PHP7
For Its Best Performance

@laruence

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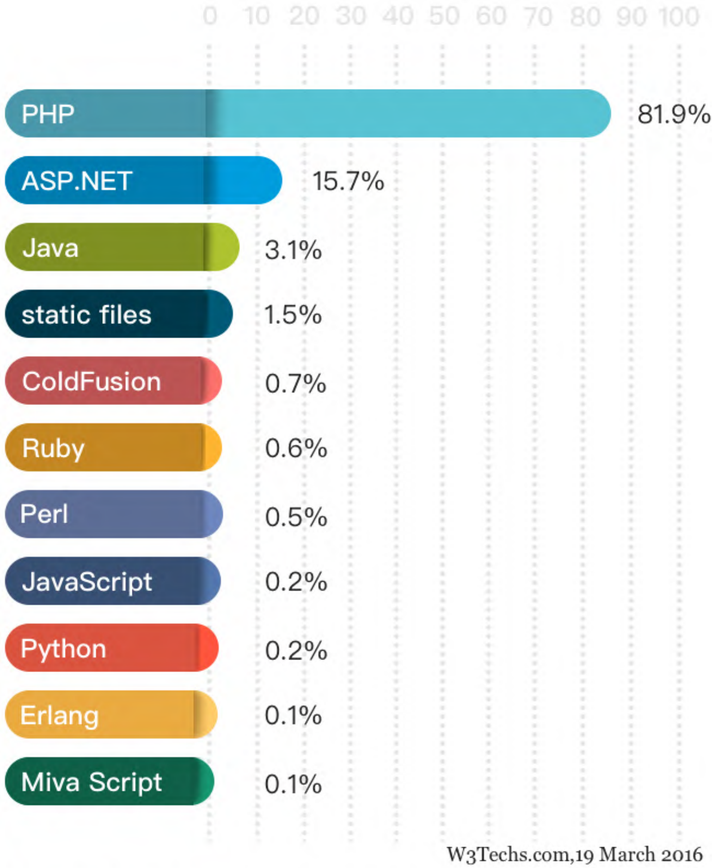
SELF INTRODUCTION

- Author of Yaf, Yar, Yac, Yaconf, Taint Projects
- Maintainer of Opcache, Msgpack, PHP-Lua Projects
- PHP Core Developer Since 2011
- Zend Consultant Since 2013
- One of PHP7 Core Developers: Dmitry Stogov, Xinchen Hui, Nikita Popov
- Chief Software Architect at Lianjia Since 2015

PHP

- Released in 1994 by Rasmus Lerdorf
- 20+ Years Programming Language
- Most Popular Web Service Program Language
- PHP7 is Released at 3 Dec 2015
- Latest Version is PHP7.0.4

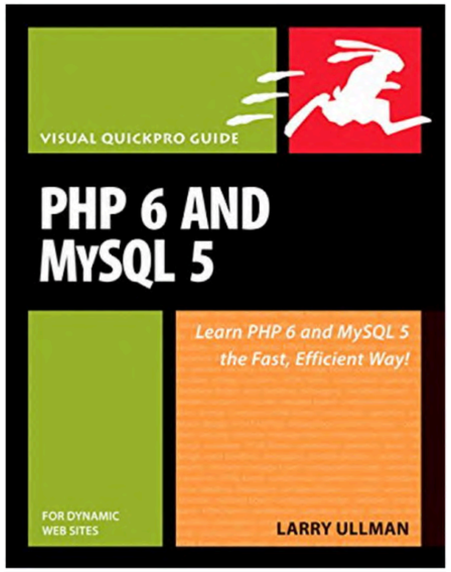


Percentages of websites using various server-side programming languages
Note: a website may use more than one server-side programming language

