



Practical PHP

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Today's Speaker



Erwin Earley

Senior Solutions Consultant,
Zend by Perforce

Erwin Earley offers more than 20 years of experience developing solutions on the IBM i platform. His expertise includes using PHP, MariaDB, Docker, and Chef for creating modern enterprise solutions that run on IBM i, as well as PowerVC for cloud deployments and virtualization management.

Mr. Earley is a frequent speaker at global technology conferences, and he has authored numerous articles on Linux, PHP, virtualization, and systems management.

Agenda

- 1 Product Update
- 2 Community PHP
- 3 Zero to Zend – One and Done
- 4 Practical PHP
- 5 PHP 7.4 Highlights
- 6 PHP 8

Product Updates

Where We've Been – Adoption of PHP on IBM i

- IBM & Zend meet...
 - SystemiNetwork, COMMON, etc., identify need for scripting on IBM i
 - Zend CEO and VP of Business Development come to COMMON
- IBM & Zend Dance
 - IBM and Zend strike a BP-relationship in 2006
 - IBM helps Zend port PHP to IBM i
- Seeding the Marketplace
 - IBM provides 1 year of "silver" support to every IBM i customer via Zend Basic License
 - Zend Basic intended for POCs, not production implementations

Where We Are



- PHP is a strategic platform/solution in many IBM i shops
 - Estimated 50% of IBM i customers have implemented PHP
 - PHP is heavily used in customer developed solutions, LAMP-based solutions, and ISV-provided solutions
- PHP supports three (3) approaches to modernization
 - Augmentation of existing solutions
 - Development of new solutions
 - Implementation of enterprise-ready productivity solutions

Where we are Going

- IBM has announced End-of-Life (EOL) for their offering of one (1) year of free "silver" support
 - EOL takes affect 30-June-2020
 - New customers (customers who have not previously registered for their one (1) year of free "silver" support will be able to continue to register past 30-June-3030; however, all free "silver" support ends on 30-June-2021)
- In conjunction with IBM's announcement, Zend by Perforce has announced the end of Zend Server Basic licensing
 - Dates coincide with IBM's "silver" support dates
- Does this mean that Zend Server is going away
 - Absolutely not!!
 - Zend Server will continue to be offered with the Professional and Enterprise licenses and will continue to be developed and supported for the IBM i platform.

Zend by Perforce Offerings

PHP Solutions for IBM i from Zend by Perforce

- Zend Server for IBM i
 - Full PHP Stack
 - Enterprise-class Application Server
 - Three license levels (Basic, Professional, Enterprise)
 - Basic – available to "new" IBMi customers, includes 1 year of "silver" support
 - Professional – subscription basis, 9x5 support
 - Enterprise – subscription basis, 24x7 support
- Zend Server Developer Edition
 - Reduced-cost includes Z-Ray & other development tools
- ZendPHP¹
 - Supported, Full PHP Stack, without Zend Server
 - Two license levels Professional, Enterprise
 - Professional – subscription basis, 9x5 support
 - Enterprise – subscription basis, 24x7 support
- ZendPHP Community
 - Sourced from community PHP
 - Support via community channels or IBM TSS
- ZendDBi
 - MariaDB build for IBM i
 - Db2 Storage Engine enables data storage in Db2 for open-source applications

¹Not currently available for IBM i

	Zend Server	ZendPHP ¹	ZendPHP Community
Bug Fixes	5 years past initial release		2 years past release
Security Patch	5 years past initial release		3 years past release
ibm_db2	Bundled		Manual build
pdo_ibm	Bundled		Separate install
ODBC	Bundled ²		Separate install
MySQL	Bundled		Separate install
Extensions	80+ Bundled		Separate installs
Monitoring	Yes	No	No
Application Management	Yes	No	No
Dynamic Profiling	Z-Ray	No	No
Debugging	Xdebug & Zend Debugger		Xdebug, phpdbg (CLI)

¹Not currently available for IBM i

²Enabled when 64bit Zend Server released

Community PHP

Community PHP for IBM i is Here

- The PHP engine that is built and maintained by the Open Source community is now available for IBM i
 - NOTE: Community PHP for IBM i is maintained by the Zend by Perforce team as part of the PHP community
- Why?
 - This has been the subject of RFEs to IBM
 - Provides choice to IBM i customers
 - Not seen as a replacement for Zend Server but more as an alternative for those that want to "kick the tires" of PHP
- Isn't the PHP that's delivered with Zend Server "community" PHP
 - In a sense yes; however, the PHP that is delivered with Zend Server has been tested/certified and includes 80+ extensions that are installed/configured "out-of-the-box"

Community PHP

Two delivery options for PHP are available:

Community OSS PHP (RPM)

- Installed with 'yum' package manager
 - Repository:
<http://repos.zend.com/ibmiphp>
- Purchasable IBM TSS Support (<http://ibm.biz/ibmi-oss-support>)
- Grow your own stack

Zend Server

- Installed as a Licensed Program Product (LPP)
- Purchasable support from Zend
 - Defect and security patches past community EOL
- Includes extra features to aid deployment, performance, monitoring, etc.
- Complete web development stack

Integrated Installation vs. Grow Your Own

Community OSS PHP (RPM)



Steps could include:

- Install PHP
- Configure PHP
- Create Apache instance
 - Configure FastCGI
 - Configure docroot
 - Configure Virtual Hosts
 - Build/Install ibm_db2
- Install iToolkit
- Install Libraries
- Install PHP Language Extensions

Zend Server



Ready to start developing /
implementing solutions



Database Connectivity

	Description	Zend Server	Community PHP
ibm_db2	Procedural Db2 calls	Provided	DIY
ODBC	Open Database Connectivity Client	Provided (details later)	DIY, recommended by IBM
pdo_ibm	Data Abstraction layer	Provided	DIY

- `ibm_db2` is the driver for Db2 that has been available since the initial roll-out of PHP on the platform.
 - This driver is leveraged by countless customer-developed as well as ISV-provided applications on the platform.
- Open Database Connectivity (ODBC) is an open standard Application Programming Interface (API) for accessing a database.
 - IBM embracing ODBC is the standard for accessing Db2 from open source programming languages
- `pdo_ibm` is a data abstraction layer that works with an underlying database driver such that PHP programs, from a data access perspective, start to become database agnostic.

Zero to PHP – One and Done
The Zend Server Approach

PHP – The Zend Server Way



A key feature of Zend Server is ease of installation



When Zend Server is installed the following is accomplished:

Required User-Profiles are Created

A Zend Server Library is created

A subsystem is created for Zend Server

Directory structure needed by Zend Server is created

Product is installed – both Application Server and PHP

80+ Extensions are installed and configured

Apache Web Server integration is configured (Apache instances added to Zend Server subsystem)

One Command – 3 <ENTER> keys

RSTLICPGM LICPGM(7PHPZND) DEV(*SAVF) SAVF(qgpl/zendphp7)

```

Rogue Wave Software, Inc - Welcome
Please read the documentation and Trial License Agreement.
You are about to install Zend Server product.
This installation procedure will create
o ZENDADMIN, NOGROUP, and ZS5250DEMO User Profiles
o ZENDPHP7 Zend Server Library
o zendphp7 directory will be placed under /usr/local
o Auto start jobs in ZENDPHP7 subsystem

Date: 9/10/20      Zend Server Installation      System: I74SALES
Time: 15:36:30

F3=Exit  Enter=Accept
© 2019 Rogue Wave Software, Inc.

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Zend
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SOFTWARE. THE SOFTWARE IS FURTHER DEFINED IN AN ORDER DOCUMENT (AN
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More...

Thank you for installing Zend Server
In order to start the Zend Server use http://your\_i\_server:10081
In order to run a PHP script use http://your\_i\_server:10080/your\_PHP\_script
Note: Press Enter to start ZENDPHP7 subsystem and finish installation
In order to manage Zend Server services use STRZS7 command or
GO ZENDPHP7/ZSMENU

Enter=Accept
© 2019 Rogue Wave Software, Inc.
```

Does PHP work after install? The proof is in the scripts!!

