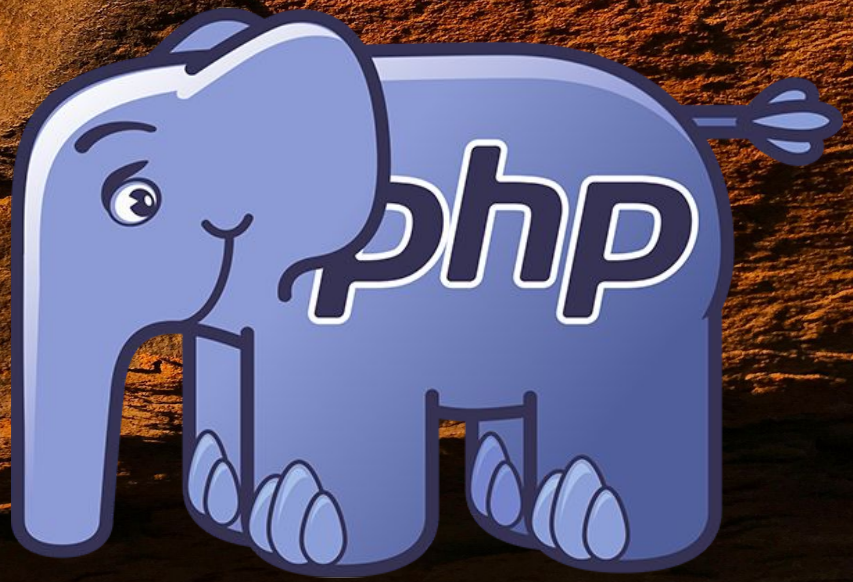
Xdebug

Debugging and profiling PHP



Prepared for PHP Sydney meet-up

28th November 2019

Kev Staunton-Lambert

pyrmontbrewery.com

what is the Xdebug Zend Extension module?

PHP Zend VM is the opcode stack machine interpreter

Xdebug is Derick's extension *(donations welcome)* which uses the common DeBugGer protocol (DBGp) to step opcodes and re-interpret what's on the stack

This allows you see/rerun code remotely with live input

Works well with FPM-PHP, i.e. debug your webservices!
But will hold up a process so important to use separate IP FastCGI port or dedicated debugging endpoint (not prod!)

how does it work?

Traverses opcodes until hits a PHP line or sees a condition

(Line 10)

```
require_once("lib/some_other.class.php");
```

```
line     #* E I O opcode                operands
-----------------------------------------------------------------------------
   9     0  E >   EXT_STMT
         1        EXT_FCALL_BEGIN
         2        INCLUDE_OR_EVAL      'lib%2Fsome.class.php', REQUIRE_ONCE
         3        EXT_FCALL_END
  10     4        EXT_STMT
         5        EXT_FCALL_BEGIN
         6        INCLUDE_OR_EVAL      'lib%2Fsome_other.class.php', REQUIRE_ONCE
         7        EXT_FCALL_END
```

