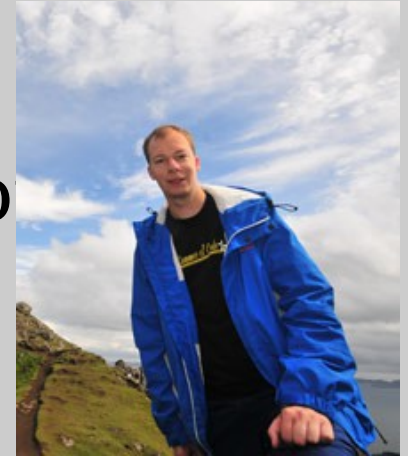


Profiling PHP Applications

PHP Tour Lille - Lille, France - Nov 25th, 2011
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Derick Rethans

- Dutchman living in London
- Freelancer doing PHP internals development ie.: writing extensions for a living
- PHP Driver Maintainer for 10gen (the MongoDB people)
- Anderskor's Camouflage Encoder
- Author of Xdebug
- Author of the `mcrypt`, `input_filter`, `dbus`, `translit` and `date/time` extensions



The Internet is Full of Nonsense

A small selection of PHP optimisation tips I found on the internet

Methods in derived classes run faster than ones defined in the base class.

Not everything has to be OOP, often it is just overhead, each method and object call consumes a lot of memory.

Avoid overusing function calls. Calling a function in PHP is very expensive, so avoid it whenever you can.

The Internet is Full of Nonsense

I can only say one thing:



Do I need to optimise my code?

Before you can optimise anything:

- Find out if things are running slow
- Find out whether it is the code
- Understand your code, application and execution paths
- Find out which parts of the code are slow
- Find out what you can optimise

How does the application perform?

Benchmark the application: siege (httpperf, jmeter-http)

- check ~/.siegerc and set the logfile setting
- Create a file with urls: `http://derickrethans.nl/`
`http://derickrethans.nl/spatial-indexes-data-sqlite.html` `http://derickrethans.nl/who.html`
- run against your code: `siege -c 4 -r 10 -f /tmp/urls.txt`

```
Transactions:           40 hits
Availability:          100.00 %
Elapsed time:           9.76 secs
Data transferred:      1.34 MB
Response time:         0.18 secs
Transaction rate:       4.10 trans/sec
Throughput:            0.14 MB/sec
Concurrency:           0.73
Successful transactions: 40
Failed transactions:    0
Longest transaction:    0.39
Shortest transaction:   0.08
```

Is it my code that is slow?

Multiple possible reasons:

- The database is slow
- There is lots of IO
- Your code is slow
- The system is busy with other things

```
$ vmstat 1
```

```
procs -----memory----- ---swap-- -----io----- -system-- -----cpu-----
r  b   swpd   free   buff   cache   si   so    bi    bo    in    cs *|dd1111|us sy|* id wa
5  0 121248 367520 767824 3080668   0   0  11272    0  1593  5540 *|dd1111|74 22|*  3  0
5  0 121248 290784 767960 3082980   0   0    268    0  1555  5381 *|dd1111|77 20|*  3  0
5  0 121248 238340 768132 3084336   0   0   1364 21160  2263  6815 *|dd1111|70 21|*  3  7
6  0 121248 170772 768300 3087100   0   0   1652    0  1802  8540 *|dd1111|71 25|*  4  0
```

CPU is (close to) fully in use: 74 + 22 → your code is slow.

```
$ vmstat 1
```

```
procs -----memory----- ---swap-- -----io----- -system-- -----cpu-----
r  b   swpd   free   buff   cache   si   so    bi    bo    in    cs us sy id *|dd1111|wa|*
0  1 121248  50776 314796 4156000   0   0 245800    0  3018  5394  1 11 71 *|dd1111|17|*
1  0 121248  52112 315108 4236692   0   0 243672    0  3107  5552  1 10 71 *|dd1111|18|*
1  1 121248  50148 315256 4318268   0   0 243096    44  3146  5463  1 11 72 *|dd1111|17|*
1  1 121248  52120 315484 4396356   0   0 243784    0  3006  5419  1 10 72 *|dd1111|18|*
```

wait is > 10 → IO is the bottleneck.