右图来自：W3Techs.com 全球前100万网站技术统计

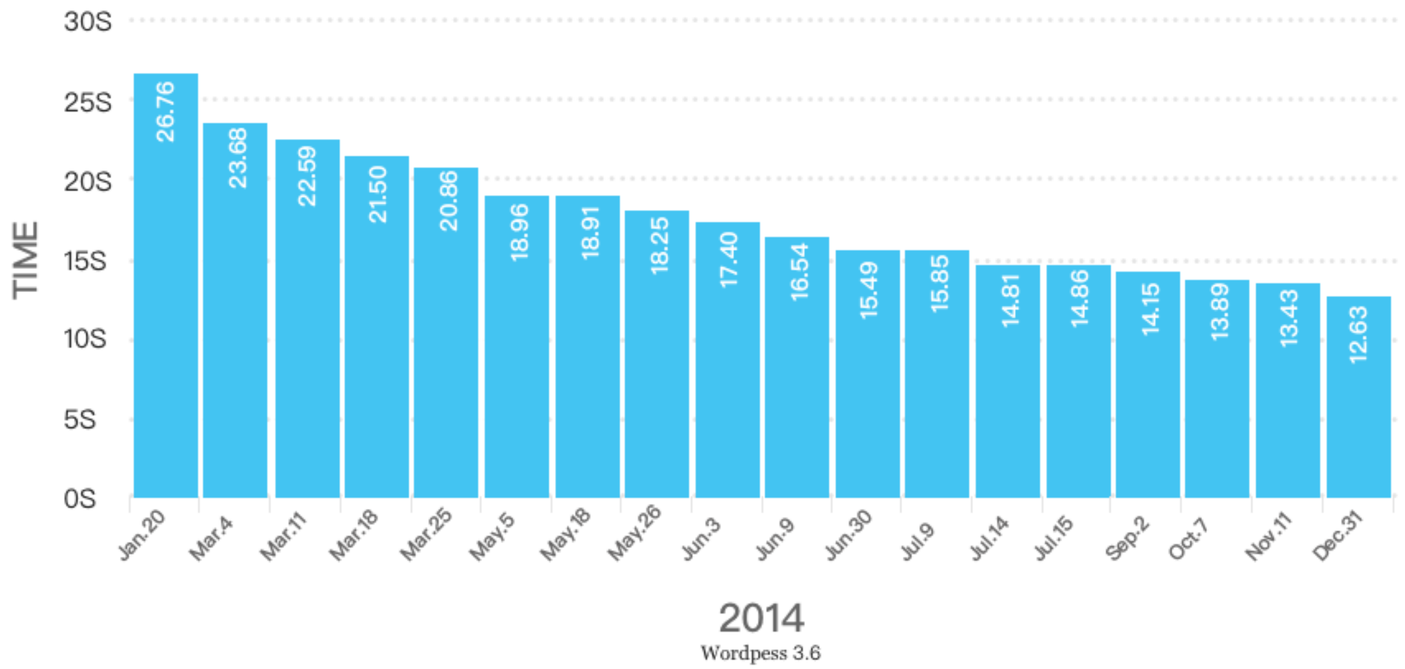
PHP6

- For Unicodes Supports
- Started in 2005, Die in 2010
- Most Features Goes Into PHP-5.3
- ++PHP5 = PHP7



PHP7

- Based on PHP-5.5 JIT-Opcache Project
- One year long work for better PHP performance



PHPNG

- Memory Optimization - PHP spends 20% time on Memory
  - Reduce Memory allocations
  - Reduce Memory Usage
  - Reduce Memory Indirection
- Cache friendly

Zval in PHP5

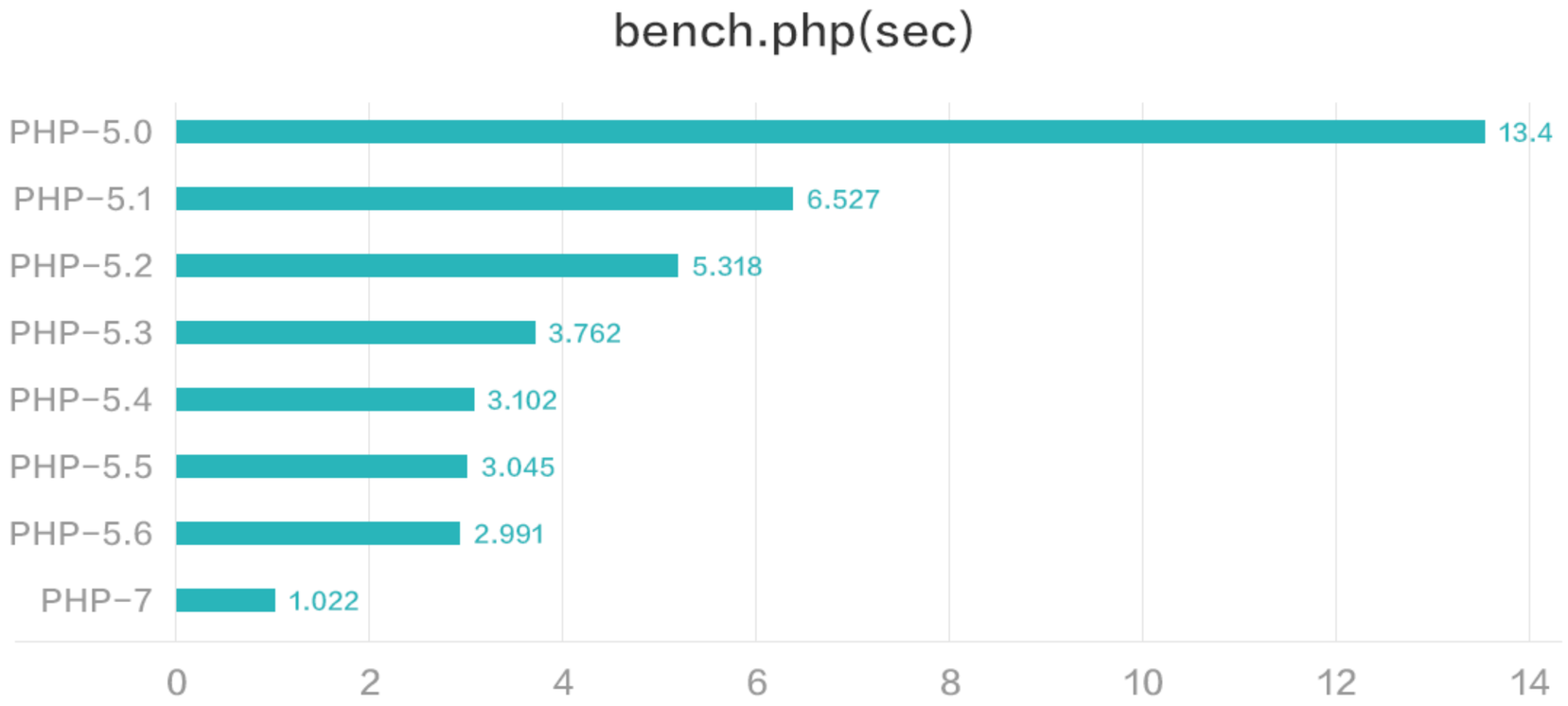
Zval in PHP7

Unit	Additional Access Latency	Local Hit rate
TLB	1 cycle	95%
L1	1 cycle	95%
L2	8 cycles	80%
L3	50 cycles	50%
Memory	100 cycles	100%
Page table walk & TLB update	200 cycles	100%