Vulcan Logic Dumper (vld) - also Derrick's work -

https://github.com/kevleyski/vld

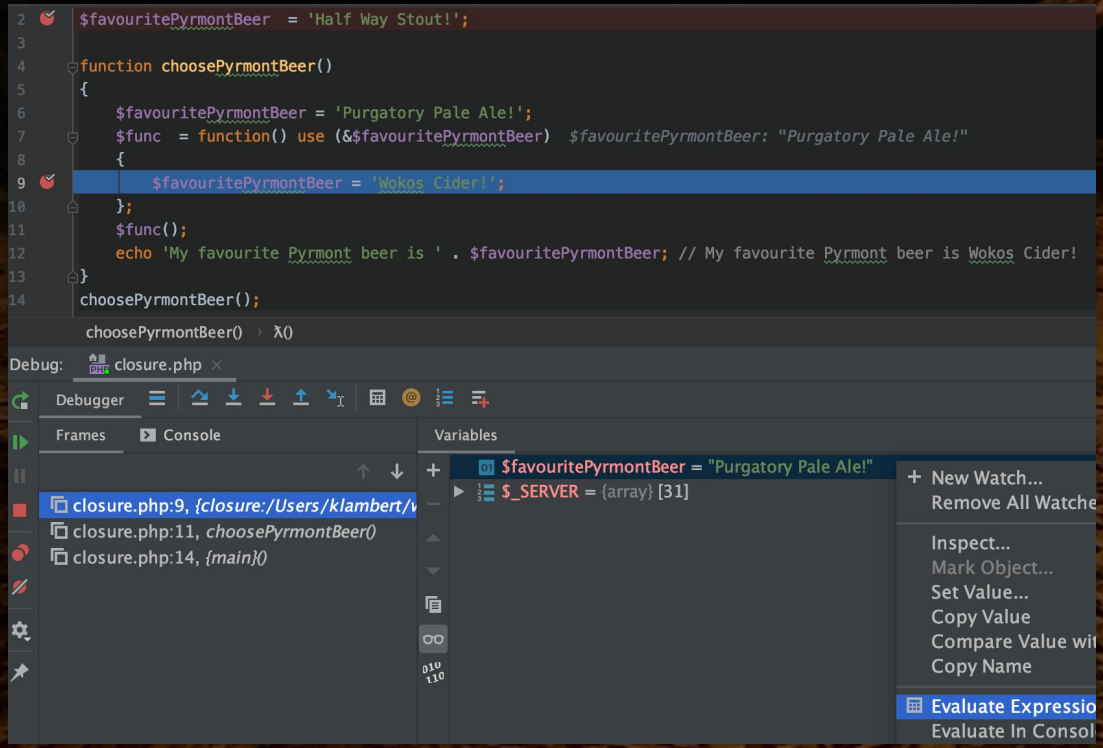
why would I want that? echo is my best mate!

Ever written a dev routine to dump a complex object state?

Auto stack trace on exception useful?

