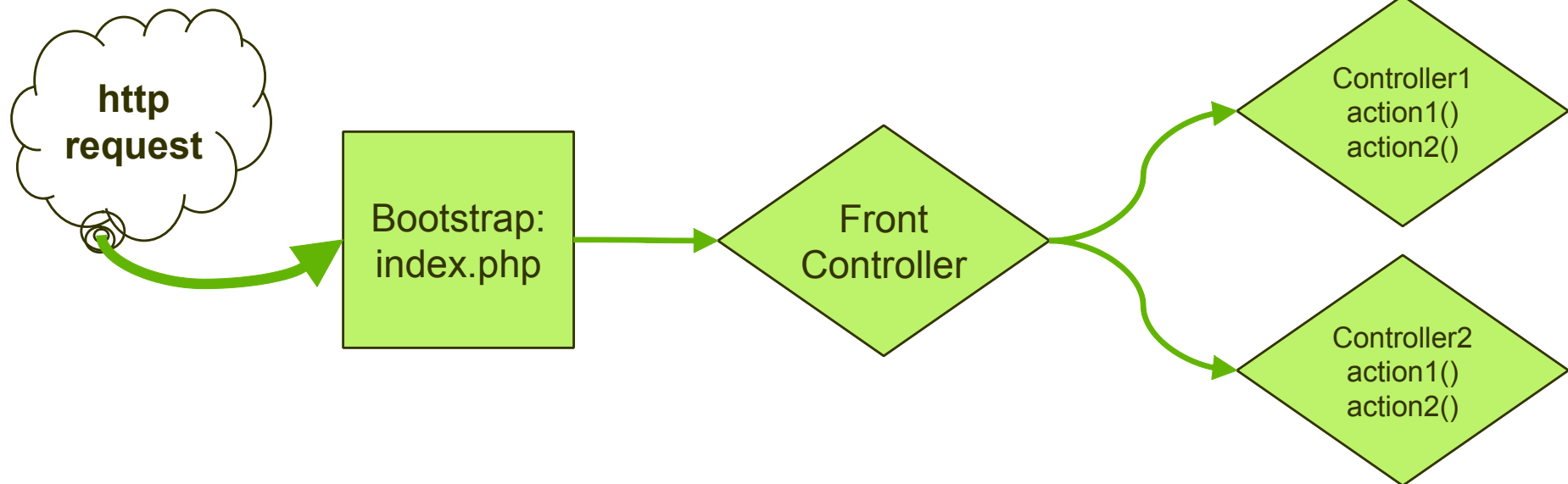
A "view helper": TitleCase.php

```php
<?php
Require_once 'Zend/View/Interface.php';


/**
 * TitleCase helper
*/
class Zend_View_Helper_Title_Case {

    public $view;

    public function titleCase($string = '')
    {
        // convert incoming string so that
        // first letter of each word is capitalized/
        // but all other letters are lowercase.
        // Also trim the string.
        return ucwords(strtolower(trim($string)));


    } //(public function titleCase())

    public function setView(Zend_View_Interface $view) {
        $this->view = $view;
    }
}
```

```
☐ 🗁 demo
  ☐ 🗁 application
    ☐ 🗁 default
      ⊞ 🗁 controllers
        🗁 helpers
      ☐ 🗁 layouts
          🄿 main.phtml
        🗁 models
      ☐ 🗁 views
          🗁 filters
          🗁 helpers
        ⊞ 🗁 scripts
    ⊞ 🄿 bootstrap.php
    ⊞ 🄿 Initializer.php
  ⊞ 🗁 library
  ⊞ 🗁 public
  ⊞ 🗁 test
```
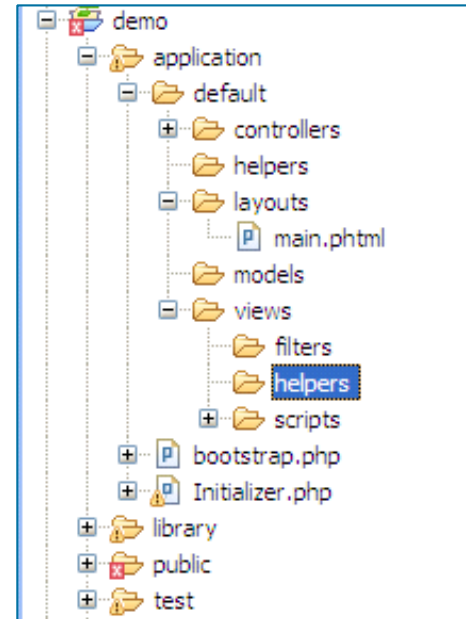
Usage:

```php
echo $this->titleCase('mozilla firefox');

// Mozilla Firefox
```

