PHP Batch Jobs on IBM i

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Strategic Business Systems, Inc.

- **Developing Web apps on IBM i (and iSeries, i5...) since 1996**
- **Based in Ramsey, New Jersey**

- **IBM Business Partner**
  - Power Systems hardware, software, development, consulting

- **Zend Business Partner**
  - Working with Zend since they brought PHP to IBM i in 2006
  - We offer Zend's training and Zend Server software to complement our consulting/development services

Alan Seiden

PHP on IBM i Developer / Consultant / Mentor

- Contributor to IBM's Redbook *PHP: Zend Core for i5/OS*
- First IBM i developer certified in Zend Framework
- Developer of IBM/COMMON's "Best Web Solution" of 2009
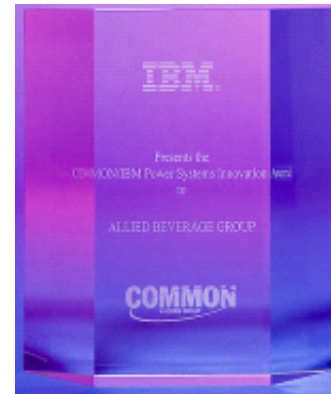
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What we'll discuss today

- **Quick overview, Zend Server for IBM i**
- **PHP for Batch (non-web) Tasks on IBM i**
  - "batch" = command line or scheduled PHP
- **Tips and techniques**

- **Questions**

PHP/web

PHP was built for server-side web apps

- **Started as a web development language in 1995**
- **Over time, the open source community and Zend made PHP more and more powerful**
- **Currently one of the most popular web languages**
  - It's everywhere, eBay, Wikipedia, Facebook…
  - But it's not limited to the web
  - It would be a shame to restrain PHP's power to only the web

- **On IBM i, all of PHP's power is available in Zend Server (formerly Zend Core).**

Zend Server

Zend Server for IBM i

- **Next generation PHP stack for IBM i**
  - Best of Zend Core and Platform in one licensed program

- **Two license levels**
  - Zend Server for IBM i Community Edition (CE)
    - Available at no charge per IBM partnership
    - Includes "Optimizer+" that speeds up code
    - One year silver (email) support
  - Zend Server for IBM i
    - Subscription-based license
    - High value extra features, higher Support SLAs

- **Details of differences:**
  - http://mikepavlak.blogspot.com/2010/08/i-want-to-do-php-on-ibm-i-so-what-do-i.html

Installation

- **http://www.zend.com/products/server/downloads**
  - Click on the "IBM i" tab

- **Prerequisites**
  - v5r4 and:
    - http://files.zend.com/help/Zend-Server-IBMi/i5_installing_zend_server.htm
    - IBM's FastCGI PTF (free)

- **Try Zend Studio's IDE (no charge, courtesy of IBM)**
  - "Zend Studio for Eclipse, IBM i Edition"
  - http://zend.com/en/products/studio/downloads
  - Look for "IBM i Edition"

Administration

- **Zend Server combines "Core" and "Platform" controls in one interface**

- **Simpler Apache setup**
  - Single web server
    - PASE server eliminated

  - IBM HTTP Server Powered by Apache
    - PHP implemented using IBM's Fast CGI

  - Clean, more complete graphical user interface
    - Favorite: the Restart button   ↻ **Restart PHP**

Admin menu (GO ZENDSVR/ZSMENU)

Zend Server's Interface

Cheat sheet for upgrade

http://alanseiden.com/2010/04/21/differences-between-zend-core-and-zend-server-on-ibm-i/

	Zend Core	Zend Server
Installation folder	/usr/local/zend/core	/usr/local/zendsvr
PHP.INI	/usr/local/zend/core/etc	/usr/local/zendsvr/etc
Web server root(s)	/www/zendcore, /usr/local/zend/apache2	/www/zendsvr
Document root	/www/zendcore/htdocs	/www/zendsvr/htdocs
Zend Framework	/usr/local /Zend/ZendFramework	/usr/local/zendsvr/share /ZendFramework
PHP binaries folder * * where php and php-cli reside	/usr/local/zend/core/bin	/usr/local/zendsvr/bin
PHP Log files	/usr/local/zend/core/logs	/usr/local/zendsvr/ var/log
Web user profile (assign authority to it)	NOBODY	QTMHHTTP
Default HTTP Port	:89	:10088
Admin Interface URL	http://yourIBMi:89 /ZendCore/	http://yourIBMi:10088 /ZendServer/