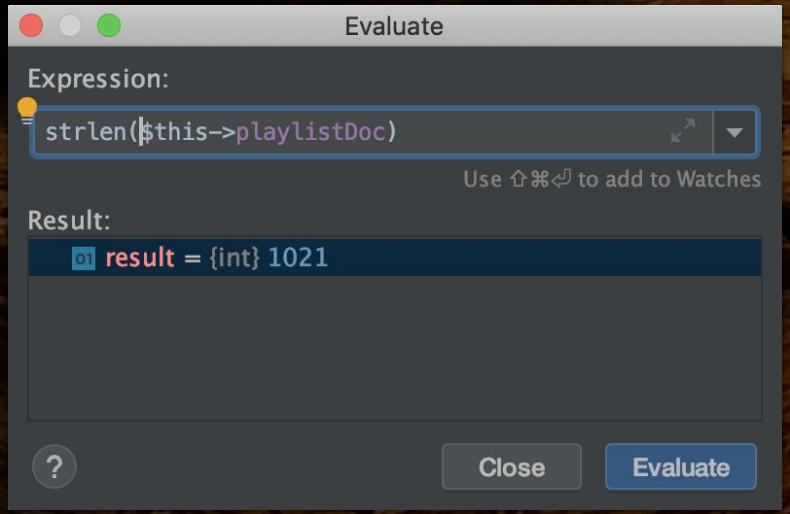
Closure debugging

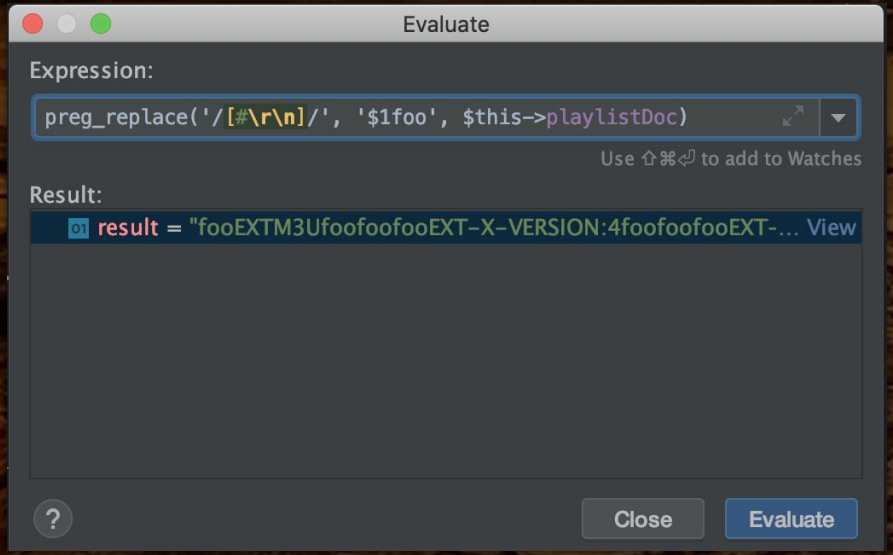
Parallel debugging
(multiple debug ports and IDE ids)



how else is Xdebug useful - Real time evaluation

Evaluate / Re-run a function whilst on a breakpoint
Helps you figure out regexp/xpaths against your *real data*
without restarting script





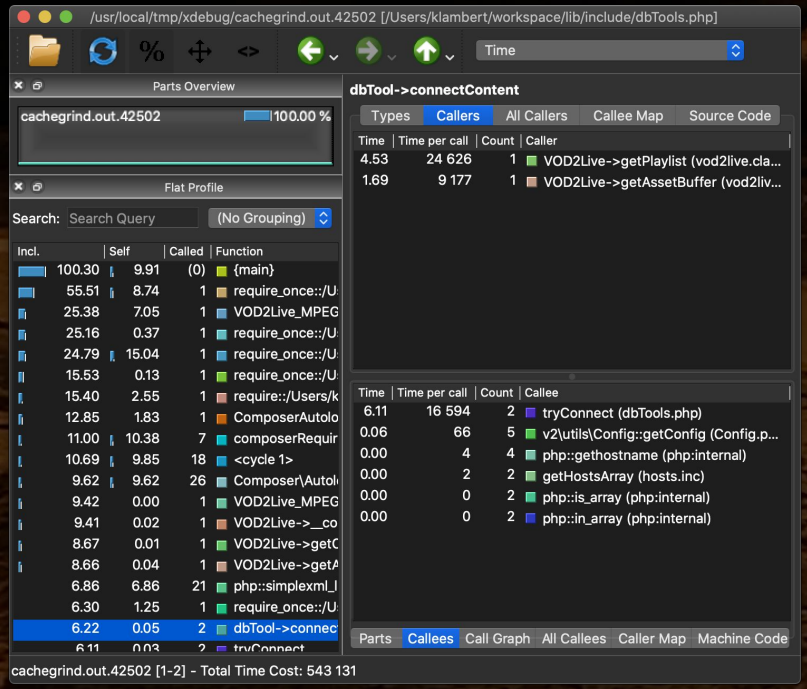
what else? Profile your code!

Want to actually see how well your last edit just ran?

Compare an earlier metric?

Which sets of opcodes (functions) get hit most often? Where to optimise

See code coverage, whats not being hit by PHPUnit



how to set up the extension (php.ini or php.d)

Grab the extension via pickle for your version of PHP

```
pecl install xdebug
```

Add the extension to *<php_version>*/php.d/15-xdebug.ini

```
zend_extension="php/modules/xdebug.so"
```

Note: If you want to use Xdebug and OPCache together, you *must* load xdebug.so *after* the opache.so extension