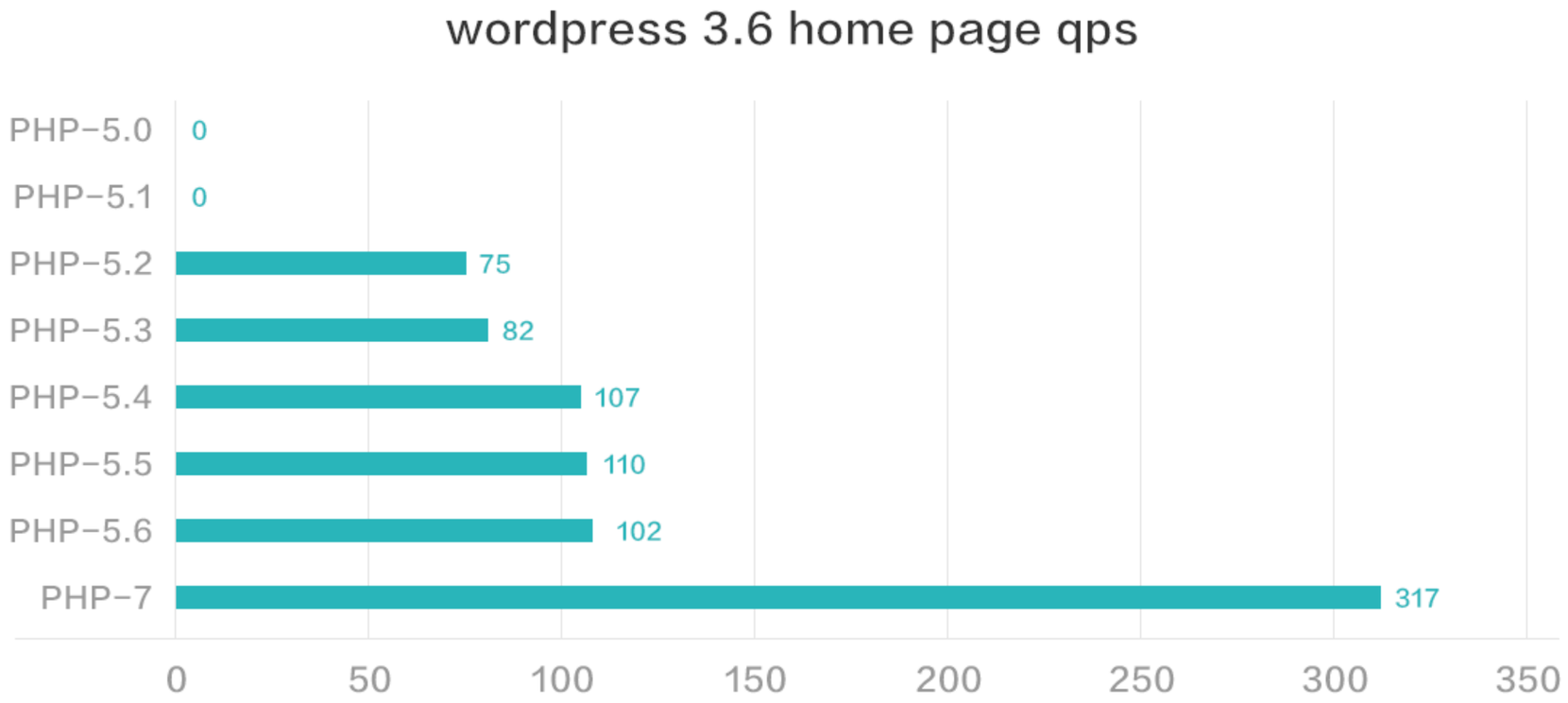
PHP7

- Improved Performance: PHP 7 is up to twice as fast as PHP 5.6
- Significantly Reduced Memory Usage
- Abstract Syntax Tree
- Consistent 64-bit Support
- Improved Exception Hierarchy
- Many Fatal Errors Converted to Exceptions
- The Null Coalescing Operator (??)
- Return & Scalar Type Declarations
- Anonymous Classes
- And More..