Zend Server and PHP resources

- **Support:** Zend Server CE includes one year of email support. Upgrade to Zend Server for more years and fast phone support
  - **Register at http://www.zend.com/products/server/downloads and also get Zend's IBM i newsletter**

- **Web:**
  - Zend's recorded webinars: http://www.zend.com/resources/webinars/i5-os
  - Zend Forums: forums.zend.com (look for IBM i Zend Server forums)
  - http://alanseiden.com (of course!)

- **Books (online and print)**
  - PHP Manual: http://php.net
  - PHP on IBM i book by Jeff Olen & Kevin Schroeder (MC Press)

- **Training from Zend/others**

PHP beyond the web

I first used "batch PHP" on an EDI project

- **Generate an XML-based price list and FTP it to customer each week at the same time**
- **Poll for and receive XML orders arriving in a folder**
  - Process the XML, generate a new XML acknowledgement, and then FTP a response
- **Send e-mail reports to adminstrators**
- **Special e-mails if any error occurred**

Why use PHP for non-web tasks?

- **PHP easily handles:**
  - IFS stream files
  - manipulation of any string data and common formats such as XML and JSON
  - communication with other processes through TCP/IP, whether on your network or on the internet

- **Leverage your PHP skills instead of learning yet another language**
  - And have another opportunity to **improve** your PHP skills!

- **Share functions between web and non-web**

Batch PHP is useful beyond the IBM i

- **I once needed to change dates of thousands of folders on a Windows XP system**

- **I could have done it with a complex DOS batch file, or a "WSH" Windows shell script**

- **But I already knew PHP and could find many of the code pieces online**

- **You can download a Windows verision of PHP from http://windows.php.net/, XAMPP, or WAMP**

Examples of what you can do with PHP on i

- **Download, upload, process files from web and FTP servers**

- **Send e-mails with great flexibility**

- **Create graphics**

- **Read and write from your regular db2 files**

- **Schedule these tasks to occur when you want**

Two methods to do this

- **Method #1: "PHP-CLI" (command line)**
  - Test on command line, embed in CL/RPG
  - Automate the process with scheduled CL programs
  - It's not difficult for IBM i professionals
    - Need some knowledge of PASE or QSHELL environment
  - This is how I've always done it

- **Method #2 (NEW): Zend Server's Job Queue**
  - Better for people not familiar with command line OR needing more flexibility, dynamic scheduling
  - accepts complex parms, multi-dimensional arrays, objects
  - PHP professionals may prefer this method
  - Included in Zend Server Professional Edition

Method #1: PHP-CLI

CLI = Command LIne

- **PHP-CLI is a simplified PHP executable**
  - http://docs.php.net/manual/en/features.commandline.php
  - Location in Zend Server: /usr/local/zendsvr/bin/php-cli

- **It's optimized for the command line**
  - It doesn't look for, or have access to, web server variables or HTTP headers
  - It assumes that you will use command line arguments ($argc and $argv) rather than web server $_GET and $_POST arrays

PHP-CLI doesn't need a web server to run

- **Apache web server does not have to be running**

- **Scripts needn't be in a web-accessible location**
  - In fact, for security, you should put them anywhere BUT the web server root, unless you also want the scripts to be run in a browser.