(and, if using FPM) systemctl php-fpm.service restart :-)

how to set up the extension - Docker container

Of course can spin up modified Dockerfile for your existing container modified for remote debugging purposes...

```
RUN echo "xdebug.remote_enable=1" >>
/etc/php/7.3/php.d/15-xdebug.ini

RUN echo
"xdebug.remote_host=your_host_name_or_ip" >>
/etc/php/7.3/php.d/15-xdebug.ini
```

how to configure remote server debugging (.ini)

```
[Xdebug]
zend_extension=/usr/local/lib/php/pecl/2018073/xdebug.so
xdebug.remote_host="<your_ip_address>"
xdebug.remote_autostart = 1
xdebug.remote_enable = 1
xdebug.remote_port="9001"
xdebug.idekey="klambert2"
xdebug.remote_connect_back = 0
```

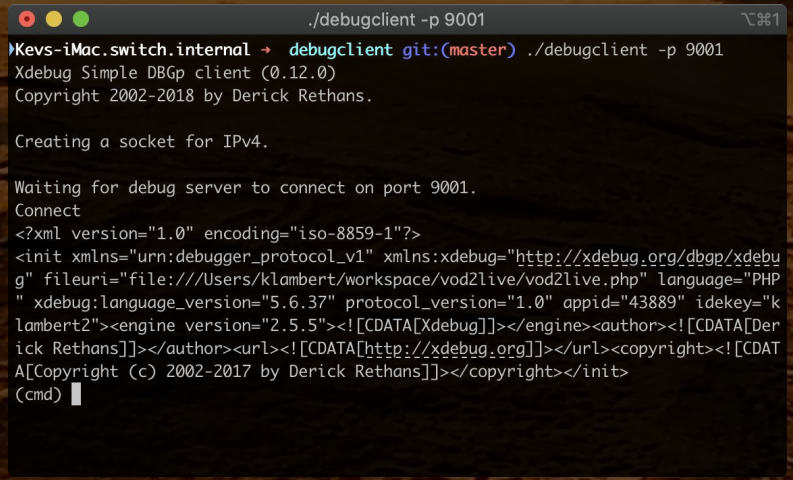
Autostart is particularly important when debugging parallel/multithreaded code else you need to send XDEBUG_SESSION_START=1 for all threads

Set this to 1 if you have multiple people debugging on the same server otherwise use remote_host

how to set up local debugclient (opensource)

Easy enough to just build it yourself from Xdebug repo

```
https://github.com/kevleyski/xdebug.git
cd debugclient
autoconf
./configure --with-libedit
make
sudo make install
```



how to configure a remote server profiler (.ini)

Decide where you want the raw **cachegrind.out.** files

```
[Xdebug]

...

xdebug.profiler_enable=1

xdebug.profiler_output_dir="/usr/local/tmp/xdebug/"

xdebug.profile_enable_trigger=1

xdebug.trace_enable_trigger=1
```

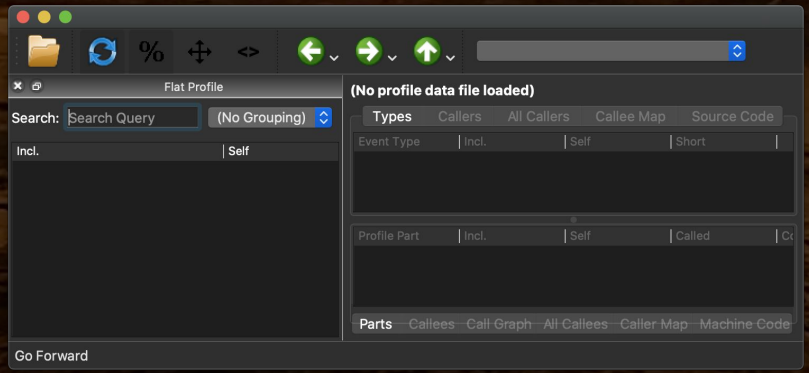
how to set up profiler - qcachegrind (opensource)

Again build it yourself (you'll need Qt5 SDK + graphviz)

```
git clone https://github.com/kevleyski/kcachegrind.git

cd qcachegrind
qmake -spec 'macx-clang'
make
```