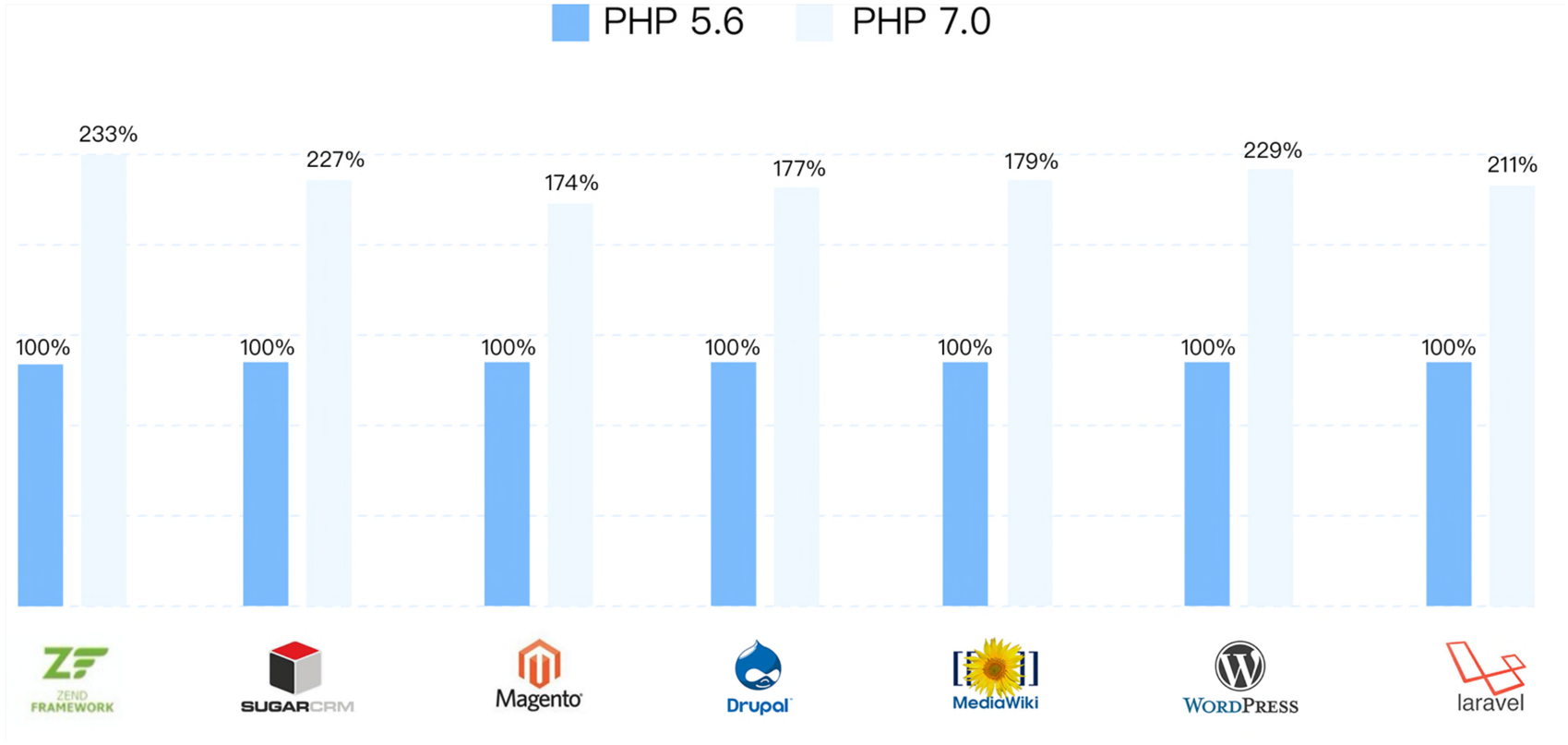
BENCHMARK


bench.php(sec)
PHP-5.0
PHP-5.1
PHP-5.2
PHP-5.3
PHP-5.4
PHP-5.5
PHP-5.6
PHP-7
13.4
6.527
5.318
3.762
3.102
3.045
2.991
1.022
0
2
4
6
8
10
12
14