In-code tools:

- Add timing points

External tools:

- Basic overview: included
- Deep details: xdebug

Timing Points

Code with analysis in mind:

- Add timing points around specific events
- Check changes over time

| Timings | Elapsed | Percent | Count | Average |
|---------------------|----------------|-----------------|----------|----------------|
| output | | | | |
| Hello world | 0.00003 | 59.39 % | 1 | 0.00003 |
| Goodbye cruel world | 0.00002 | 40.61 % | 1 | 0.00002 |
| Total: | 0.00005 | 100.00 % | 2 | 0.00002 |
| Accumulators | | | | |
| Program runtime | 0.00051 | 100.00 % | 1 | 0.00051 |
| <i>Start</i> | <i>0.00025</i> | <i>49.41 %</i> | | |
| <i>Half the way</i> | <i>0.00038</i> | <i>75.11 %</i> | | |
| <i>Stop</i> | <i>0.00049</i> | <i>96.85 %</i> | | |

Timers

| type | calls | time (ms) |
|---|-------|-----------|
| Configuration | 14 | 60.42 |
| Action "question/frontpage" | 1 | 132.43 |
| Database | 9 | 7.56 |
| View "Success" for "question/frontpage" | 1 | 243.24 |
| Partial "question/_question_list" | 1 | 151.49 |
| Partial "question/_question_block" | 2 | 119.74 |
| Partial "question/_interested_user" | 2 | 12.99 |
| Partial "moderator/_question_options" | 2 | 2.80 |
| Component "sidebar/default" | 1 | 0.02 |
| Partial "sidebar_default" | 1 | 25.62 |
| Partial "tagf_tag_cloud" | 1 | 2.09 |
| Partial "question/_search" | 1 | 0.97 |
| Partial "sidebar_rss_links" | 1 | 3.08 |
| Partial "sidebar_moderation" | 1 | 1.32 |
| Partial "sidebar_administration" | 1 | 1.85 |

Timing points:

| Checkpoint | Begins at (sec) | Lasts (sec) | Memory at start (KB) | Memory used (KB) |
|----------------------|-----------------|-------------|----------------------|------------------|
| Module start 'setup' | 1.5722 | 1.7874 | 6,439,2578 | 5,780.6953 |
| Module end 'setup' | 3.3596 | 2.6235 | 12,219.9531 | 8,173.0625 |
| End | 5.9831 | | 20,393.0156 | |

Resources:

Total runtime (sec): 6.0161
Peak memory usage (KB):22,098.9375

Time accumulators:

| Accumulator | Lasts (sec) | Lasts (%) | Count | Average (sec) |
|--|-------------|-----------|-------|---------------|
| ini_load | | | | |
| Load cache | 0.5950 | 9.8895 | 29 | 0.0205 |
| Find INI Files | 0.4026 | 6.6922 | 18 | 0.0224 |
| Parse | 0.0981 | 1.6302 | 18 | 0.0054 |
| Save Cache | 0.0699 | 1.1613 | 18 | 0.0039 |
| Check MTime | 0.0102 | 0.1703 | 11 | 0.0009 |
| Mysql Total | | | | |
| Mysql_queries | 0.0285 | 0.4745 | 18 | 0.0016 |
| Looping result | 0.0005 | 0.0090 | 14 | 0.0000 |
| Template Total | | | | |
| Template load | 4.4332 | 73.7 | 3 | 1.4777 |
| String conversion in template resource | 0.0066 | 0.1105 | 75 | 0.0001 |
| Template parser: create text elements | 0.0978 | 1.6264 | 42 | 0.0023 |
| Template parser: remove whitespace | 0.0264 | 0.4382 | 42 | 0.0006 |
| Template parser: construct tree | 0.3477 | 5.7793 | 42 | 0.0083 |
| Template load and register function | 0.0264 | 0.4394 | 11 | 0.0024 |
| Template processing | 2.5457 | 42.3150 | 3 | 0.8486 |
| Override | | | | |
| Cache load | 1.3062 | 21.7117 | 15 | 0.0871 |
| General | | | | |
| INI string conversion | 0.0065 | 0.1075 | 74 | 0.0001 |
| String conversion | 0.0041 | 0.0683 | 149 | 0.0000 |
| String conversion w/ mbstring | 0.0004 | 0.0072 | 8 | 0.0001 |
| dbfile | 0.0581 | 0.9665 | 47 | 0.0012 |