Note, make sure
xdebug.profiler_output_dir
is writable, or this won't work
(you'll also want to scp files)



how to get DBGp commands to your remote

Set debug port same as your remote (confusingly, the default port *9000* is a common FastCGI port - you *probably* don't want that)

```
./debugclient -p 9001
```

```
Xdebug Simple DBGp client (0.12.0)
Copyright 2002-2018 by Derick Rethans.
Creating a socket for IPv4.

Waiting for debug server to connect on port 9001.

Connect
```

debugclient preflight check you're all set to go

Verify your IDE key + remote debug port actually opened

```
(cmd) status -i klambert2
```

```
<?xml version="1.0" encoding="iso-8859-1"?>

<response xmlns="urn:debugger_protocol_v1"
xmlns:xdebug="http://xdebug.org/dbgp/xdebug"
command="status"
transaction_id="your_ide_key_you_set_earlier"
status="starting" reason="ok"></response>
```

debugclient setting a code breakpoint (line 10)

Set your PHP script running (however you usually do that, e.g. hitting an endpoint **?XDEBUG_SESSION_START=1**
or from shell command line

```
XDEBUG_CONFIG="idekey=klambert2" php
script.php 329 123
```

PHP will pause until you step into it from the debugger

```
(cmd) breakpoint_set -i klambert2 -t line -f
file:///path/script.php -n 10
```

```
<?xml version="1.0" encoding="iso-8859-1"?>
<response xmlns="urn:debugger_protocol_v1" xmlns:xdebug="http://xdebug.org/dbgp/xdebug"
command="breakpoint_set" transaction_id="klambert2" id="477600001"></response>
```

debugclient get property values from the stack

```
(cmd) step_into -i klambert2

(cmd) property_value -i klambert2 -n ext
```

```
<?xml version="1.0" encoding="iso-8859-1"?>

<response xmlns="urn:debugger_protocol_v1"
xmlns:xdebug="http://xdebug.org/dbgp/xdebug"
command="context_get" transaction_id="klambert2"
context="0">...<property name="$ext" fullname="$ext"
type="uninitialized"></property><property name="$m3u8"
fullname="$m3u8" type="uninitialized"></property></response>
```

wtf? that all seems a bit hard! *Easier alternatives*

As you can see, sending raw DBGp commands to your remote is not the most inviting debugging experience!

but there is good news! These tools will call DBGp for you

- Vim with Vdebug
- Eclipse IDE *(preferences > php > debug > debuggers)*
- Notepad++ with DBGP Plugin
- Microsoft VSCode with PHP Debug Adapter
- JetBrains PHPStorm, *and others...*

vi Xdebug debugger with vdebug plugin

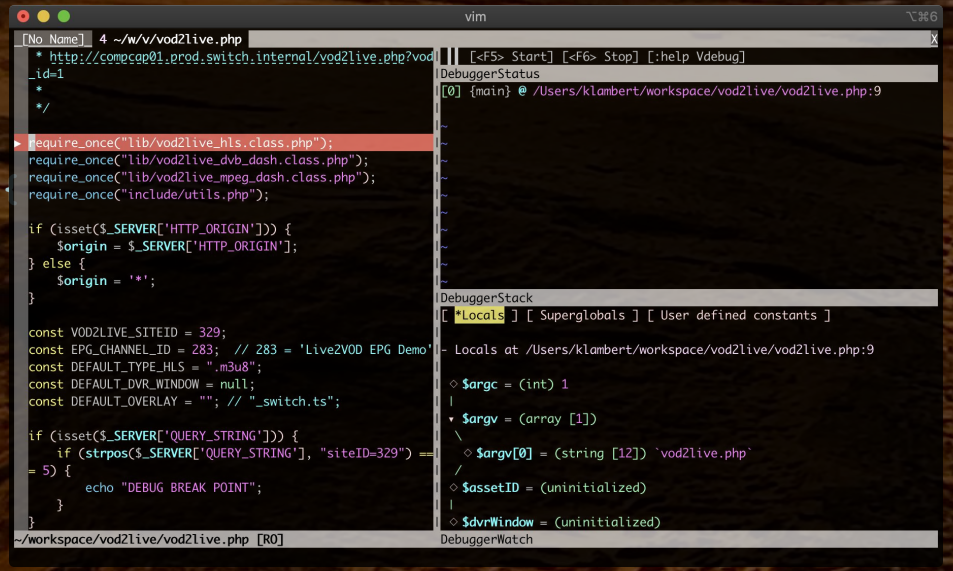
Pre-req you'll need vim built with python3 and pydbgp

```
git clone https://github.com/kevleyski/vdebug
mv vdebug/* ~/.vim/
pip3 install komodo-dbgp
```