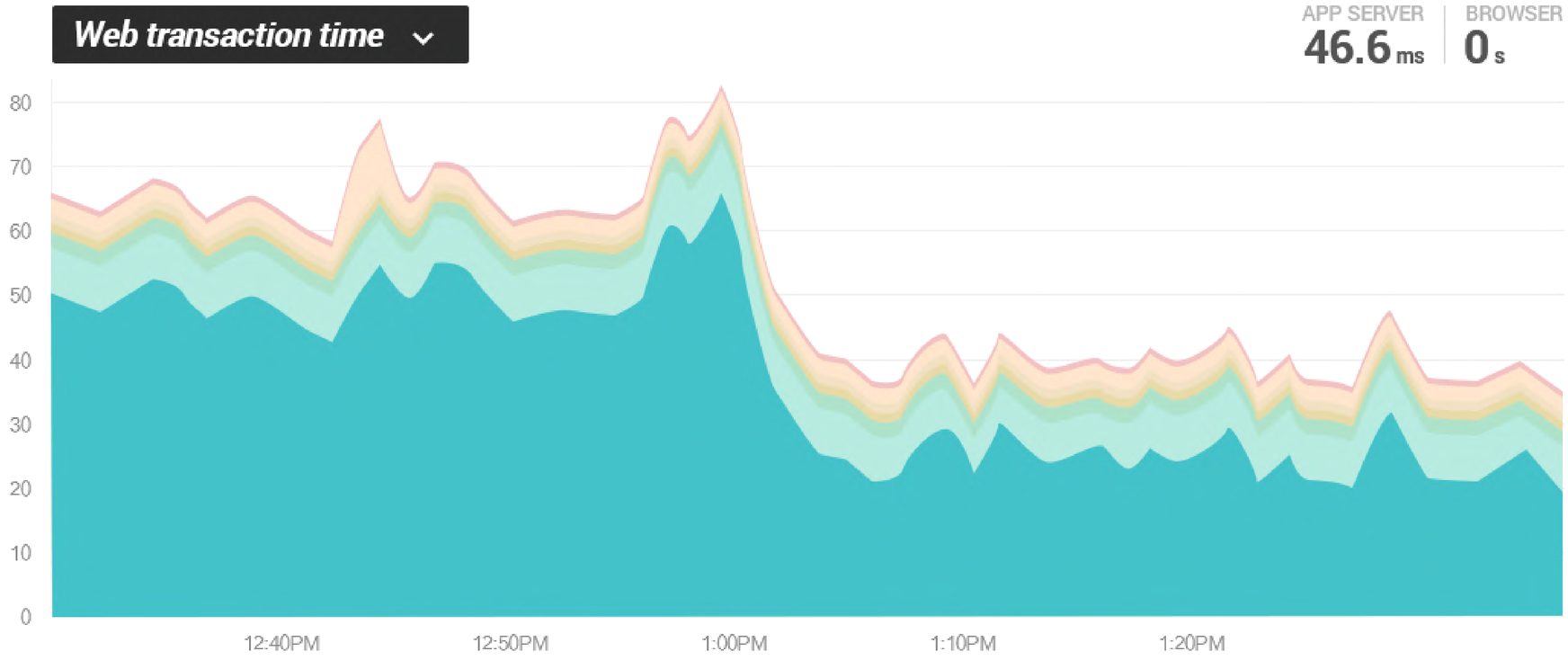
REAL-LIFE APPLICATION BENCH



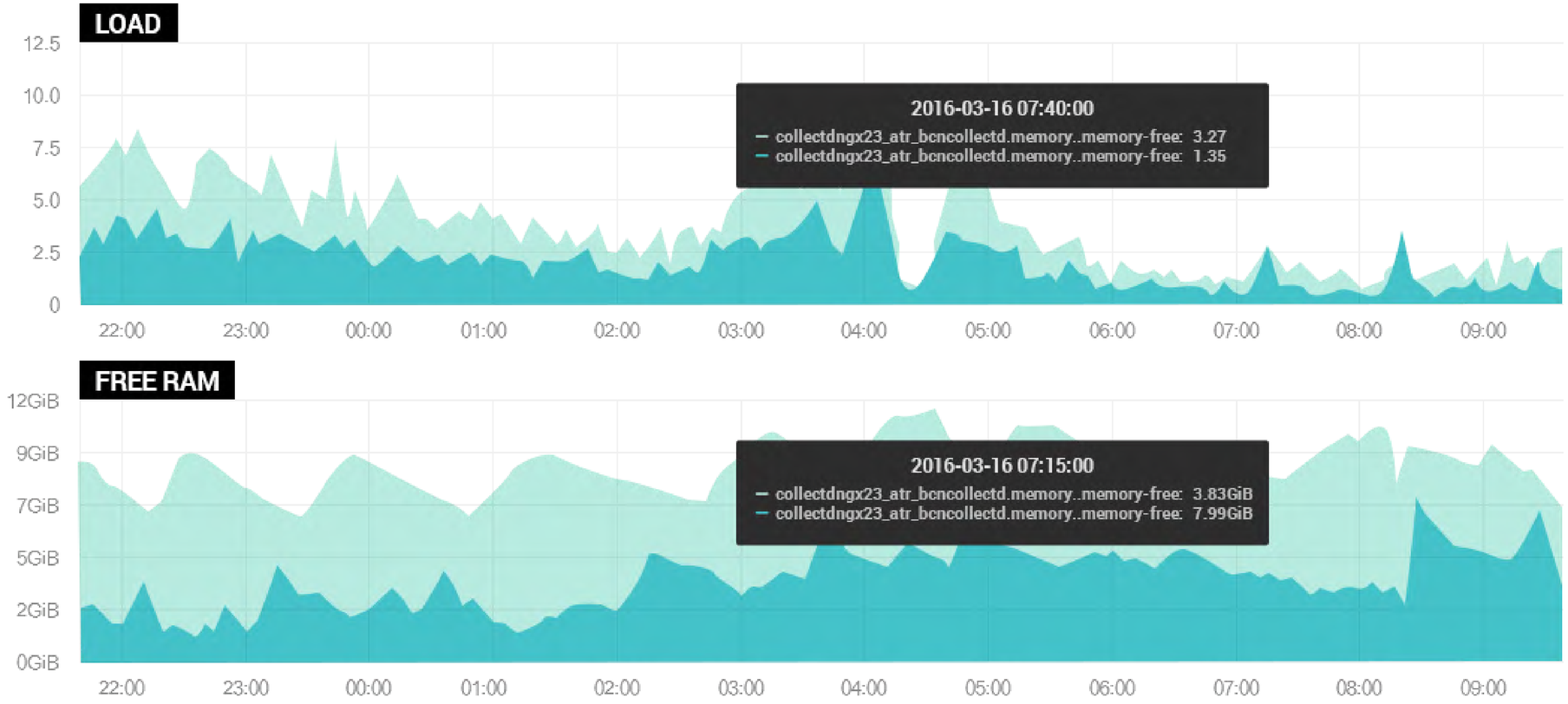
PHP5.6 VS PHP7



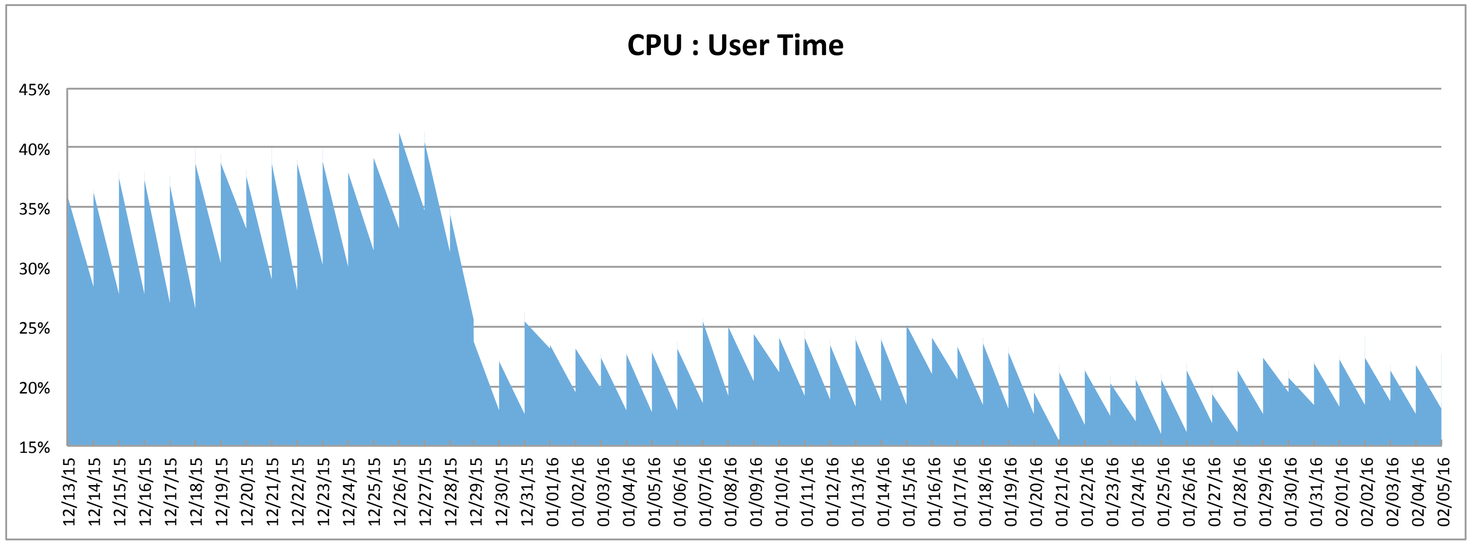
PERFORMANCE COMPARISON BY ULABOX

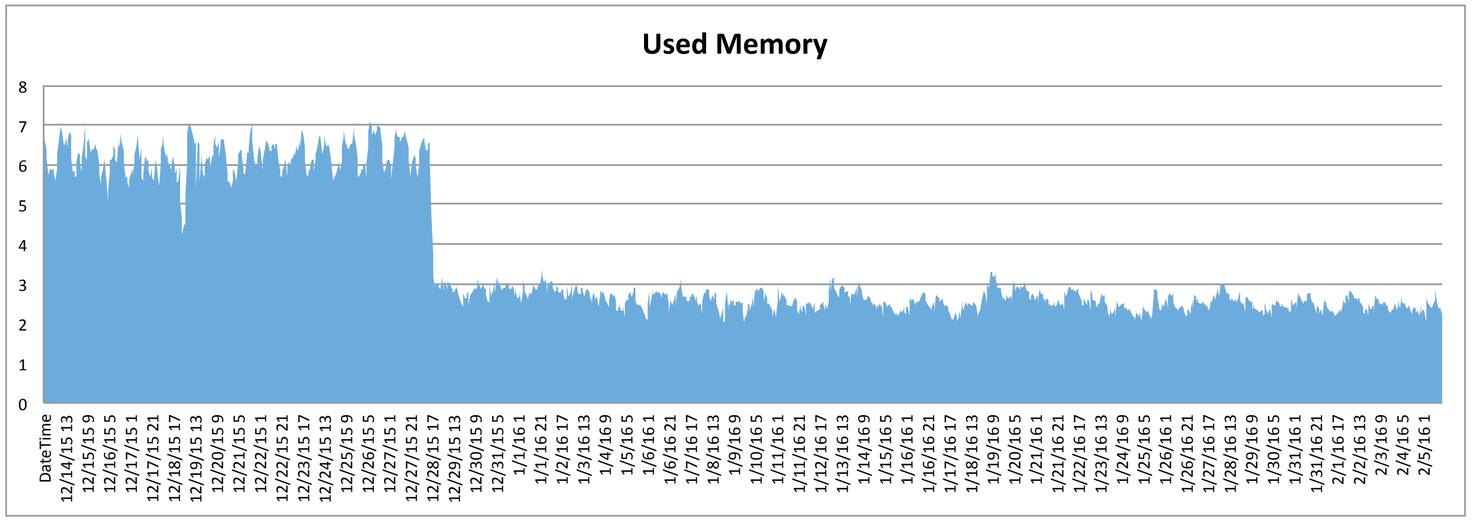


PERFORMANCE COMPARISON BY ATRAPALO



PERFORMANCE COMPARISON BY WEIBO





MAKE PHP7 FASTER