Note: percentages do not add up to 100% because some accumulators overlap
Total runtime - incl. debug printing (sec):6.3711

Dumps includes/classes hierarchies

Install:

```
pecl install included
```

Add to php.ini:

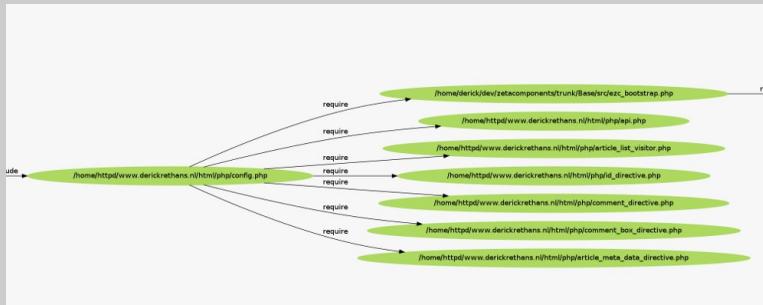
```
extension=included.so  
included.enabled=1  
included.dumpdir=/tmp
```

Generate graphs:

```
php -dincluded.enable=0 gengraph.php -t includes -i /tmp/included.22439.1  
dot -Tpng -o included-includes.png included.out.dot  
php -dincluded.enable=0 gengraph.php -t classes -i /tmp/included.22439.1  
dot -Tpng -o included-classes.png included.out.dot
```

Include overview: included-includes.png:

Class hierarchy: included-classes.png:





- Xdebug: An Open Source debugging tool
- About 8 years old
- Works on "every" operating system
- Version 2.1 released earlier this year
- PHP 5.1, 5.2, 5.3, 5.4 and trunk