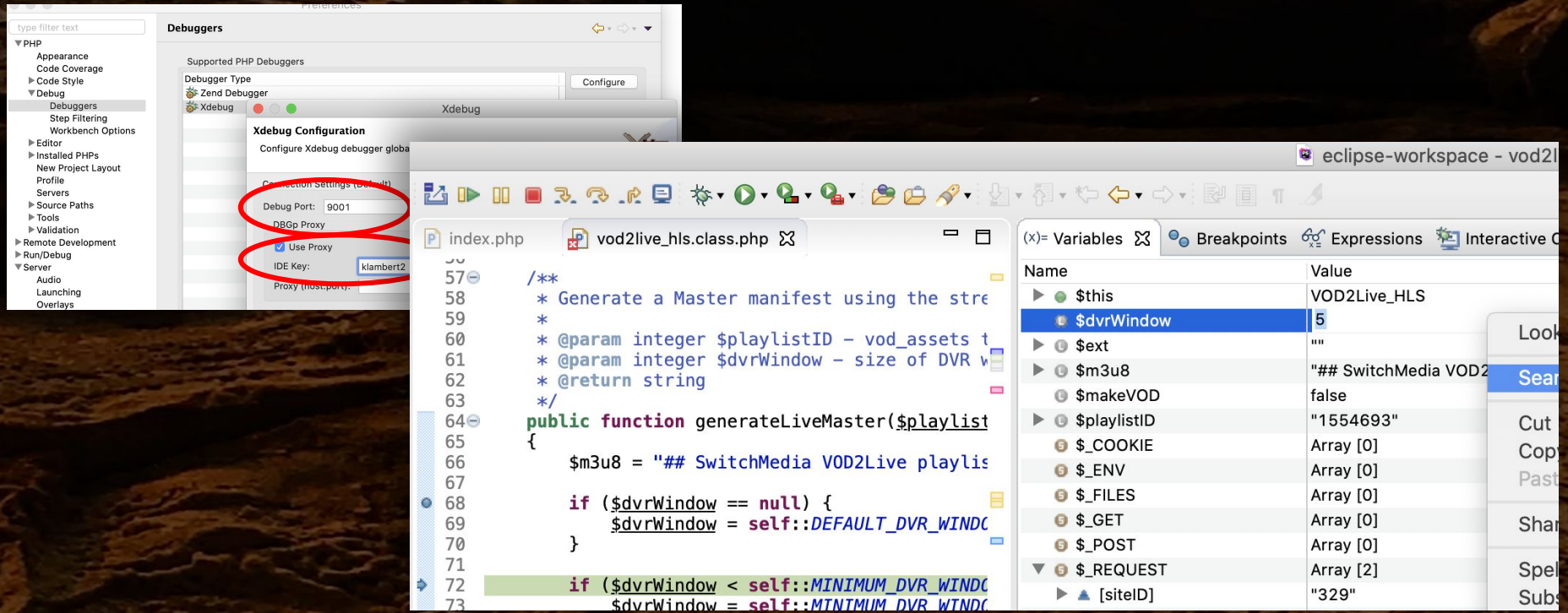
~/.vim/plugin/vdebug.vim

```
let g:vdebug_options_defaults =
\    'port' : 9001,
\    'ide_key' : 'klambert2',
```