- Place following script in the configured document root (/www/ZendPHP7/htdocs):

```
<?php
    echo "Hello world - Zend Server is sure easy to install!!";
```

- Point a web browser at the IP address (network name) of your IBM i with virtual host 10080 (configured in Apache by the Zend Installer) followed by the name of the script just created:

```
http://<IBM i>:10080/hello.php
```

Output generated in web browser



Hello World - Zend Server is sure easy to install!!

Cool!! You are now ready to develop your own PHP scripts – but wait, there is so much more!!

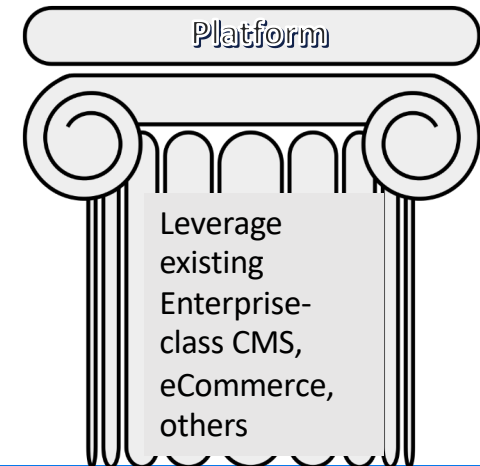
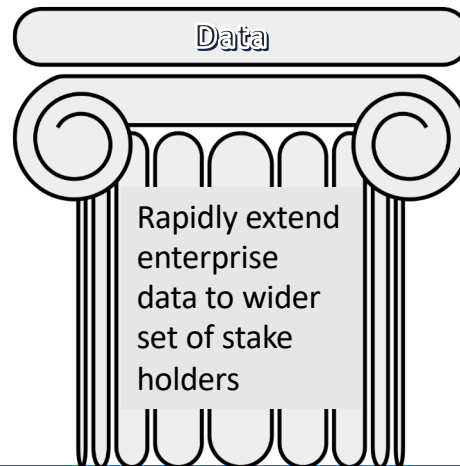
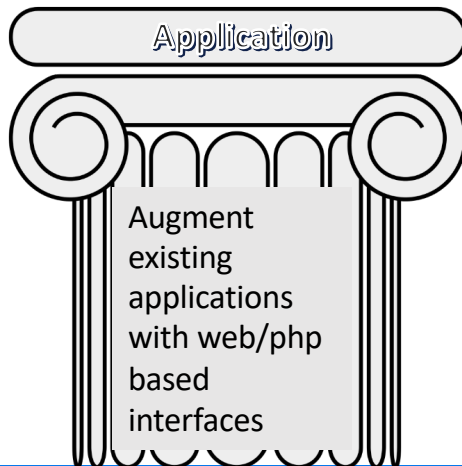
Practical PHP

What can be Done with PHP Productivity Solutions

- Grow Your Own
 - Non IBM i Specific
 - SQL-based
 - ILE Integration
- Ready Made
 - LAMP
 - CRUD

The PHP Ecosystem on IBM i

- PHP on IBM i continues to be a driving force in web deployments
 - >80% of web sites use PHP for dynamic content
- PHP provides an ease of entry in both development and deployment
- PHP provides excellent performance and scalability
 - And this improved significantly with v7 of the language
- Complete Open Source Deployment Stack (IBM i, Apache, PHP, MariaDB)
 - Enterprise-class Open Source Applications such as WordPress, Joomla, and ZenCart deployable on IBM i without change



PHP – The Zend Server Way - Revisited



A key feature of Zend Server is ease of installation

Did I mention that the driver for SQL access to Db2 (ibm_db2) as well as the toolkit for ILE Integration (iToolkit) is also automatically setup!!



When Zend Server is installed the following is accomplished:

Required User-Profiles are Created

A Zend Server Library is created

A subsystem is created for Zend Server

Directory structure needed by Zend Server is created

Product is installed – both Application Server and PHP

80+ Extensions are installed and configured

Apache Web Server integration is configured (Apache instances added to Zend Server subsystem)

Think access to Db2 is going to be difficult? Think again!!

- Place the following script in the Document Root directory:

```
<?php
    $conn = db2_connect('*LOCAL', '', '');
    $result = db2_exec($conn, "SELECT * FROM zendphp7.sp_cust");
    $firstRow = db2_fetch_assoc($result);
    echo "<pre>" . print_r($firstRow, true) . "</pre>";
```

- Execute the script

<http://<IBM i>:10080/dbtest.php>

Drumroll please 

```
Array
(
    [CUST_ID] => 1221
    [COMPANY] => Kauai Dive Shoppe
    [FIRSTNAME] => LINA
    [LASTNAME] => Norman
    [CIVIL] => 2
    [ADDRESS] => 4-976 Sugarloaf Hwy
    [ADDR2] => Suite 103
    [CITY] => Kapaa Kauai
    [STATE] => HI
    [ZIP] => 94766-1234
    [COUNTRY] => US
    [PHONE] => 808-555-0269
    [FAX] => 808-555-0278
)
```

No intervening steps
between Zend Server
installation and
running of this script!

Wouldn't it be nice to truly "Integrate" PHP with IBM i – wait for it...

- Place the following script in the document root directory:

```
<?php
require_once zend_deployment_library_path('PHP Toolkit for IBMI i') .
    '/ToolkitService.php';

$obj = ToolkitService::getInstance();

$rows = $obj->CLInteractiveCommand('DSPLIBL');
echo '<pre>' . print_r($rows, true) . '</pre>';
$obj->disconnect();
```

- Execute the script:

```
http:<<IBM i>:10080/ilettest.php
```

Again, no intervening steps
between Zend Server installation
and running of this script!

```
Array
(
    [0] => 5770SS1 V7R4M0 190621 Library List
    [1] =>
    [2] => Library Type Device Text Description
    [3] => QSYS SYS ASP System Library
    [4] => QSYS2 SYS System Library for CPI's
    [5] => QHLPSYS SYS
    [6] => QUSRSYS SYS System Library for Users
    [7] => QGPL USR General Purpose Library
    [8] => QTEMP USR
    [9] => * * * * * E N D O F L I S T I N G * * * * *
```

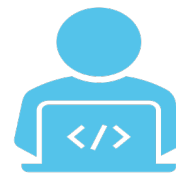

PHP – The Zend Server Way – Revisited 1 More Time!



A key feature of Zend Server is ease of installation

Did I mention that the driver for SQL access to Db2 (ibm_db2) as well as the toolkit for ILE Integration (iToolkit) is also automatically setup!!

The Open Source Database (MariaDB) is also delivered (although not installed by default) for those who want to implement LAMP-based productivity solutions!!



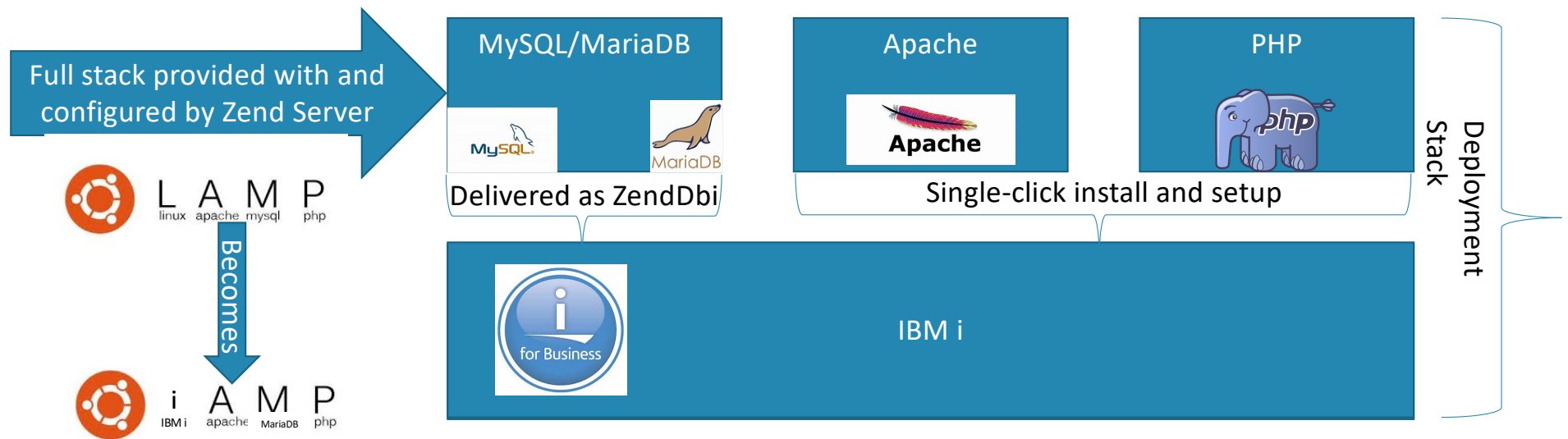
When Zend Server is installed the following is accomplished:

- Required User-Profiles are Created
- A Zend Server Library is created
- A subsystem is created for Zend Server
- Directory structure needed by Zend Server is created
- Product is installed – both Application Server and PHP
- 80+ Extensions are installed and configured
- Apache Web Server integration is configured (Apache instances added to Zend Server subsystem)

Is installing MariaDB difficult? Nope!

- **Step 1:** Use Zend Server's management menu (GO ZENDPHP7/ZSMENU) to set the desired open source database (MySQL or MariaDB)
- **Step 2:** Use Zend Server's management menu (GO ZENDPHP7/ZSMENU) ZendDBi submenu to install MariaDB
 - This will perform a RSTLICPGM for the ZendDBi Licensed Program

Myth: Cutting-edge LAMP applications don't run on IBM i



General Process for Installing Open Community Web Applications

- **Step 1:** Download the application to your PC
- **Step 2:** Copy the tar file (resulting from previous step) into the IFS (normally into the `/www/zendphp7/htdocs` directory)
- **Step 3:** Enter the PASE environment
ssh into IBM i
- **Step 4:** Navigate to the directory where the uploaded file resides

General Process for Installing Open Community Web Applications

- **Step 5:** Determine if a subdirectory needs to be created

```
tar tvf application.zip
```

- **Step 5a:** if a subdirectory is needed:

```
mkdir /<docroot>/<appl>
```

```
cd /<docroot>/<appl>
```

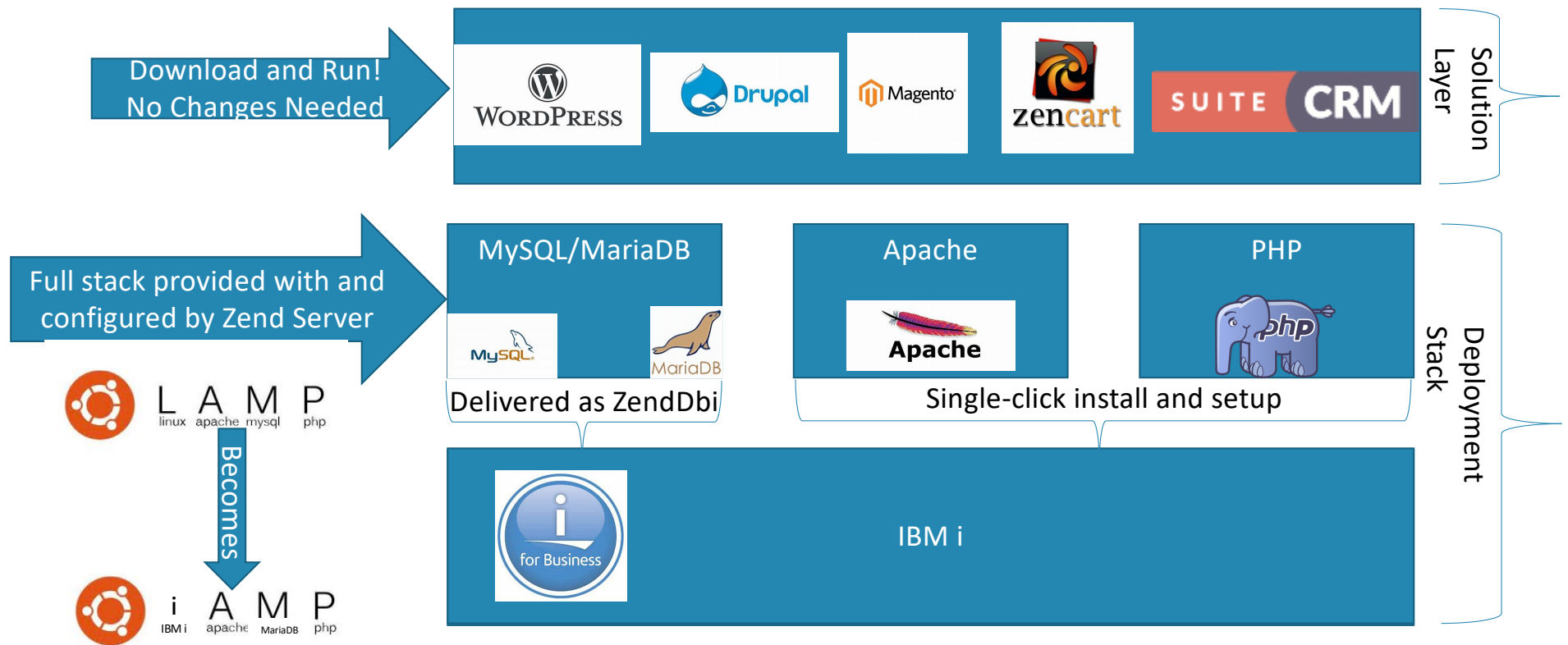
- **Step 6:** Expand the archive file:

```
tar xvf application.tar
```

- **Step 7:** Point a web-browser to the application setup/configuration program:

```
http://IBMi:10080/<appl>
```

Myth: Cutting-edge LAMP applications don't run on IBM i



Other Ways to Exploit/Extend your Data → Datagrid Utilities

- If you don't want to write your CRUD type of applications from scratch you might want to check out the following:

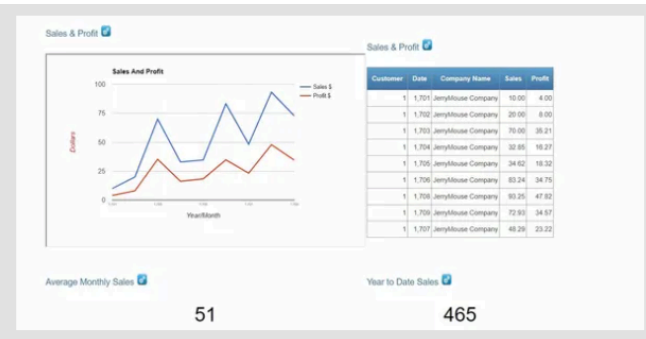


CUST_ID	COMPANY	FIRSTNAME	LASTNAME	CIVIL	ADDRESS	ADDR2	CITY	STATE	ZIP	COUNTRY	PHONE	FAX
1221	Kaui Dive Shoppe	LINA	Norman	2	4-976 Sugarloaf Hwy	Suite 103	Kapa Kaaui	HI	94766-12	US	808-555-0265	808-555-0278
1331	Unico	George	Weathers	1	PO Box Z-547		Freeport			Bahamas	809-555-3915	809-555-4958
1351	Sight Diver	Phyllis	Spooner	1	1 Neptune Lane		Kato Paphos			Cyprus	357-6-876708	357-6-870943
1354	Cayman Divers World Unlimited	Joe	Bailey	1	PO Box 541		Grand Cayman			British West Indie	011-5-697044	011-5-697064
1356	Tom Sewer Diving Centre	Chris	Thomas	1	632-1 Third Frydenhoj		Christiansted	St. Croix	00820	US Virgin Islands	504-798-3022	504-798-7772
1380	Blue Jack Aqua Center	Ernest	Barratt	1	23-788 Paddington Lane	Suite 310	Waipahu	HI	99776	US	401-609-7623	401-609-9403
1384	VIP Divers Club	Russell	Christopher	1	32 Main St.		Christiansted	St. Croix	02800	US Virgin Islands	809-453-5762	809-453-5932
1510	Ocean Paradise	Paul	Gardner	1	PO Box 8745		Kauiua-Kona	HI	94756	US	808-555-8231	808-555-8450
1513	Fantastique Aquatica	Susan	Wong	2	232 999 #12A-77 A.A.		Bogota			Columbia	057-1-773454	057-1-773421
1551	Marmot Divers Club	Joyce	Marsh	2	872 Queen St.		Kitchener	Ontario	G3N 2E1	Canada	416-698-0399	426-698-0399