Function trace

```
TRACE START [2010-03-24 11:03:12]
0.0022    787776    -> {main}() /home/httpd/pres2/show2.php:0
0.0028    803160    -> require(/home/derick/dev/ezcomponents/trunk/Base/src/
ezc_bootstrap.php)/home/httpd/pres2/show2.php:2
0.0029    803552    -> dirname('/home/derick/dev/ezcomponents/trunk/Base/src/
ezc_bootstrap.php')/home/derick/dev/ezcomponents/trunk/Base/src/ezc_bootstrap.php:12
0.0030    803968    -> explode('/', '/home/derick/dev/ezcomponents/trunk/Base/src')/home/
derick/dev/ezcomponents/trunk/Base/src/ezc_bootstrap.php:13
0.0031    807352    -> count(array (0 => '', 1 => 'home', 2 => 'derick', 3 => 'dev', 4 =>
'ezcomponents', 5 => 'trunk', 6 => 'Base', 7 => 'src'))/home/derick/dev/ezcomponents/trunk/Base/src/
ezc_bootstrap.php:15
0.0032    807800    -> array_slice(array (0 => '', 1 => 'home', 2 => 'derick', 3 => 'dev', 4
=> 'ezcomponents', 5 => 'trunk', 6 => 'Base', 7 => 'src'), 0, -2)/home/derick/dev/ezcomponents/
trunk/Base/src/ezc_bootstrap.php:17
0.0033    808952    -> join('/', array (0 => '', 1 => 'home', 2 => 'derick', 3 => 'dev', 4
=> 'ezcomponents', 5 => 'trunk'))/home/derick/dev/ezcomponents/trunk/Base/src/ezc_bootstrap.php:17
0.0065    1002544    -> require(/home/derick/dev/ezcomponents/trunk/Base/src/base.php)/home/
derick/dev/ezcomponents/trunk/Base/src/ezc_bootstrap.php:18
0.0066    990560    -> __autoload('ezcTemplateCustomFunction')/home/derick/dev/ezcomponents/
trunk/Base/src/ezc_bootstrap.php:0
0.0066    990560    -> ezcBase::autoload('ezcTemplateCustomFunction')/home/derick/dev/
ezcomponents/trunk/Base/src/ezc_bootstrap.php:38
0.0067    990560    -> ezcBase::setPackageDir()/home/derick/dev/ezcomponents/trunk/Base/
src/base.php:125
0.0068    990832    -> dirname('/home/derick/dev/ezcomponents/trunk/Base/src/base.php')/
home/derick/dev/ezcomponents/trunk/Base/src/base.php:244
0.0069    990728    -> array_key_exists('ezcTemplateCustomFunction', array ())/home/
derick/dev/ezcomponents/trunk/Base/src/base.php:128
0.0069    990728    -> array_key_exists('ezcTemplateCustomFunction', array ())/home/
derick/dev/ezcomponents/trunk/Base/src/base.php:142
0.0070    991536    -> preg_match('/^([a-z0-9]*)([A-Z][a-z0-9]*)?([A-Z][a-z0-9]*)?/',
'ezcTemplateCustomFunction', NULL)/home/derick/dev/ezcomponents/trunk/Base/src/base.php:157
0.0072    993304    -> sizeof(array (0 => 'ezcTemplateCustom', 1 => 'ezc', 2 =>
'Template', 3 => 'Custom'))/home/derick/dev/ezcomponents/trunk/Base/src/base.php:161
0.0073    993664    -> strtolower('Template_Custom_autoload.php')/home/derick/dev/
ezcomponents/trunk/Base/src/base.php:165
0.0073    993496    -> ezcBase::requireFile('template_custom_autoload.php',
'ezcTemplateCustomFunction', 'ezc')/home/derick/dev/ezcomponents/trunk/Base/src/base.php:167
0.0074    994184    -> file_exists('/home/derick/dev/ezcomponents/trunk/Base/src/../../../../
autoload/template_custom_autoload.php')/home/derick/dev/ezcomponents/trunk/Base/src/base.php:278
0.0075    993848    -> strtolower('Template_autoload.php')/home/derick/dev/ezcomponents/
trunk/Base/src/base.php:175
0.0076    993888    -> ezcBase::requireFile('template_autoload.php',
'ezcTemplateCustomFunction', 'ezc')/home/derick/dev/ezcomponents/trunk/Base/src/base.php:177
0.0077    994568    -> file_exists('/home/derick/dev/ezcomponents/trunk/Base/src/../../../../
autoload/template_autoload.php')/home/derick/dev/ezcomponents/trunk/Base/src/base.php:278
0.0100    1105728    -> require(/home/derick/dev/ezcomponents/trunk/autoload/
template_autoload.php)/home/derick/dev/ezcomponents/trunk/Base/src/base.php:280
```

Function trace to file

Automatic readable format

```
function-trace-comp.xt (~/dev/php/xdebug-demos) - VIM - Terminal
Version: 2.2.0-dev
File format: 2
TRACE START [2011-11-23 10:44:31]
1 0 0 0.001373 773608 {main} 1 /home/httpd/www.derickrethans.nl
2 1 0 0.001747 800080 include 1 /home/httpd/www.derickrethans.nl/bra
3 2 0 0.002017 815432 require 1 /home/derick/dev/ezcomponents/trunk/
4 3 0 0.002057 815824 dirname 0 /home/derick/dev/ezcomponents/tr
4 3 1 0.002110 815976
4 4 0 0.002156 816192 explode 0 /home/derick/dev/ezcomponents/tr
4 4 1 0.002200 819544
4 5 0 0.002224 819624 count 0 /home/derick/dev/ezcomponents/tr
4 5 1 0.002270 819624
4 6 0 0.002301 820072 array_slice 0 /home/derick/dev/ezcomponent
4 6 1 0.002352 821344
4 7 0 0.002374 821224 join 0 /home/derick/dev/ezcomponents/tr
4 7 1 0.002417 821392
4 8 0 0.004136 1014824 require 1 /home/derick/dev/ezcomponents/trunk/
4 8 1 0.004170 1014824
3 2 1 0.004190 1013848
3 9 0 0.007865 1438592 require 1 /home/httpd/www.derickrethans.nl/bra
3 9 1 0.007903 1438592
3 10 0 0.008274 1469824 require 1 /home/httpd/www.derickrethans.nl/bra
function-trace-comp.xt 1,1 Top
```

```
xdebug.auto_trace=1 ; enable tracing
xdebug.trace_format=1 ; selects computerized format
xdebug.trace_options=0 ; sets extra option (1 = append)
```