Action Controller

- **Controller classes handle groups of request URLs**

  http://example.com/**controller**/action

  Default: IndexController

  - Organizes and groups functionality
  - One class (extending Zend_Controller_Action) for each controller

- **Action methods in each controller class handle requests**

  http://example.com/controller/**action**

  Default: indexAction()

  - **Named like *action*Action()**
    - **Example: If *action* is "edit" then method is editAction()**

Controller example


```php
<?php

require_once 'Zend/Controller/Action.php';

class IndexController extends Zend_Controller_Action
{
    /**
     * The default action - show the home page
     */
    public function indexAction()
    {
        // Use default value of 1 if id is not set
        $id = $this->_getParam('id', 1);

        // assign id to view
        $this->view->id = $id;
    }
}
```
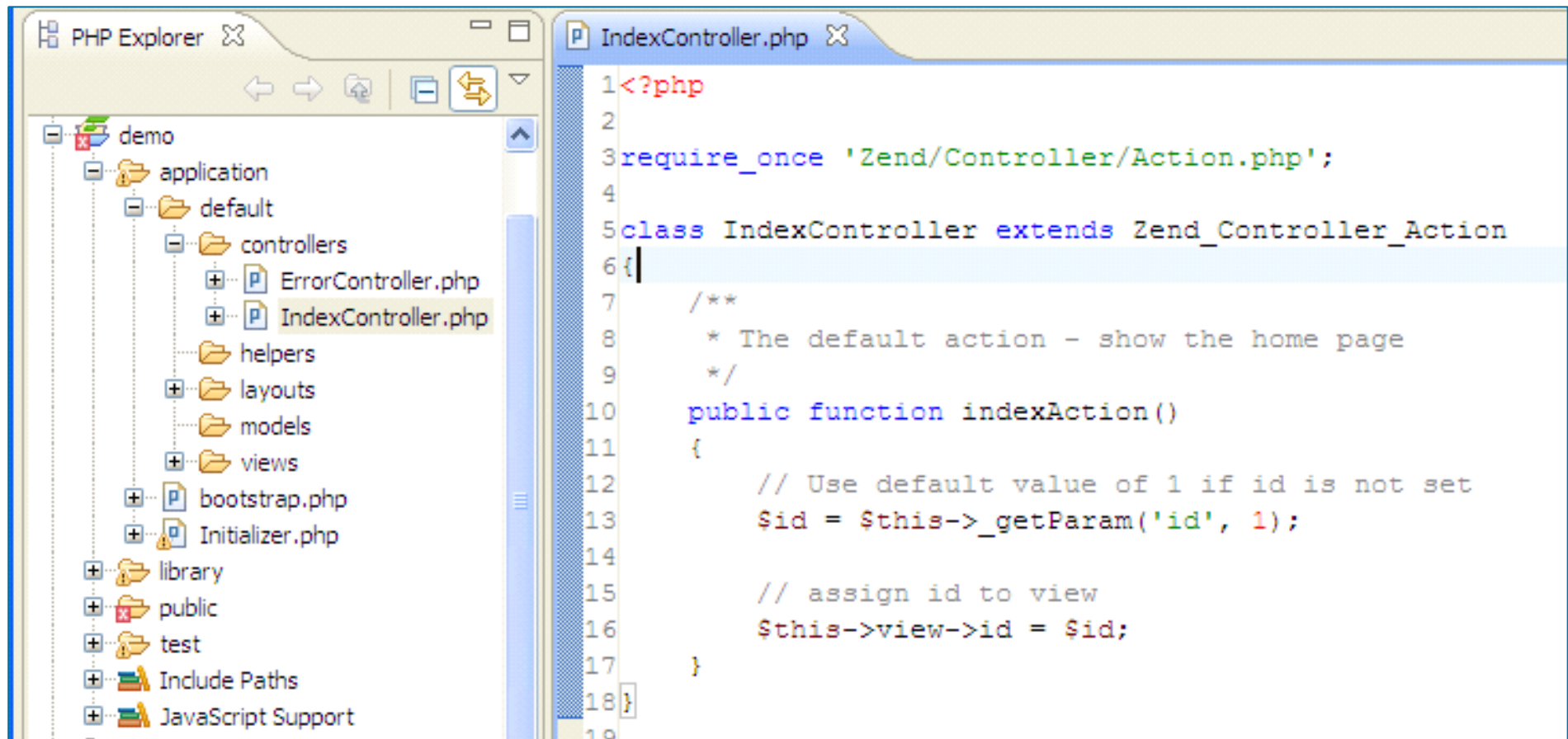
Zend Framework resources