ScoreStory

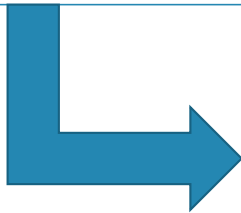
```

Position to line ..... Shift to column
Line .....1.....2.....3.....4.....5.....6.....7.....
Customer # Year/Month Customer Sales Pro
Name Month 1 Mon
000001 1 1.701 JerryMouse Comp 10.00
000002 1 1.702 JerryMouse Comp 20.00
000003 1 1.703 JerryMouse Comp 70.00 3
000004 1 1.704 JerryMouse Comp 32.85 1
000005 1 1.705 JerryMouse Comp 34.62 1
000006 1 1.706 JerryMouse Comp 83.24 3
000007 1 1.708 JerryMouse Comp 93.25 4
000008 1 1.709 JerryMouse Comp 72.93 3
000009 1 1.707 JerryMouse Comp 48.29 2
***** End of report *****
    
```



phpGrid Example

```
<!DOCTYPE html>
<?php
use phpgrid\C_DataGrid;
require_once("phpGrid/conf.php");
$dg = new C_DataGrid("SELECT * FROM SP_CUST", "CUST_ID", "SP_CUST");
$dg -> display();
?>
```

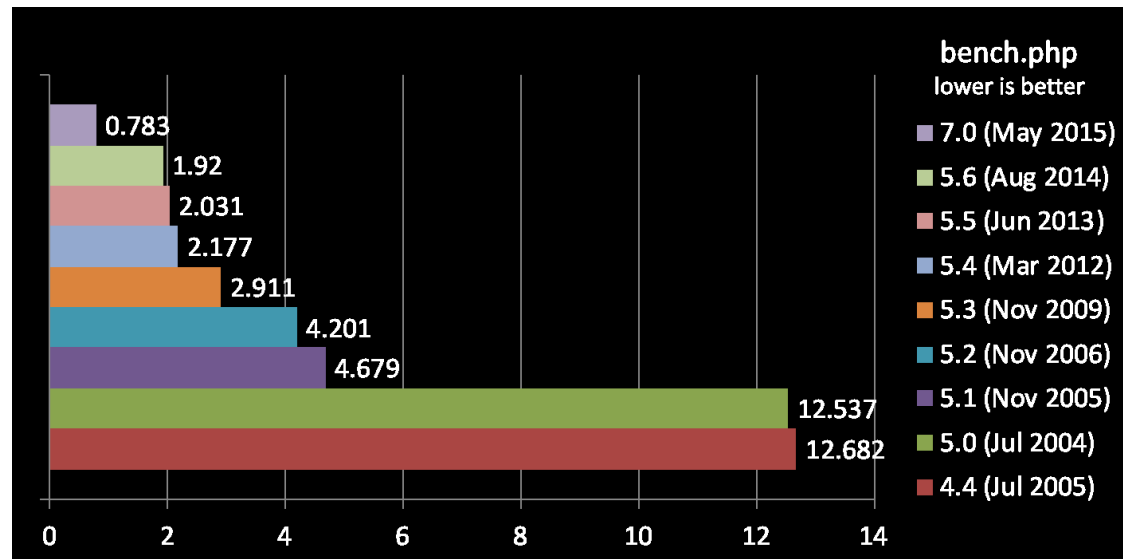


SP_CUST												
CUST_ID	COMPANY	FIRSTNAME	LASTNAME	CIVIL	ADDRESS	ADDR2	CITY	STATE	ZIP	COUNTRY	PHONE	FAX
1221	Kauai Dive Shoppe	LINA	Norman	2	4-976 Sugarloaf Hwy	Suite 103	Kapaa Kauai	HI	94766-123	US	808-555-0269	808-555-0278
1231	Unisco	George	Weathers	1	PO Box Z-547		Freeport			Bahamas	809-555-3915	809-555-4958
1351	Sight Diver	Phyllis	Spooner	1	1 Neptune Lane		Kato Paphos			Cyprus	357-6-876708	357-6-870943
1354	Cayman Divers World Unlimite	Joe	Bailey	1	PO Box 541		Grand Cayman			British West Indie	011-5-697044	011-5-697064
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1380	Blue Jack Aqua Center	Ernest	Barratt	1	23-738 Paddington Lane	Suite 310	Waipahu	HI	99776	US	401-609-7623	401-609-9403
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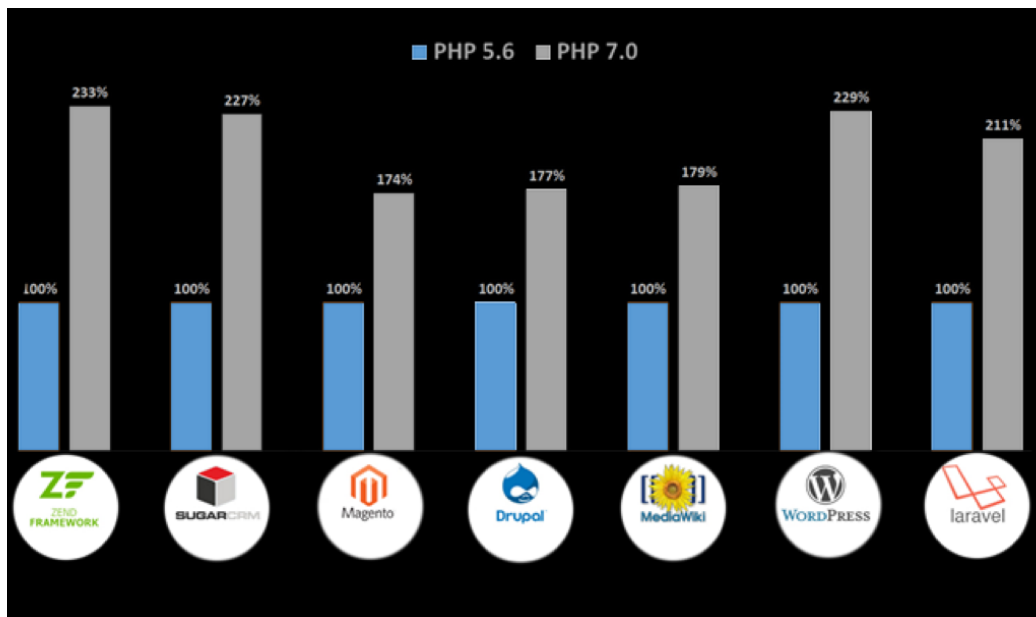
Updates

Significant Performance Gains

- Performance gains a goal of every release!
- Optimizations to the Zend Engine significantly enhances performance
- Performance gains ranging from 20-70% have been seen in real-world applications
 - No application code changes required!
 - Point releases within 7.x see 5-10% performance improvements as well