  - That means don't put them in /www/zendsvr/htdocs

  - I like a location such as /php/appname/myscript.php
    - Note: no "www" in the path. Not accessible to the web
    - Choose a convention so you'll be able to find the scripts

PHP-CLI provides sanity checks

- **Its independence from the web server makes it a good tool to check your PHP installation's health**

- `php-cli -v` **outputs PHP version information**
- `php-cli -i` **outputs the equivalent of phpinfo()**
  - Shows what extensions and options you have loaded. An excerpt:
    ```
    ibm_db2
    IBM DB2, Cloudscape and Apache Derby support => enabled
    Module release => 1.8.1
    ```

- **Use** `php-cli -h` **to see all options**

PHP-CLI Runs via PASE or QSHELL

- **PASE (Portable Application System Environment) is an AIX-like environment on the IBM i**

- **QSHELL is a scripting environment**

- **I prefer PASE for calling php-cli**
    - PASE lets you pass parameters separately
    - Qshell requires a single concatenated command string
    - But you'll see Qshell in articles, or may have a need for it

- **I compared PASE and QSHELL in this article:**
    - http://www.mcpressonline.com/tips-techniques/programming/techtip-qshell-vs-pase.html

PASE Primer

Calling applications in PASE

- **If an app runs in AIX it will probably run in PASE**

- **How to use it**
  - "CALL QP2TERM"
    - Launches interactive command-line session
    - Think "TERM" = "terminal"
  - "CALL QP2SHELL PARM('/php/sendinvoice.php' &EMAIL &NAME 'Y')
    - Launches an application of your choice directly
    - Don't confuse with QSHELL.
  - "CALL QP2SHELL2"
    - The same as QP2SHELL except it runs in the caller's ILE activation group.

Parameters for QP2SHELL or QP2SHELL2

From IBM Infocenter entry for QP2SHELL

- **pathName**
  - Character string that identifies the stream file in the Integrated File System that contains the OS/400 PASE program to run. The pathName string may include an absolute or relative path qualifier in addition to the stream file name. Relative path names are resolved using the current working directory.

- **argument strings**
  - Optional character strings that are passed to the OS/400 PASE program as arguments. The system copies argument strings into OS/400 PASE memory and converts them from the job default CCSID to the CCSID specified by ILE environment variable QIBM_PASE_CCSID.

    Note: When calling QP2SHELL or QP2SHELL2 from CL, be sure to quote any argument string that could be interpreted as a numeric value. CL converts unquoted numeric arguments to decimal or floating-point format, which does not match the assumption made by these APIs and OS/400 PASE programs that all arguments are null-terminated character strings.

QP2SHELL2 Example (non-PHP)

```
CALL PGM(QP2SHELL2) PARM('C42PDF' '-o' 'invoice.pdf' '-l' +
'tifflist.txt')
```

This is an example of calling an AIX binary in PASE. The C42PDF binar combines "TYPE IV TIFF" images into a multi-page PDF file.

I found the C42PDF program on the internet. It converts TIFFs to PDF, and it had a compiled AIX binary. I tried it and it worked on IBM i.

Qshell Primer

Qshell is another UNIX-like environment

- **Run commands on its command line or launch Qshell environment from CL, etc.**

- **Allows complex shell script utilities if you are comfortable with shell scripting**

- **For our purposes, use it similarly to PASE, except you'll have to concatenate commands into a single string.**

Using Qshell

- **`STRQSH` or `QSH` command can launch command line or immediately run a program**

- **How to use it**
  - "QSH" by itself
    - Launches interactive session
  - "QSH CMD('MYCOMMAND')"
    - Launches a command or application of your choice