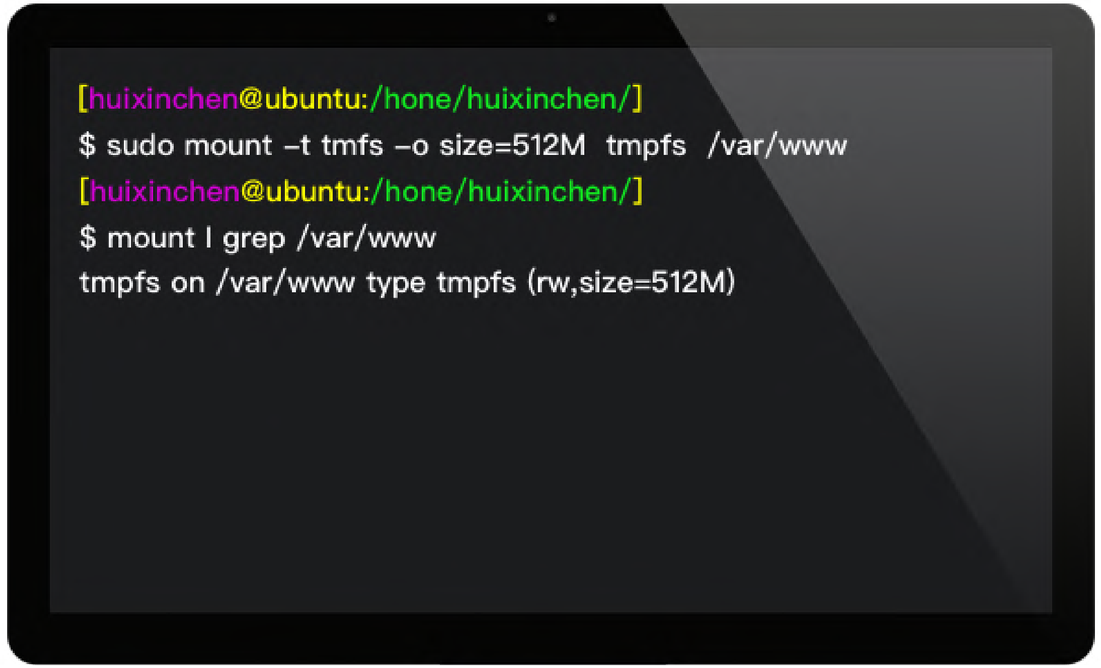
- PHP 7 is Up to Twice as Fast as PHP 5.6
- Significantly Reduced Memory Usage
- However, It Could Be Faster…

NGNIX+PHP-FPM

- Unix Domain Socket
- FastCGI Params
- Use Static PM
- Less Configuration is Better
- Opt Children Number = Total CPU Resource / CPU Usage Per Request
  - Of course, 400 children also make sense