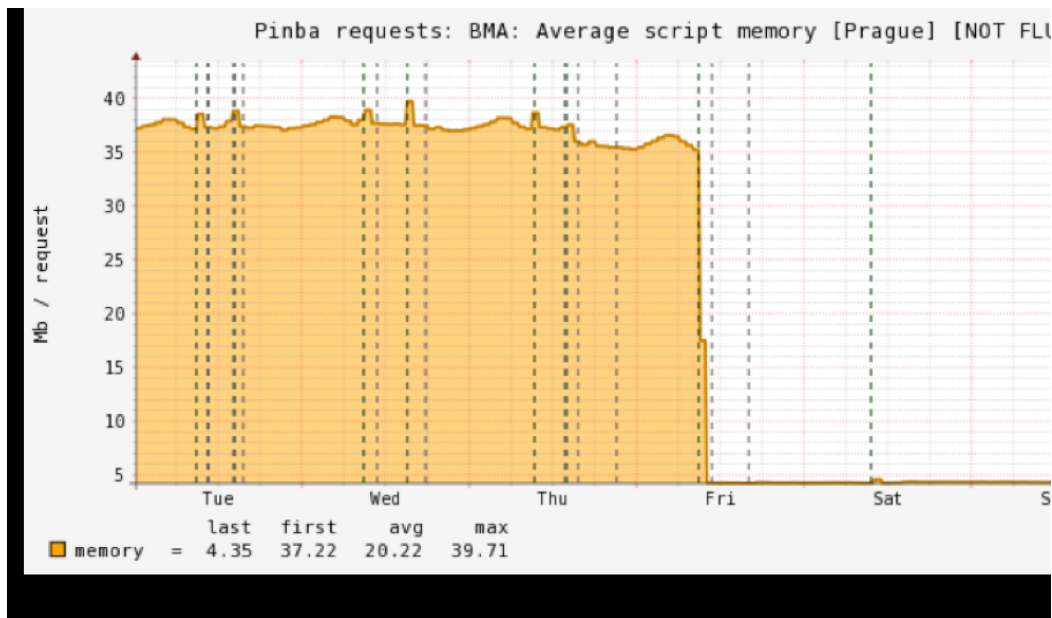


Real Applications Enjoy Increased Performance



These benchmarks show a roughly 2x performance gain between PHP 7.0 and PHP 5.6 using real-world application performance.

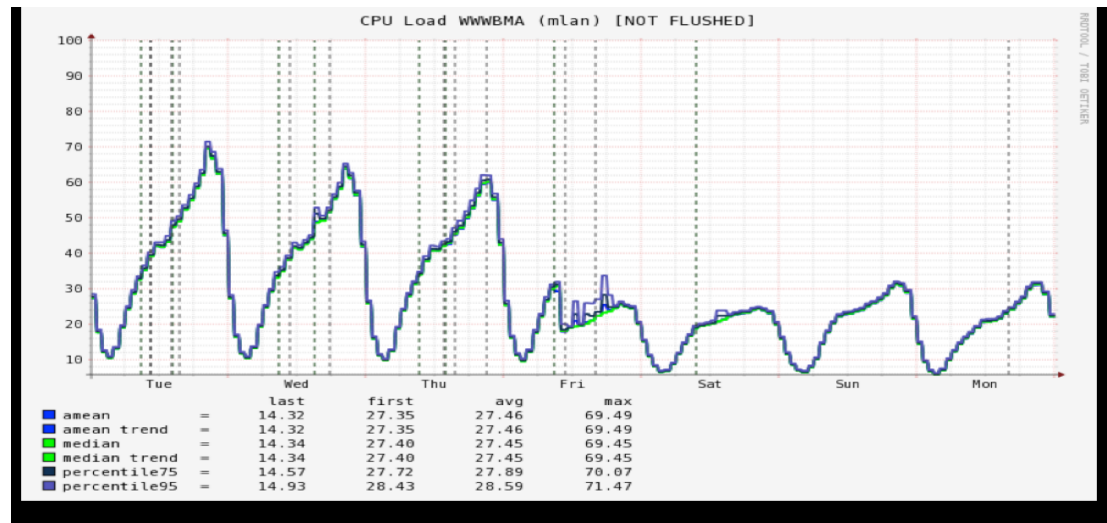
Reduced Memory Footprint



Badoo estimates \$1m+ and \$100K/yr savings on their Application Server in part due to the memory footprint gains with version 7 of PHP

Zend Engine has improved performance with reduced memory footprint!

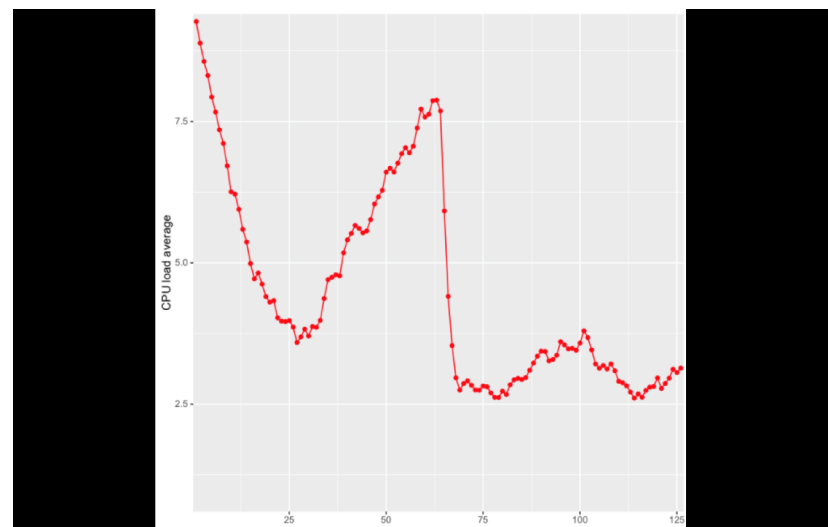
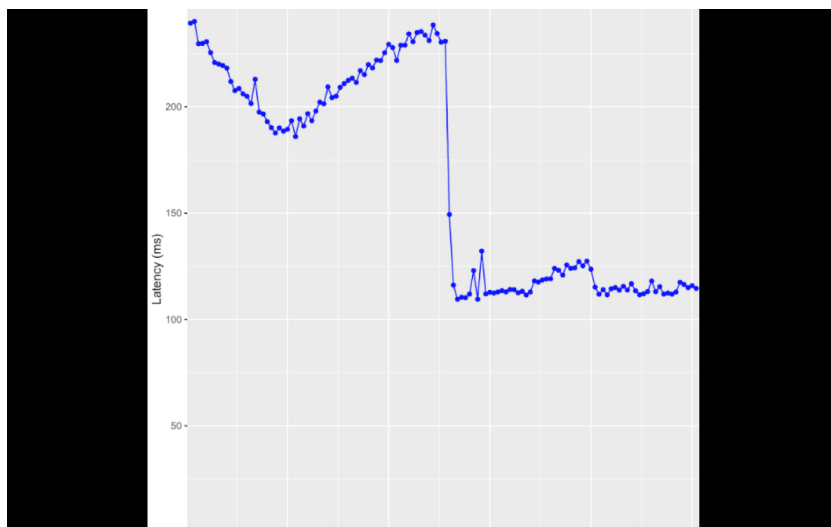
Reduced CPU Load



Reduced CPU load achieved from further optimizations in the Zend Engine

Twice the Performance w/Half the CPU

Tumblr indicates that their servers are serving pages twice as fast and that they are doing it with half the amount of CPU resources.