Try PHP-CLI

Start PASE session with QP2TERM

QP2TERM launches an interactive ("terminal") PASE session where you can use UNIX-style commands
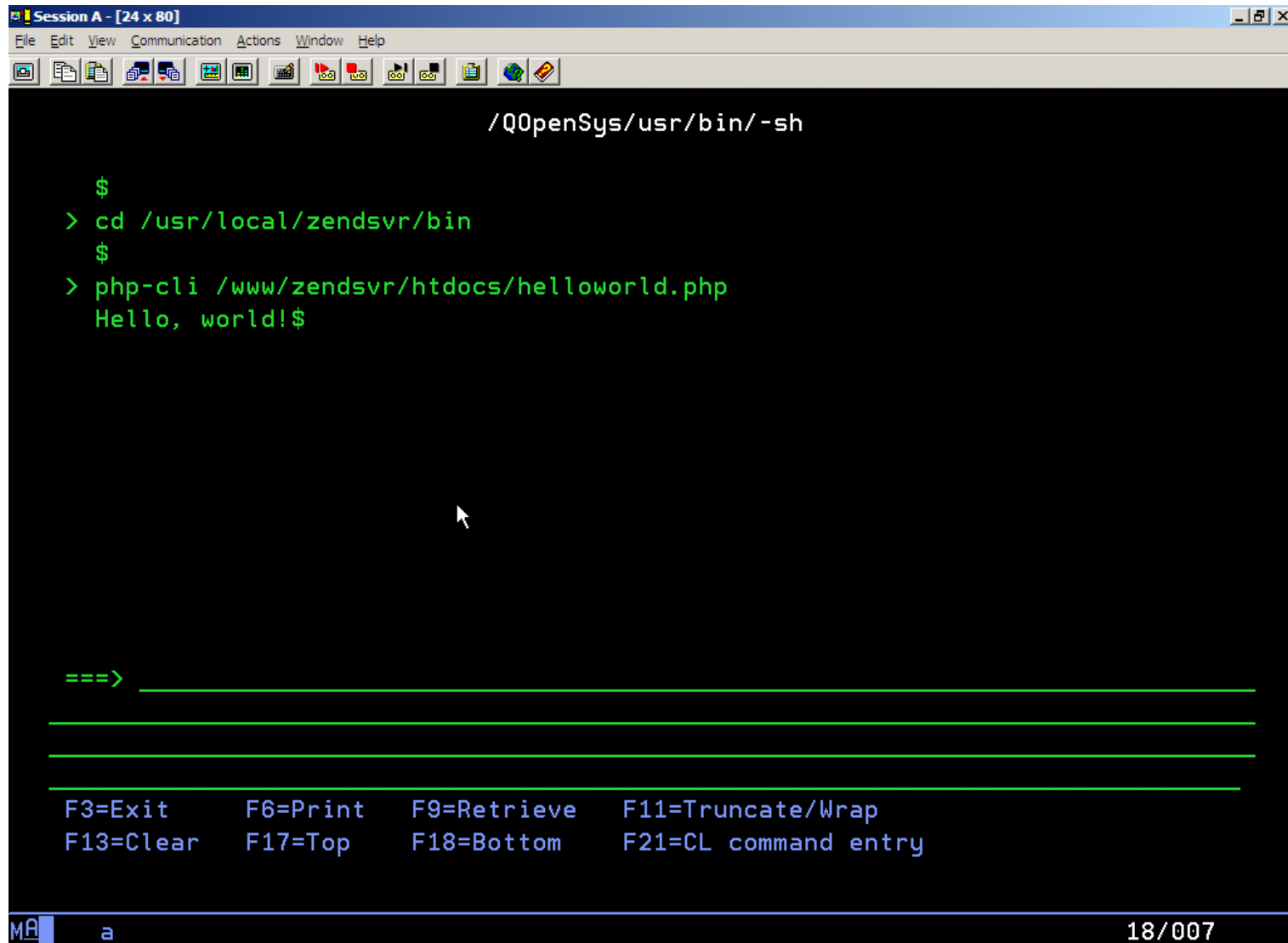
Do a simple version check: php-cli -v


```
                        /QOpenSys/usr/bin/-sh


   $
 > cd /usr/local/zendsvr/bin
   $
 > php-cli -v
   PHP 5.2.10 (cli) (built: Sep  9 2009 11:50:07)
   Copyright (c) 1997-2009 The PHP Group
   Zend Engine v2.2.0, Copyright (c) 1998-2009 Zend Technologies
       with Zend Extension Manager v5.1, Copyright (c) 2003-2009, by Zend Techno
   logies
       - with Zend Data Cache v4.0, Copyright (c) 2004-2009, by Zend Technologie
   s [loaded] [licensed] [disabled]
       - with Zend Java Bridge v3.1, Copyright (c) 2004-2009, by Zend Technologi
   es [loaded] [licensed] [enabled]
       - with Zend Job Queue v4.0, Copyright (c) 2004-2009, by Zend Technologies


   ===> █_____

   _____

   _____


   F3=Exit      F6=Print     F9=Retrieve    F11=Truncate/Wrap
   F13=Clear    F17=Top      F18=Bottom     F21=CL command entry
```