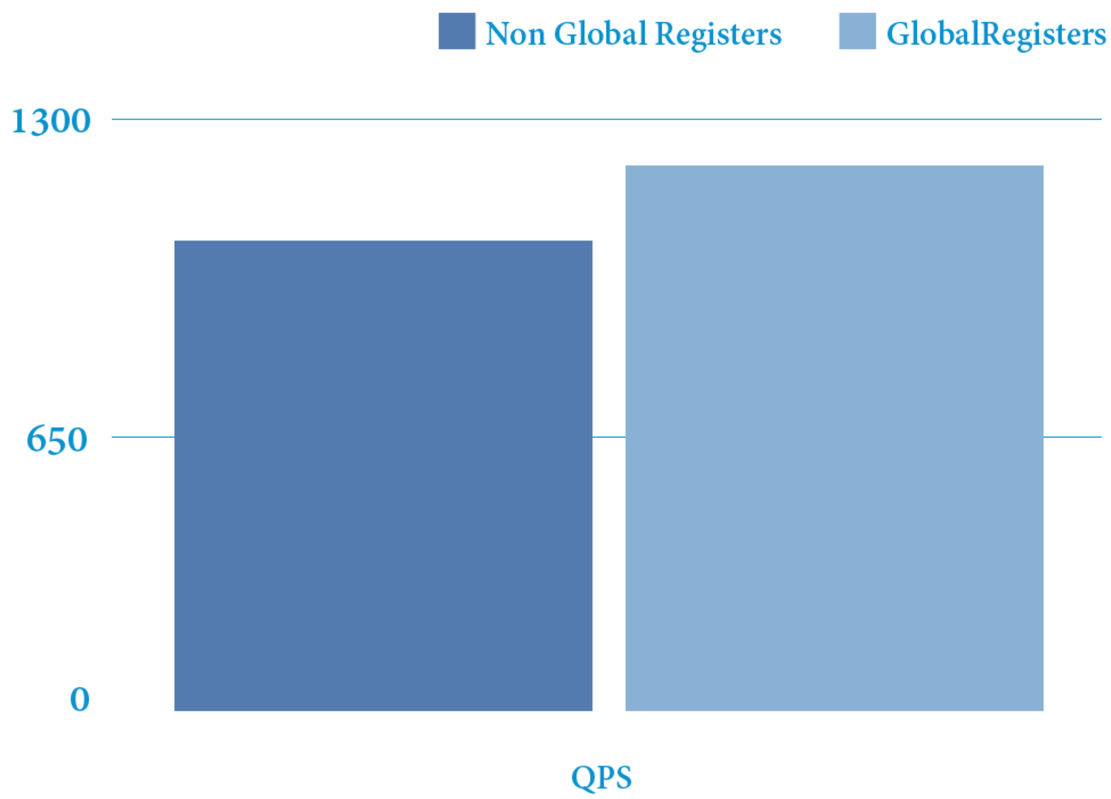
USE TMPFS

- Deploying Document Root in Tmpfs
- Use Fixed Size Memory
- Data Could Be Lost After Reboot



USE LATEST COMPILER

- More Compiler Optimization
- GCC4.8 - Global Registers
  - %r14 : execute_data
  - %r15: opline
- Up to 10% Performance Improvement

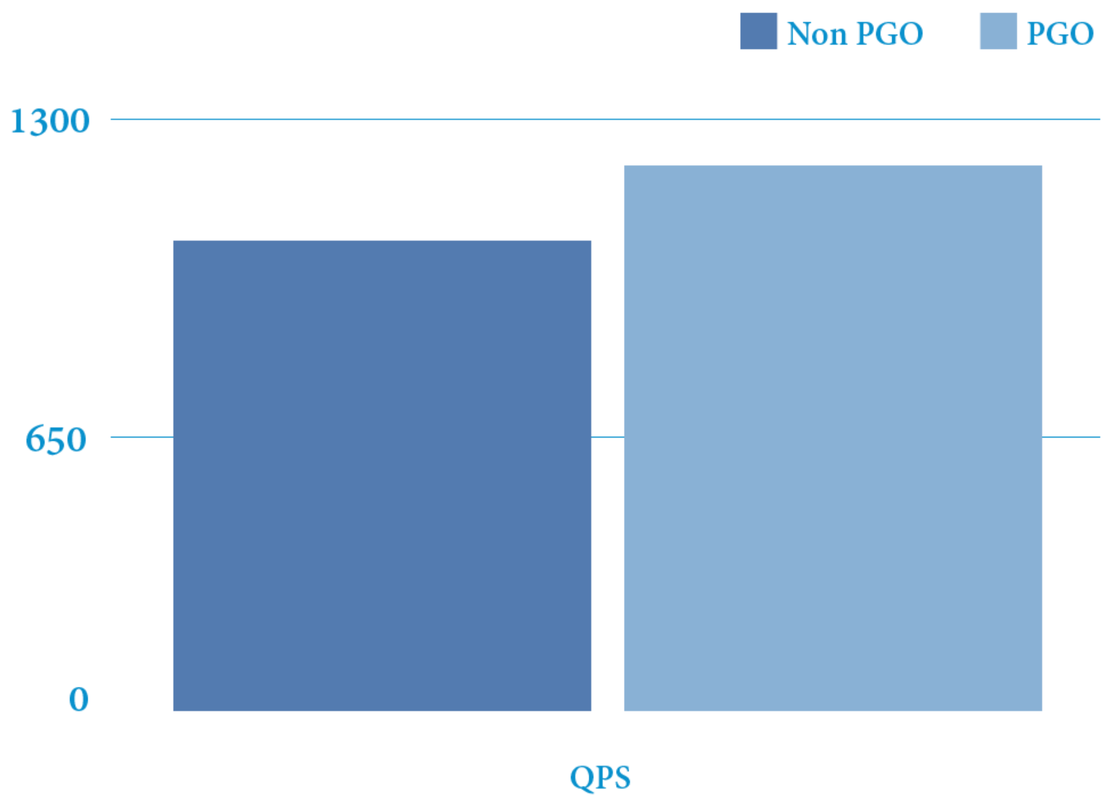


USE PGO

- Profile Guided Optimization
- Optimize for Specific Cases
- Optimization According to Data Collected in Runtime
- Up to 7% Performance Improvement
- Each Coin Has Two Side