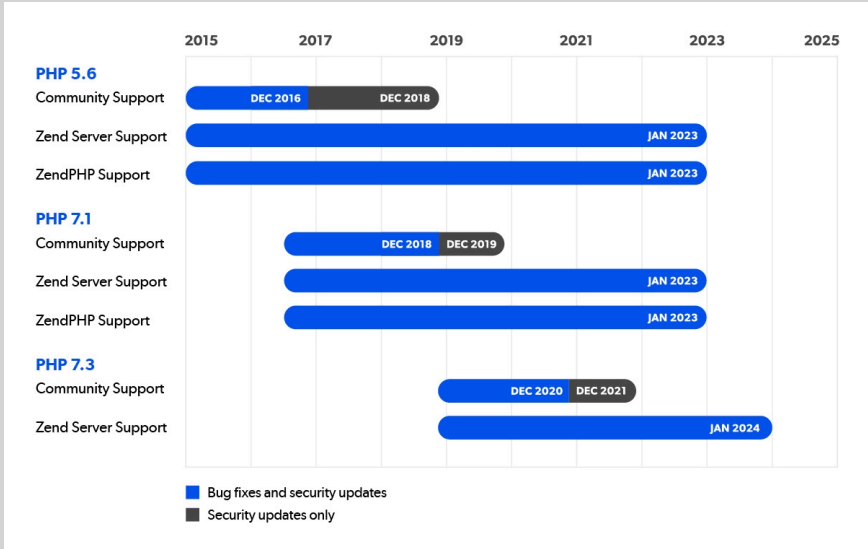


Long Term Support (LTS)

Running a version of PHP earlier than 5.6 may put your site at risk:

- ✓ Bugs/defects
- ✓ Breaks
- ✓ Security vulnerabilities

- Community PHP
 - Support typically ends three (3) years after release
 - No bug fixes
 - No security patches!
- Zend Server's PHP
 - Support at least five (5) years after release
 - PHP applications remain secure



Why Long-Term Support Matters

- Upwards of 77% of sites are running versions of PHP no longer supported by the community
- Of that 77%, upwards of 66% would continue to be supported via Zend Server's PHP
 - Covers versions 5.6, 7.0, and 7.1 which are no longer community supported

These numbers are based on packagist/composer pulls.

Percentage of IBMi customers on versions of PHP not supported by community is likely higher.

5.2	0.68% (-0.06)	
5.3	8.87% (-0.75)	■
5.4	8.97% (-1.51)	■
5.5	7.78% (-1.52)	■
5.6	12.64% (-1.57)	■
7.0	16.79% (-1.09)	■
7.1	22.24% (-1.71)	■
7.2	16.56% (+4.76)	■
7.3	3.06% (+1.27)	■
7.4	2.4% (+2.17)	■

<https://blog.packagist.com/php-versions-stats-2020-1-edition/>

Highly-Useful Changes

- Type declarations for class properties
- Arrow functions shorthand syntax
- Covariance in return and argument types
- Array unpacking
- Scalar Type Declarations
- Return Type Declarations
- Void Return Type
- Null Coalescing and Null Coalescing Assignment Operators
- Numeric literal separator for readability
- Spaceship Operator `<=>`
- Array Constants
- Exceptions in the Engine
- Session Options
- Easy Userland CSPRNG (Cryptographically Secure Pseudo-Random Number Generator)
- Group Use Declarations
- Filtered `unserialize()`

Time doesn't permit going into detail on all of these – feel free to request the PHP7 Benefits of Upgrading deck.

PHP 7.4 Highlights

Released: 28 November 2019

Leverage Zend Server's multi-PHP support

Foreign Function Interface (FFI)

- Allows for loading of shared libraries (.DLL and .so), calling of C functions and accessing of C data structures in pure PHP.
- Implemented as a single class (FFI)

```
<?php
// create FFI object, loading libc and exporting function printf()
$ffi = FFI::cdef(
    "int printf(const char *format, ...);", // this is a regular C declaration
    "libc.so.6");
// call C's printf()
$ffi->printf("Hello %s!\n", "world");
?>
```

Provided for ad-hoc interfacing with C functions and data structures. Does not render the classic PHP extension API obsolete..

output

Hello world!

<https://www.php.net/manual/en/book.ffi.php>

From the RFC: FFI allows calling C functions and using C data types from pure scripting language and therefore develop "system code" more productively. For PHP, FFI opens a way to write PHP extensions and bindings to C libraries in pure PHP.

Array Spread Operator (aka Argument Unpacking)

- The spread operator (Argument Unpacking) introduced a syntax for unpacking arrays and traversables into argument lists
 - This is sometimes referred to as "splat operator", "scatter operator" or "spread operator"
- Compared to `array_merge()`
 - Spread operator should have better performance as the spread operator is a language construct while `array_merge()` is a function call.
 - `array_merge()` only supports arrays while spread operator also supports object implementing Traversable
- Version 7.4 of PHP adds this capability to array expressions
- The change does not introduce any backward compatibility issues.

```
$array1 = [1, 2, 3];  
$array2 = [4, 5];  
  
$result = [0, ...$array1, ...$array2, 6, 7];  
  
// [ 0, 1, 2, 3, 4, 5, 6, 7
```

Numeric Literal Separator

- PHP 7.4 allows the use of underscores to visually separate numeric values:

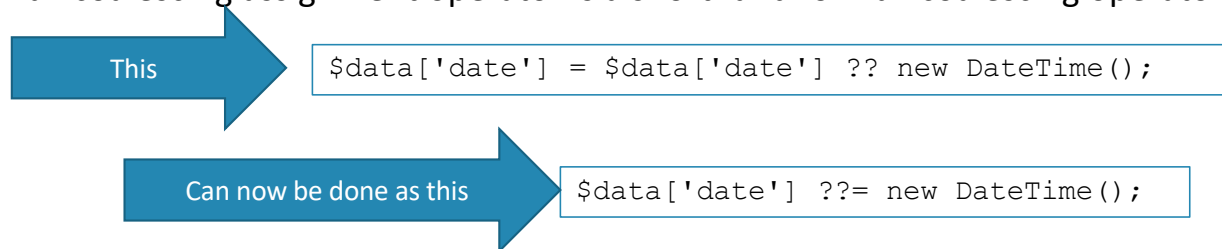
```
$unformattedNumber = 107925284.88;  
$formattedNumber = 107_925_284.88;
```

- The underscore between digits does not change its value.
 - The underscore(s) are stripped out during the lexing stage, so the runtime is not affected.

From the RFC: The human eye is not optimized for quickly parsing long sequences of digits. Thus, a lack of visual separators makes it take longer to read and debug code and can lead to unintended mistakes.

Null Coalescing Assignment Operator

- The null coalescing assignment operator is a shorthand for null coalescing operators:



Combining null coalescing with assignment

The null-coalescing operator `??` Returns the value of its left-hand operand if it isn't null, otherwise, it evaluates the right-hand operand and returns its result.

From the RFC: Combined assignment operators have been around since 1970's, appearing first in the C Programming Language. For example, `$x = $x + 3` can be shortened to `$x += 3`. With PHP being a web focused language, the `??` operator is often used to check something's existence like `$username = $_GET['user'] ?? 'nobody'`; However, because variable names are often much longer than `$username`, the use of `??` for self assignment creates repeated code, like `$this->request->data['comments']['user_id'] = $this->request->data['comments']['user_id'] ?? 'value'`; It is also intuitive to use combined assignment operator null coalesce checking for self assignment.

Despite `??` coalescing operator being a comparison operator, coalesce equal or `??=` operator is an assignment operator. If the left parameter is null, assigns the value of the right parameter to the left one. If the value is not null, nothing is made.

Preloading

- PHP can be configured to preload scripts into the opcode cache when the engine starts
- Any symbols (functions, classes, etc.) in those files will then become globally available for all requests without needing to be explicitly included.
- Preloading is a tradeoff between convenience/performance and baseline memory usage

The resulting performance improvement comes at a cost

If the source code of preloaded files are changed, the server must be restarted

<https://stitcher.io/blog/preloading-in-php-74>

Preloading Extends the Effectiveness of OPCache

OPCache

- PHP parses source code, compiles to platform-independent intermediate bytecode, which is then passed to Zend Engine for execution
- The built in OPCache caches the bytecodes for PHP files, so they don't have to be re"compiled" each time the file is used
- Least recently-used files get removed from the cache when it's full

Preloading takes OpCache further

- PHP files in memory on startup and have them permanently available for all subsequent requests
- On web server startup, a set of PHP files is loaded, parsed, and compiled
- Permanently-available for as long as the web server is running
- Without preloading non-opcached files are loaded on every request – especially costly with frameworks

Other Notable Updates

- Named Parameters → Passing arguments to a function based on the parameter name, rather than position.

```
// Using positional arguments:
```

```
array_fill(0, 100, 50);
```

```
// Using named arguments:
```

```
array_fill(start_index: 0, num: 100, value: 50);
```