Now run our "Hello World" script

Output the results to an IFS file

Type this into QP2TERM (note 'pipe' symbol):

```
> php-cli /www/zendsvr/htdocs/helloworld.php > /alan/hello.html
  $
```

Produces a file that I can view in Notepad:
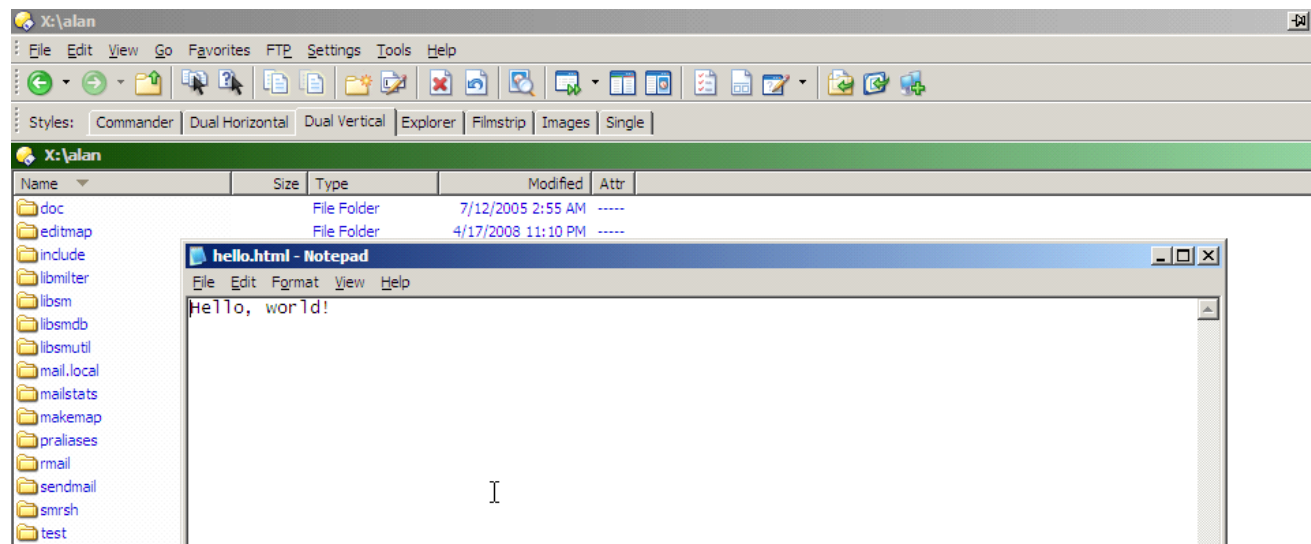
Email with PHP

```php
<?php

// emailme.php

// establish "from" user (optional)
ini_set("sendmail_from","sender@example.org");

// Parameters: recipient, subject, body
mail("alan@alanseiden.com",
    "Sent from CL",
    "CL can call PHP scripts.");

?>
```

Call the email script from a CL program


```
Columns . . . :   1  71              Edit                      ALAN/QCLSRC
SEU==>  _____              CALLPHP
        **************** Beginning of data ***************************************
0001.00         CALL        PGM(QP2SHELL) +
0002.00                     PARM('/usr/local/zendsvr/bin/php-cli' +
0003.00                     '/www/zendsvr/htdocs/emailme.php')
        **************** End of data ********************************************
```

Now call your CL

```
                                                             Bottom
Type command, press Enter.
===> call alan/callphp
```

I received the message

Inbox for alan@alanseiden.com - Thunderbird

| Sent from CL | sender@example.org | 4:42 PM |

Subject: **Sent from CL**
From: sender@example.org
Date: 4:42 PM
To: alan@alanseiden.com

CL can call PHP scripts.

How to automate it?