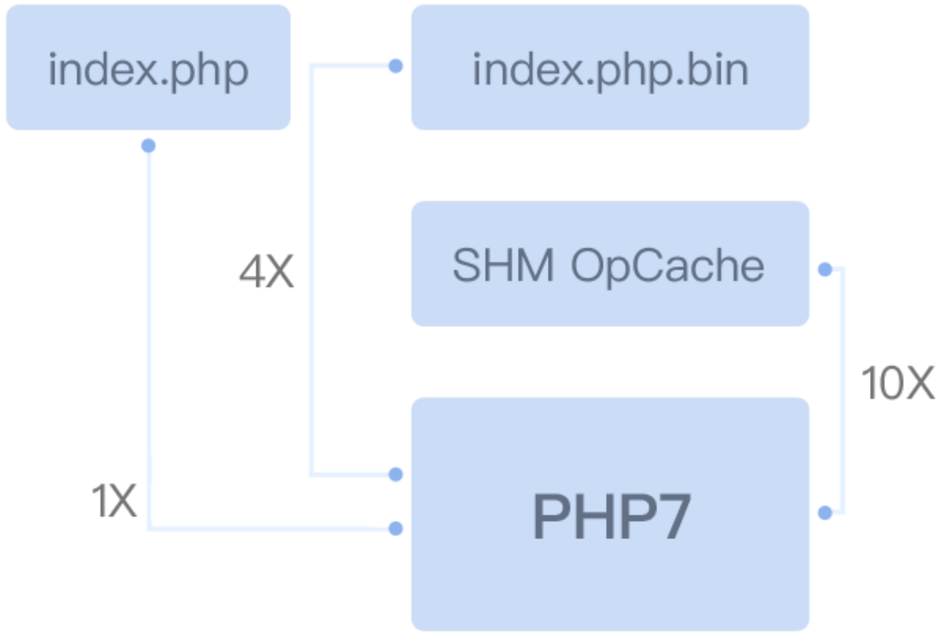
```
make prof-gen
sapi/cgi/php-cgi -T 100 /home/huixinchen/local/www/htdocs/wordpress/index.php >/dev/null
make prof-clean
make prof-use
make install
```

Using PGO is simple in PHP7



OPCACHE FILE CACHE

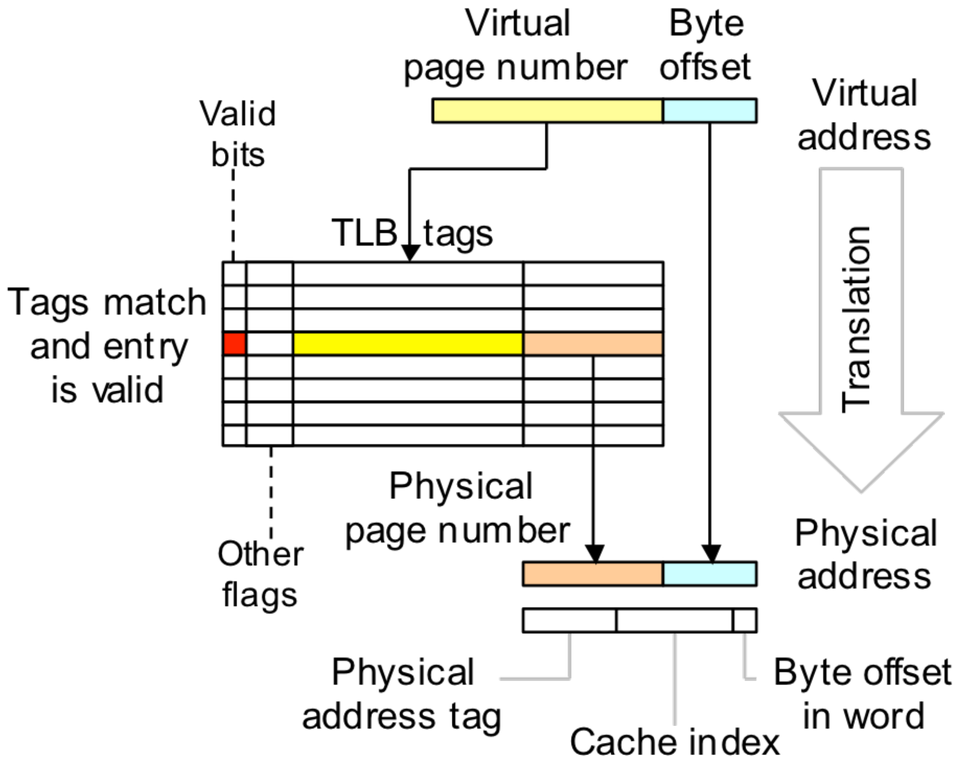
- Persistent Secondary File-Based Cache for OPCache
- Shared Memory is Limited
- Cache Can Live Across Processes
  - opcache.file_cache=/tmp/
  - opcache.file_cache_only?



USE HUGEPAGES

- Hugepages - Reduce TLB Miss
- Opcache.huge_code_page - Reduce iTLB miss
- Shared Memory
- Regular Memory Allocations
  - Note: SIGBUS on Forking
    - USE_ZEND_ALLOC_HUGE_PAGES = 1
    - PHP7.0.5

```
[huixinchen@ubuntu:/hone/huixinchen/opensource/trunk/] (master)
$ sudo sysctl vm.nr_hugepager=512
[huixinchen@ubuntu:/hone/huixinchen/opensource/trunk/] (master)
$ cat /proc/meminfo | grep Huge
AnonHugePages:    450560  KB
HugePages:_Total:     512
HugePages:_Free:      512
HugePages:_Rsvd:        0
HugePages:_Surp:        0
Hugepagesize:       2048  KB
```



Always Do Your Own Benchmark

Links

- http://w3techs.com/technologies/overview/programming_language/all
- http://talks.php.net/confoo16#/perf2014
- https://carlosbuenosvinos.com/first-tests-with-php7-in-production-at-atrapaloeng/
- https://techblog.badoo.com/.../how-badoo-saved-one-million-dollars-switching-to-php7/

Q&A