- `str_starts_with()` → checks if a string begins with another string
- `str_ends_with()` → checks if a string ends with another string
- `str_contains()` → checks if a string is contained in another string and returns a Boolean value whether or not the string was found

Code Checkers and Fixers

- Command-line tools that make migration from PHP 5.x to 7.x easier
- Search code and generates reports containing file names, line numbers, and short problem descriptions
- PHPCompatibility
 - <https://github.com/PHPCompatibility/PHPCompatibility>
 - Compatibility "sniffs" for PHP Codesniffer
- Rector
 - <https://github.com/rectorphp/rector>
- Phan
 - <https://github.com/phan/phan>
- Phpstan
 - <https://github.com/phpstan/phpstan>
- Psalm
 - <https://github.com/vimeo/psalm>

Leveraging Subsystems in IBM i

- Zend Server 9 is a different Licensed Program than earlier versions of Zend Server/Platform/Core
 - It is not possible to simply upgrade the existing Zend Server to version 9
- Zend Server 9 runs in a different subsystem than earlier versions of Zend Server/Platform/Core
 - This enables version 9 of Zend Server to run side-by-side with earlier versions

Version	Licensed Program	Subsystem	Management Program	DocRoot	Program Directory	Ports ¹
Core	1ZCORE	ZEND		/www/zend/htdocs	/usr/local/zend	89
5.X	2ZSVRPI	ZENDSVR	zendsvr/zsmenu	/www/zendsvr/htdocs	/usr/local/zendsvr	10088
6.x-8.x	6ZSVRPI	ZENDSVR6	zendsvr6/zsmenu	/www/zendsvr6/htdocs	/usr/local/zendsvr6	10080 - DocRoot 10081 - WebGUI
9.X 2018.X 2019.x	7PHPZND	ZENDPHP7	zendphp7/zsmenu	/www/zendphp7/htdocs	/usr/local/zendphp7	10080 – DocRoot 10081 - WebGUI

¹If a later version of Zend Server is installed on a system with a previous version of Zend Server, the port numbers will be different (typically, 10090, and 10091 are used)

Zend Server 2019

- Support for PHP 7.3
 - Zend Server ships a certified and secure PHP &.3 stack including a large set of tested PHP extensions and libraries
- Multi PHP Version Support (7.1, 7.2, & 7.3)
 - Zend Server now ships with more than one version of PHP.
 - Enables both the selection of the version to run as well as easily switching between versions.
- Improvements to Page Cache
 - Ease of use improvements
 - Rule engine modernized, more intuitive to use
 - Conditions can be added based on response headers
- Improvements to URL Insight
 - Dashboard redesigned with clearer visualizations including separate Requests Per Second and Response Time measurements.

<https://www.zend.com/en/products/server/whats-new>

Zend Server Enterprise

Find (Ctrl-Alt-F) 🔍

PHP Info ⓘ

Getting Started

Dashboard

PHP ▾

Extensions

phpinfo()

PHP version settings

7.3

7.1

Current PHP version ✓ 7.2

PHP Version 7.2.15

Zend Server Version: 2019.0.0

Build: 125566

Multi-PHP

PHP 8

Overview

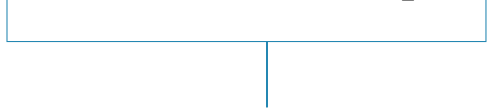
- Version 8.0 of PHP is the next major release of PHP
- Currently expected to be released at the end of 2020
- Information provided on the upcoming slides is the current planned features
 - Version 8 is under active development and the features are subject to change
 - Keep up to date at <https://wiki.php.net/rfc>
- 44 Implemented as of September 22, 2020
 - Stringable Interface
 - ::class allowed on objects
 - Static return type
 - Union types
 - Array negative indexes
 - Trailing comma in parm lists
 - PDO::ERRMODE_EXCEPTION as default
 - Weak maps
 - Fatal error on incompatible method signature
 - Attributes
 - Several more...

New Features

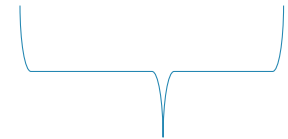
- Union Types

- **Definition:** collection of two or more types which indicates (or limits) which can be used
- **Advantages:**
 - Types are enforced, mistakes caught early
 - Type information less likely to become outdated
 - Types checked during inheritance
 - Types available through Reflection

```
public function foo(Foo | Bar $input) : int | float;
```



Parameter function called with can be user-defined type of Foo or Bar.

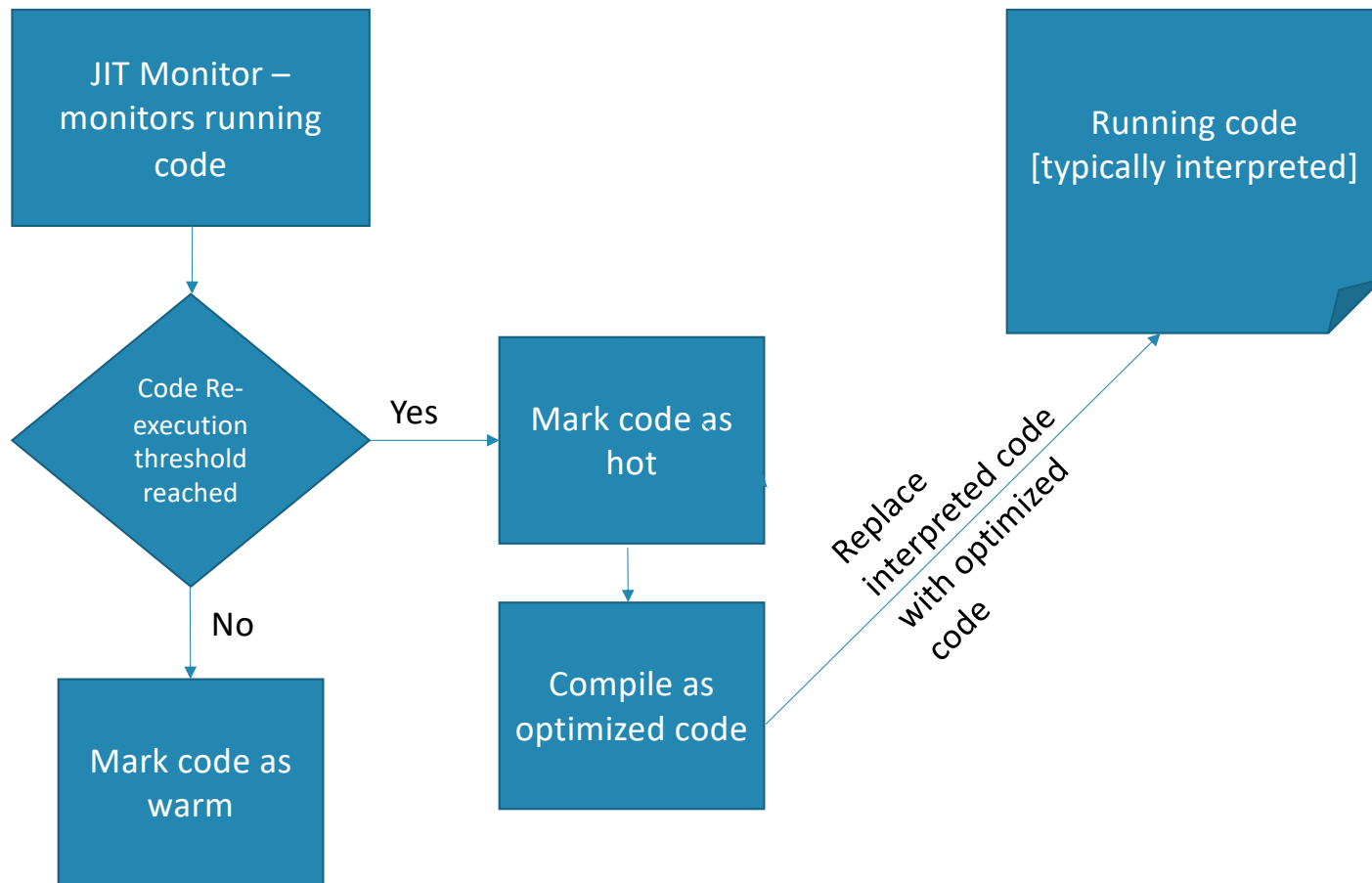


Value returned can be either an int or a float

New Features – JIT (Just In Time Compiler)