- **Add a job schedule entry (ADDJOBSCDE) for your CL program**

- **The CL will act like a normal CL program, which it is!**

- **(In the UNIX world they call this a "CRON JOB.")**

- ```
  ADDJOBSCDE JOB(SNDPRICES) SCDDATE(*NONE)
  CMD(CALL PGM(MYLIB/PRICEPGM))
  SCDDAY(*FRI) SCDTIME('23:00')
  FRQ(*WEEKLY) RCYACN(*NOSBM)
  JOBD(MYLIB/PRICEJOBD)
  ```

Receive params in PHP

Command-line arguments in PHP

- **When we use PHP in a website, we receive parameters using the $_GET and $_POST arrays**

- **How do we get parameters/arguments when PHP is called from the command line or a CL?**

Two special variables

- **$argv: array of arguments**
  - $argv[0] is always the PHP script name itself, e.g. helloworld.php
  - $argv[1], $argv[2], and so on are the actual arguments

- **$argc: count (how many) of arguments**
    - Use it to check that you've received what you expected

Demonstrate argc and argv to get CLI params

```php
<?php

// args.php
// remember, [0] is the script itself.

echo "\n"; // blank line

// check argument count
if ($argc > 0) {
    echo $argc . " argument(s) received, including the script name
    itself.\n\n";

    foreach ($argv as $num=>$val) {
        echo "arg $num: $val\n";
    }

} else {
    echo "We should have had at least one argument: the script name
    itself.";
}

// usage: /usr/local/zendsvr/bin/php-cli /batchphp/args.php firstarg
    secondarg
?>
```

Pass parameters into CL, into PHP

```
PGM            PARM(&FIRST &SECOND)
DCL            VAR(&FIRST) TYPE(*CHAR) LEN(25)
DCL            VAR(&SECOND) TYPE(*CHAR) LEN(25)

/* Call PHP with command line arguments */
CALL           PGM(QP2SHELL) +
               PARM('/USR/LOCAL/ZENDSVR/BIN/PHP-CLI' +
                    '/BATCHPHP/ARGS.PHP' +
                    &FIRST &SECOND)

ENDPGM
```

Then…
```
CALL PHPPARAMS PARM('param1'  'param2)
```

What else can you do?

- **Generate and email Excel spreadsheets or HTML-formatted emails**

- **Access web services (see my talk tomorrow!)**

- **Create PDF files with dynamic text and graphics**

- **Manipulate IFS stream files**

Excel spreadsheets: simple or formatted

	A	B
1	firstname	lastname
2	Joe	Smith
3	Andi	Gutmans
4		

	A	B	C	D	E	F
1	**Houlihan's price list**				***October	
2			Order			
3	**Description**	**Code**	**Cases**	**Btls**	**Size**	**Pk**
4						
5	**WHISKEY**					
6	BEAM 8 STAR	0102030			LITER	12
7	BELLOWS CLUB BOURBON	0204030			LITER	12
8	BUSHMILLS IRISH	0393030			LITER	12
9	CANADIAN CLUB 6YR	0360030			LITER	12
10	CROWN ROYAL	0387030			LITER	12
11	JACK DAN #7	0226030			LITER	12
12	JAMESON REG 80	0448930			LITER	12
13	JIM BEAM BOURBON	0260030			LITER	12
14	JIM BEAM RED STAG	0200030			LITER	12
15	KNOB CREEK BBN 6PK	0242030			LITER	6
16	MAKERS MARK	0261030			LITER	12
17	SEAG WH VO	0388030			LITER	12
18	SEAG WH 7 CROWN	0183030			LITER	12
19	W.TURKEY 101	0331630			LITER	12
20	W.TURKEY 80	0331530			LITER	12
21						
22	**COGNAC/BRANDY/GRAPPA**					
23	COURVOISIER VSOP	1234230			LITER	12
24	HENNESSY V.S.	1225030			LITER	12

How to generate spreadsheets

- **Simple CSV spreadsheet: Output (echo) comma-delimited data**
  - Note: change curly quotes to straight quotes in your code

```php
<?php
header('Expires: 0');
header('Cache-control: private');
header('Content-Description: File Transfer');
header('Content-Type: application/vnd.ms-excel');
header('Content-disposition: attachment; filename="file_name.csv"');
// commas to separate. \n for new line
echo "firstname,lastname\nMike,Pavlak\nAndi,Gutmans";
?>
```