- HTML traces
- Tracing only parts of an application with `xdebug_start_trace()` and `xdebug_stop_trace()`.
- Fetching the trace file name that is being used with `xdebug_get_tracefile_name()`.
- Changing how much data is shown with `xdebug.var_display_max_children`, `xdebug.var_display_max_data` and `xdebug.var_display_max_depth`.

One bundled with Xdebug:

```
php ~/dev/php/xdebug/trunk/contrib/tracefile-analyser.php time-own 5
```

```
...
```

```
Showing the 5 most costly calls sorted by 'time-own'.
```

| function | #calls | Inclusive time | memory | Own time | memory |
|------------|--------|-------------------|---------|-------------|-----------|
| array_pop | 715 | 1.0252 | -139880 | 1.0252 | -139880 |
| preg_match | 2986 | 0.3718 | 1016336 | 0.3718 | 1016336 |
| {main} | 1 | 6.4562 | 7335704 | 0.3476 | -15198832 |
| next | 432 | 0.2386 | 0 | 0.2386 | 0 |
| count | 3302 | 0.2132 | 0 | 0.2123 | 0 |

ValaXdebugTools (<http://tinyurl.com/vxdebugtools>):

- trace4func: Give a function name, get a stack trace for each time it is called.
- evaled: Prints an ordered list of evals, together with what file is responsible for this evil.
- whocalls: Find out what files contain calls to the given function.
- whatisincluded: Find out what files are included and where they are included from.

demo

Profiling



Install:

```
pecl download xhprof-beta
tar -xvzf xhprof-0.9.2.tgz
cd xhprof-0.9.2/extension
phpize && ./configure && make install
```

In php.ini:

```
extension=xhprof.so
xhprof.output_dir=/tmp
```

Download XHGui:

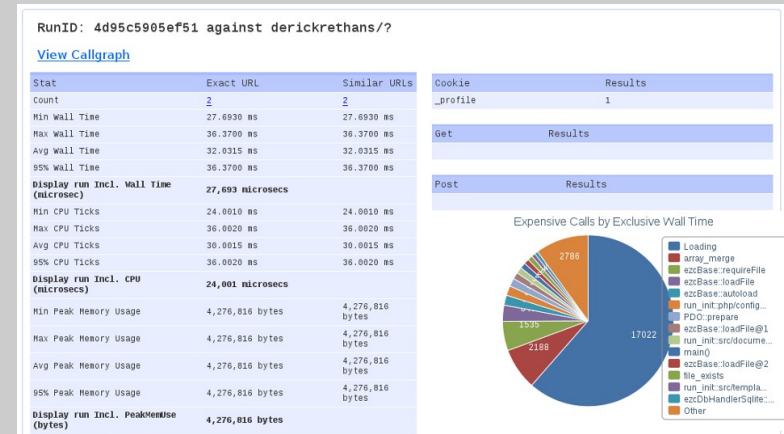
```
$ cd /home/httpd
$ git clone https://github.com/preinheimer/xhprof
```

Config XHGui (xhprof/xhprof_lib/config.php):

```
$_xhprof['dbhost'] = 'localhost';
$_xhprof['dbuser'] = 'root';
$_xhprof['dbpass'] = 'root';
$_xhprof['dbname'] = 'xhprof';
$_xhprof['servername'] = 'derickrethans';
$_xhprof['namespace'] = 'MySite';
$_xhprof['url'] = 'http://xhprof/';
```

Setup XHGui database:

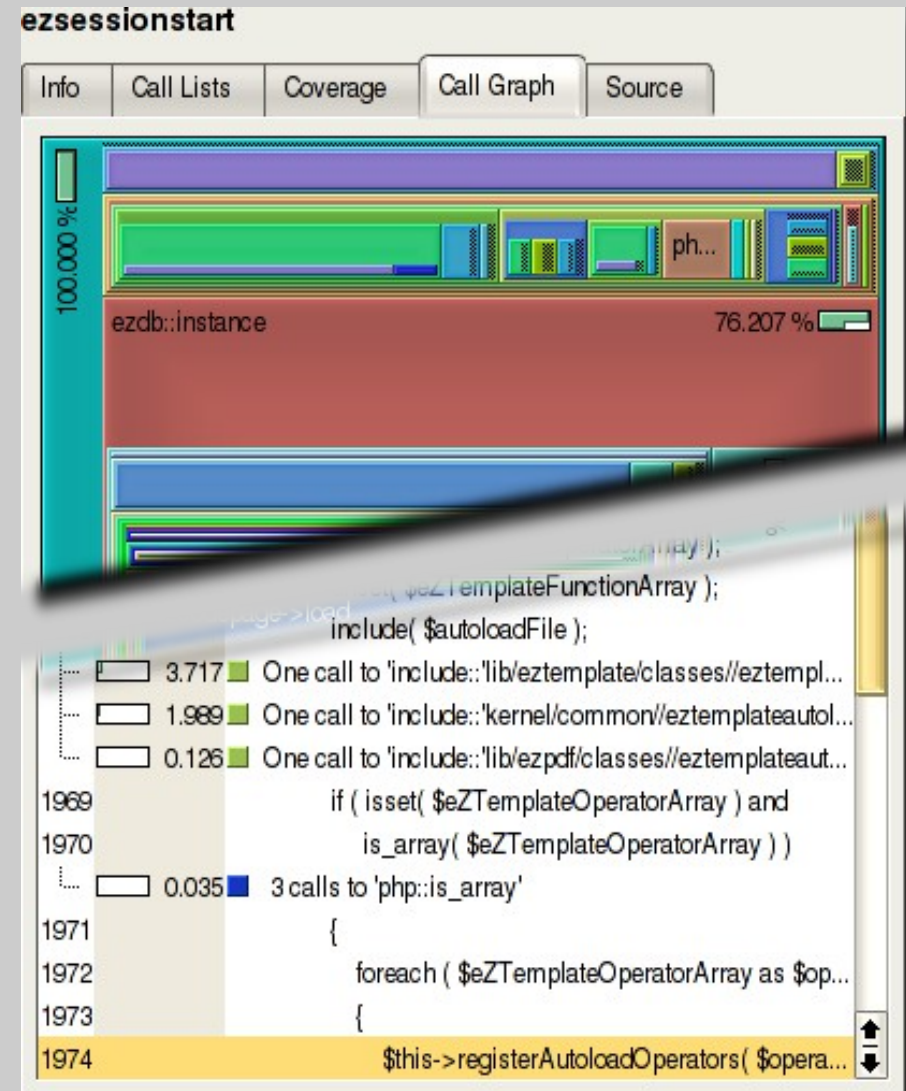
```
mysqladmin -u root -p create xhprof
mysql -u root -p xhprof
CREATE TABLE `details` (
  `id` char(17) NOT NULL,
  `url` varchar(255) default NULL,
```



Profiling

Valgrind / Cachegrind

- Written for C-applications
- Xdebug uses the same format
- KCacheGrind is an awesome viewer
- Profile your app with both CacheGrind and Xdebug
- Alternative viewers: WinGrind, Macgrind, Webgrind, PHP Storm



demo

- Siege: <http://www.joedog.org/index/siege-home>
- Included: <http://uk2.php.net/included>
- ValaXdebugTools: <http://tinyurl.com/vxdebugtools>
- XHProf:
<http://mirror.facebook.net/facebook/xhprof/>
- XHGui: <https://github.com/preinheimer/xhprof>
- Xdebug: <http://xdebug.org>
- If you like Xdebug: <http://xdebug.org/donate.php>
- These slides: <http://joind.in/4357>