- Description: Compiles parts of PHP code at runtime such that the compiled versions can be used instead of repetitively interpreting the code at run time
- Advantages: will provide performance improvements
 - NOTE: no accurate benchmarks to date
 - NOTE: JIT depends on a certain level of code-reuse before it will be enforced (see next slide)
 - This makes possible performance improvements for web-based applications somewhat suspect
 - This should; however, make for better performant PHP as a general-purpose language

JIT



Bonus: Open Source Opens up So Many Possibilities

So Much More... Blending Open Source and Proprietary

- Applications tend to use various standards to communicate
 - JSON, REST, XML, etc
- Almost any software provides integration points

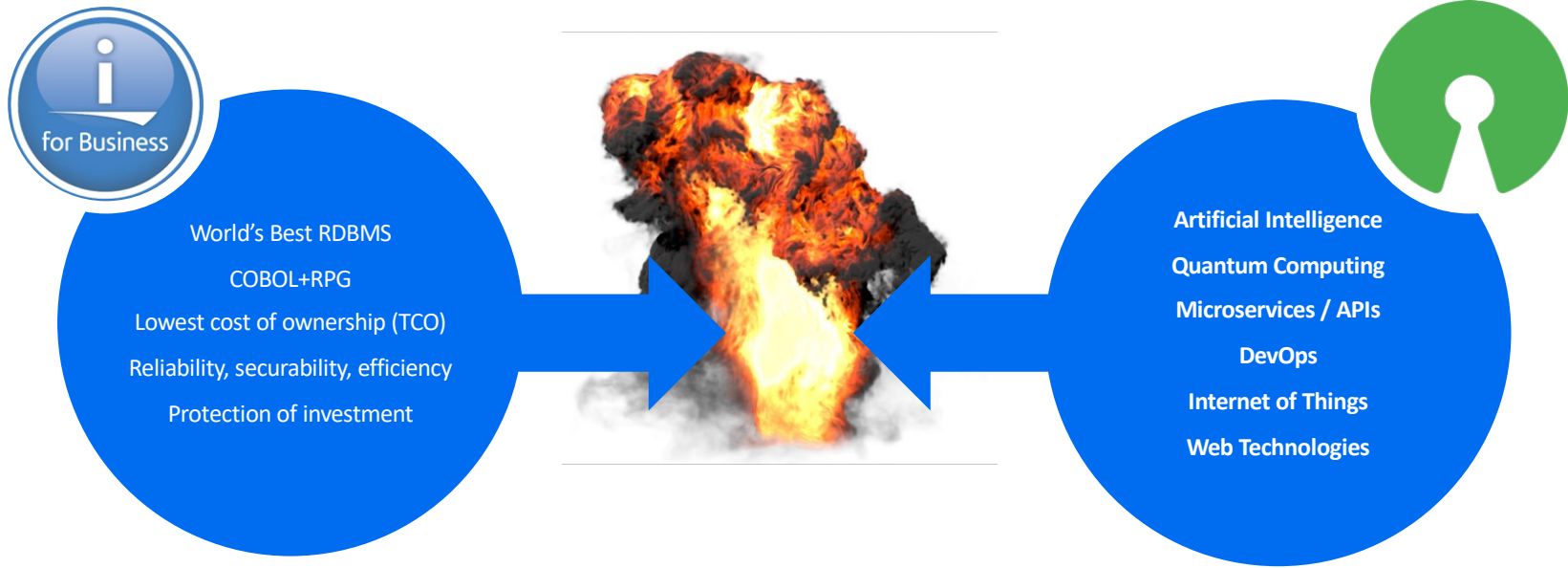


IBM i Integration Techniques

- Open source languages provide integration pieces
 - SQL Connectors
 - Toolkits for RPG, CL, ILE C/C++, etc
- Use of a mutually-understood protocol and methodology. Examples:
 - REST APIs
 - Data Queues, Data Areas, or other IBM i constructs
- Apache Camel
 - Message Queueing protocols (STOMP, AMQP, MQTT, Kafka, etc)
 - Email/Slack/Twitter
 - Open source program invocation

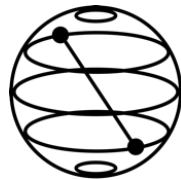


The Hybrid Approach



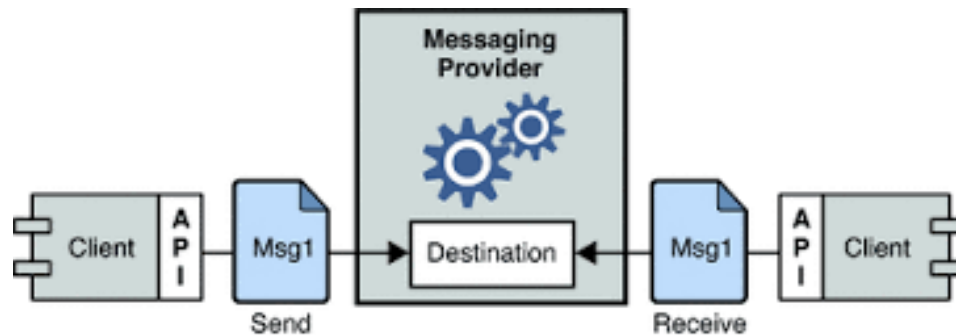
See this trend in action at the IBM Customer Stories page: <http://ibm.biz/ibmistories>

A Cornucopia of Options



Message oriented middleware

- If you don't need a full ESB, you may still be making use of (and paying for) commercial messaging
- Technically, MOM is any **platform that sends and receives messages** between distributed applications
- Commercial versions include IBM MQ Series, Amazon SQS, and Oracle AQ
- This pattern allows for **asynchronous processing**, and **normalization** of data exchanges
- Clients connect to a **messaging provider**, and send and receive messages via that provider



Meet: Some Really Good, Really Free Solutions!

- Apache ActiveMQ is a **JMS implementation**, and can help with both federation of systems and asynchronous processing
- Apache Camel is a sophisticated **message oriented middleware** language, with hundreds of integration components
- Apache Kafka is a high-throughput streaming event engine suitable for very large datasets
- So...



References

- IBM Announcement
 - https://www-01.ibm.com/common/ssi/ShowDoc.wss?docURL=/common/ssi/rep_ca/7/897/ENUS920-047/index.html&lang=en&request_locale=en
- Perforce Announcement (Blog)
 - <https://www.zend.com/blog/zend-perforce-announcement-ibm-i-users>
- New in PHP 8
 - https://wiki.php.net/rfc#php_80
 - <https://stitcher.io/blog/new-in-php-8>
- Laminas blog
 - <http://zend.com/blog/evolution-zend-framework-laminas-project>
- Laminas Migration Tools
 - <http://docs.laminas.dev/migration/>
- Community PHP
 - <https://www.zend.com/blog/getting-started-community-php>
 - <https://www.zend.com/blog/installing-community-php-ibm-i>

Free, Hands-on Training with Open Source

The Perforce team has developed a number of free hands-on exercises for you to further your exploration of Open Source based technologies

Available Exercises:

- Implementing Productivity Solutions via LAMP Applications
- Exploring Basic PHP Programming
- Introduction to XMLService and the Toolkit
- Leveraging Db2 Data via a CRUD Application
- Getting Familiar with the PASE Shell Environment
- Setting up an Open Source Development Environment
- Introduction to Open Source Programming Languages – Node.js
- Introduction to Open Source Programming Languages – Python
- Overview of Shell Programming

Information/Registration: zend.com/ibm-i-training-exercises#tab-panel-12066