	A	B
1	firstname	lastname
2	Joe	Smith
3	Andi	Gutmans

- **True Excel file with formatting**
  - http://pear.php.net/package/Spreadsheet_Excel_Writer
  - http://phpexcel.net (for newer format, 2007+)
  - These free packages allow complex styling, nonscrolling headers, lots more

	A	B	C	D
1	Houlihan's price list			
2				Order
3	Description	Code	Cases	Btls
4				
5	WHISKEY			
6	BEAM 8 STAR	0102030		
7	BELLOWS CLUB BOURBON	0204030		

Generate and send HTML email

From:	Alan Seiden/strategic
Recipients:	Houlihan's Hasbrouck Hts <andyladrum@aol.com>, Kevin Donahue <kevin.donahue@alliedbeve <kjlrs1@optonline.net>, <lisa.kligge@alliedbeverage.com>,<jparrott@optonline.net>,<japarrott@gmail.com>,<paulprucko ,<shawn.kelly@alliedbeverage.com>
Subject:	Order from Houlihan's
Date:	02:25:13 PM Yesterday

An order from Houlihan's
Allied customer 34838, Houlihan's Hasbrouck Hts, HASBROUCK HTS NJ

Thank you for ordering from Allied Beverage!
Please print for your records.

Order reference number
Message for your rep
Order date
Web confirmation no.

WHISKEY

Sending authenticated HTML mail

```php
require_once '/usr/local/Zend/ZendFramework/library/Zend/Mail.php';
require_once '/usr/local/Zend/ZendFramework/library/Zend/Mail/Transport/Smtp.php';
$mail = new Zend_Mail_Transport_Smtp('mail.myhost.com',
                                     array('auth' => 'login',
                                           'username' => 'myuser',
                                           'password' => 'mypass'));

Zend_Mail::setDefaultTransport($mail);

$mail = new Zend_Mail();

$mail->setFrom($mailFrom, $mailFromName);

$mailBody = '<HTML><table><tr><td>Alert 1: hot tea at buffet<td><tr><tr><td>Alert 2:
   decaf available<td><tr></table></HTML>';

// add addresses
foreach ($custEmails as $custEmail) {
    $mail->addTo(trim($custEmail['email']), trim($custEmail['name']));
} //(foreach ($custEmails as $custEmail) )

$mail->AddTo('alan@alanseiden.com', 'Alan Seiden');
$mail->AddCc('president@common.org', 'Mr. President');

$mail->setSubject("Alert of vital importance";
$mail->setBodyHTML($mailBody);

$mail->send();
```

Generate a PDF from text provided

```php
<?php
// for documentation on Zend_Pdf: http://files.zend.com/help/Zend-
    Framework/zend.pdf.drawing.html
require_once("Zend/Pdf.php");

$textToShow = $argv[1]; // assume argument is present

// Create new PDF
$pdf = new Zend_Pdf();

// Add new page to the document
$page = $pdf->newPage(Zend_Pdf_Page::SIZE_A4);
$pdf->pages[] = $page;

// Set font
$page->setFont(Zend_Pdf_Font::fontWithName(Zend_Pdf_Font::FONT_HELVETICA), 40);

// Draw text
$page->drawText($textToShow, 100, 510);
$this->_helper->layout()->disableLayout();
$this->_helper->viewRenderer->setNoRender();
// plus I create an ellipse shape (code not shown here…see zend documentation,
    above, for how to do that)
$pdf->save('/alan/pdffromtext.pdf'); // now save to a file on IFS
?>
```

Run PDF generator

```
/usr/local/zendsvr/bin/php-cli
   /batchphp/pdffromtext.php "Look, ma! I'm
   in a PDF!"
```

Tip: edit the last line in php-cli so that spaces can be included in params:

`/usr/local/zendsvr/bin/php-cli`

Change `$*` to `"$@"` in the last line

It is documented here:
   http://forums.zend.com/viewtopic.php?f=77&t=6218

Result

Look ma, I'm in a PDF!