- **Framework.zend.com**

- **Devzone.zend.com**

- **Tune in to my webcast with Zend on June 17, 2009 (12pm Eastern Time)**
  - http://www.zend.com/en/news/event/list/year/2009/month/6/day/17
  - Afterward, look for archived copy online

Enterprise PHP in detail

- **Design/development cycle**
  - Standards
  - Security
  - Focus on easy maintainance
  - Reusable functionality (not just copy and paste)
  - Procedures that ensure quality
    - Think of change management as well

- **Deployment**
  - Need tools to help support app in live environment
  - Predictable, consistent performance

Zend Platform

Provides caching (fast!), debugging and event tracking, integration with Zend Studio (IDE)

Zend Platform: detail

Drill down to find the cause of performance lags or errors

Enterprise and Zend Framework demo

Allied Beverage Group: Wine catalog/ordering system

Enterprise demo ingredients

- **Allied project won IBM/COMMON "Best Web Solution" of 2009**

- **For Allied, PHP brings people and resources together on the "i"**
  - db2 database provides reliable, consistent product catalog and order data
  - No extra servers needed
  - Re-using RPG logic
  - Everyone on the same team
  - PHP is "superglue": plans afoot to connect other systems, too

- **In the wine distribution industry, a solid reputation is important**
  - For their first high-profile project, asked Strategic (us) to develop the system

- **Consistency, standards, security, reusability**
  - Zend Framework

- **Speed critical for sales reps in the field**
  - (Being compared to green screen speed!)
  - Zend Platform
    - Also allows monitoring of production environment

How we did a full text search

- **Create a reverse index, just as Google did**
  - Don't use "LIKE" heavily in your SQL…must read every byte

- **Run a job that goes through product catalog, breaking up each field into individual words**
  - Omit "a", "the", etc.

- **For each word, add a record to WRDSEARCH table/file**
  - Keyed by the search word
  - Other fields
    - "Origin" of the word (original field name in which word was found)
    - The product code that we're looking up

- **Now, we can query by the words the user typed in, and get the product codes back**

How do we get there?

Path to Enterprise PHP

Business-critical applications require higher levels of reliability, predictability, scalability, & performance

Enterprise

Consulting

Training

Support

Buy-in

Pilot project, experience

Requires low/no cost tools, documentation, & support

- Enterprise versions of software
- Professional developer tools

Grass roots

- No-Charge versions of software
- Community support
- Eclipse support
- PHP frameworks
- DevZone

Investment Required for Success

PHP Value to Business

Tools that help (3 of them are free)

Grass roots → Consistent & Predictable → **Enterprise**

Zend Core™ for i5/OS®

- Consistent commercial versions of PHP, extensions, database drivers, libraries
- Timely updates of security patches, bug fixes, new extensions/drivers
- Configuration Management across entire production infrastructure

ZEND FRAMEWORK

- Pre-built components for rapid development
- Best Practices
- Iterative development cycles
- Higher deployment success rates results from rigorous testing by Zend & PHP community

Zend Studio

- Reusability
- Remote Debugging in Production
- Development best practices
- Repeatable, uniform testing
- Standards for deployment
- Root Cause Analysis
- Replicate Production problems in developer's environment

Zend Platform

- Improved Scalability
- High performance via Caching
- Defining/measuring performance & scalability metrics
- Proactive Monitoring & Management

Get help to smooth the learning curve

Grass roots → Consistent & Predictable → **Enterprise**

Support	**Gold Support** Business Hour Phone Access 4 hr Priority Response		**Platinum Support** 24/7 Phone Access 4 hr Priority Response/2 hr on P1
Training	PHP I: Foundations PHP for RPG Prog PHP for Exp Prog Studio w/ Platform	PHP II: Higher Structures Building Apps w/ Framework Zend Certifications	Zend Platform for SysAdmins Building Secure Apps
Consulting	Architecture & Design SmartStart Rapid App Dev Coached Development	Remote Install & Admin PHP Performance Audits PHP Security Audits	App Migration

Enjoy the ride…

Enjoy the ride…

…on the path to Enterprise PHP!

- **Start with grass roots: experiment**

- **Get training and move on to pilot project**

- **As your confidence grows, use Zend Framework and other tools. Consider mentoring to accelerate progress, avoid pitfalls**

- **Call me for guidance or to sign up for training, mentoring, or to learn more about Zend's productivity tools**
  - 1-800-727-7260 or aseiden@sbsusa.com
  - Say you saw Alan's presentation at NH/VT

Thanks and Questions

To download these slides, go to:
http://nemug.com/speaker_handouts.htm, or
http://alanseiden.com/presentations (leave a comment!)

To receive free PHP/i tips by email, write to
aseiden@sbsusa.com with subject: "PHP tips."
Or write "PHP tips" on a business card.