Method #2: PHP Job Queue

Job Queue is part of Zend Server (non-CE)

- **A nice bonus when you buy the license**

- **More flexibile than the CL technique**

- From the sales literature: "Long-running report generation, order processing, database cleanup, and pulling of RSS feeds are some examples of jobs that can be executed asynchronously. Zend Server for IBM i incorporates a job queue to provide full support for creating, executing and managing jobs to optimize application performance and reduce server load, **minimizing application bottlenecks** and improving the end-user experience. "

Job Queue allows you to...

- **Move tasks into a separate execution queue**
  - Off-load to new process (or defer to a later time)
  - Off-load to a different server

- **Execute certain tasks at a specified time**
  - Distribute processing load to off-hours

- **Use complex parameters**

- **Do it from a PHP API**

Creating Jobs

- **Jobs are created using the *createHttpJob()* method**

```
$queue = new ZendJobQueue();
$queue->createHttpJob(http://backend.local/jobs/somejob.php');
```

- **Pass parameters**
  - Simple: via query string *$_GET*
  - Complex: as an associative array of key => value pairs

- **Set job options**
  - Name, priority, schedule, etc.
  - Create deferred or recurring jobs

- **Launch right from PHP or use the Zend Server UI**

More about Zend Job Queue

Full specs: http://files.zend.com/help/Zend-Server/jobqueue-global-api.html
Tutorial: http://files.zend.com/help/Zend-Server/working_with_jobs.htm

API signature for createHttpJob:

```
int ZendJobQueue::createHttpJob (
      string $url,
      array $vars,
      mixed $options)
```

Example with nested array variables:
$queue = new ZendJobQueue();
$queue->createHttpJob(
  'http://yourIBMi.com/send_alert.php',
  array('from'=> 'alan@alanseiden.com',
        'to'=>array('someone@example.com',
                'another@example.com')),
  array('persistent'=>false));

Job Queue Management

View job status and manage execution

Other Job Capabilities

- **Managing priorities**
- **Job dependencies**
- **Querying for jobs**
- **Checking job status and queue statistics**
- **Suspending and resuming recurring jobs & queues**
- **Passing custom HTTP headers**
- **Handling failures and controlling retries**

Other ideas

Other ways to use batch PHP

- **Web services to synchronize data**
  - Call from interactive RPG
  - OR schedule for nighttime

- **Use Zend Framework's "livedocx" service to merge data with .doc templates/overlays to create MS Word .docx files**

- **Authenticate users with an Active Directory server**

Now it's your turn

Share what you've been working on

- **Or brainstorm some ideas**

Thanks! Stay in touch

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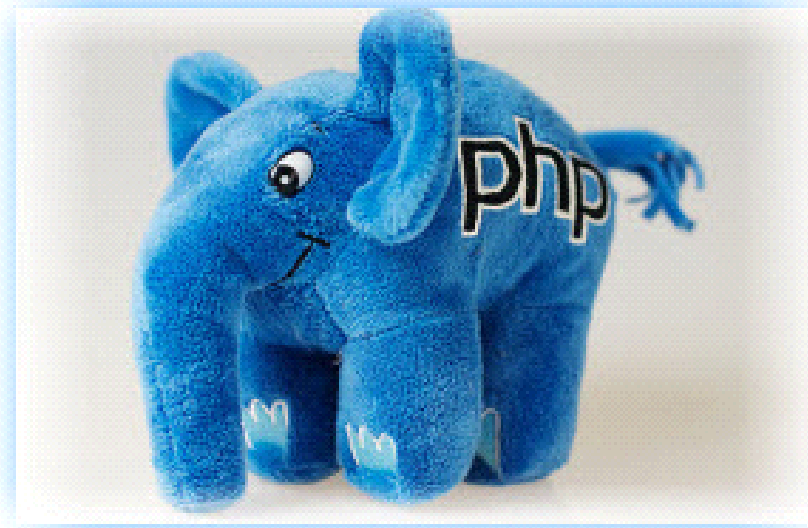
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Or write "PHP tips" on a business card today