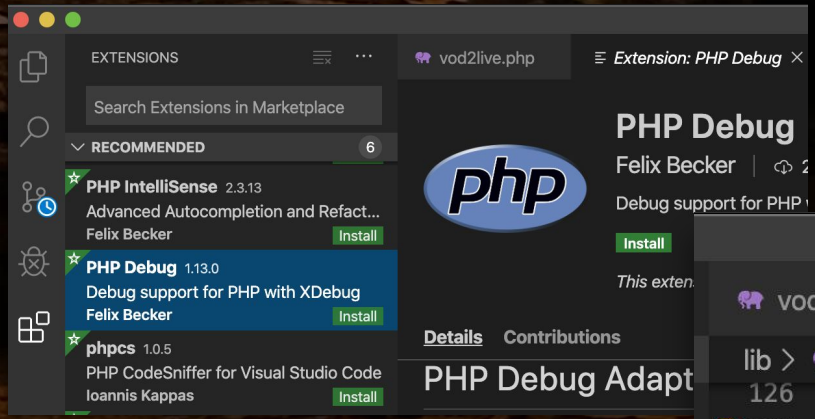
Connect to debugger F5
(run your PHP, F2 to step)

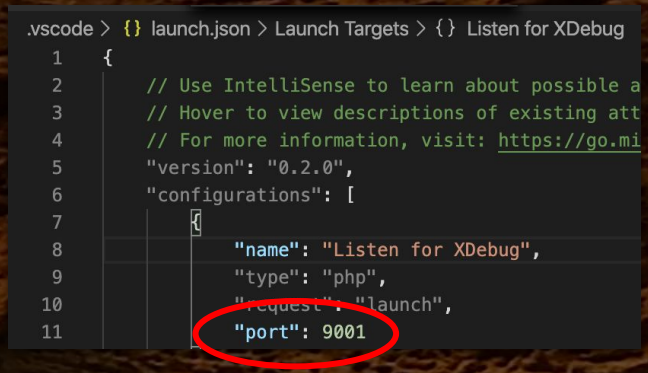


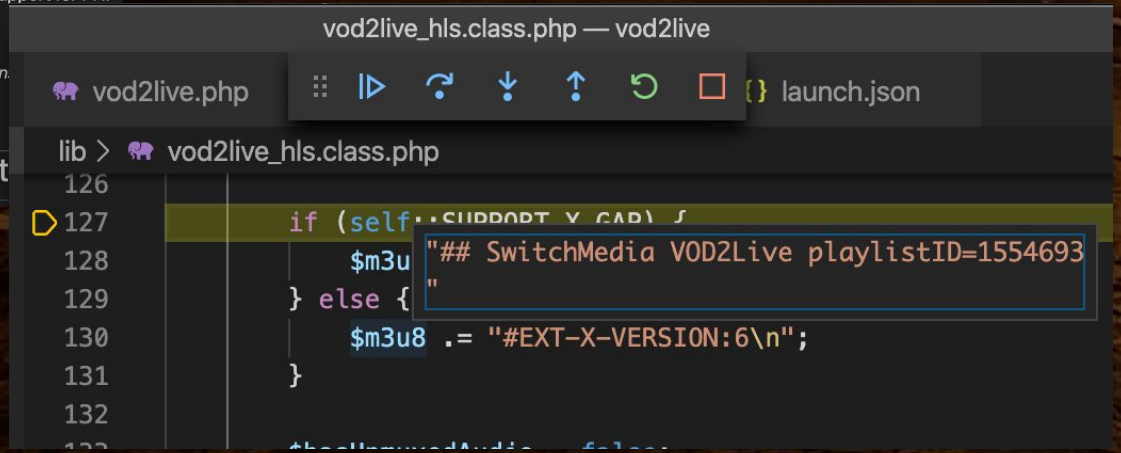
eclipse Xdebug setup and basic call stack



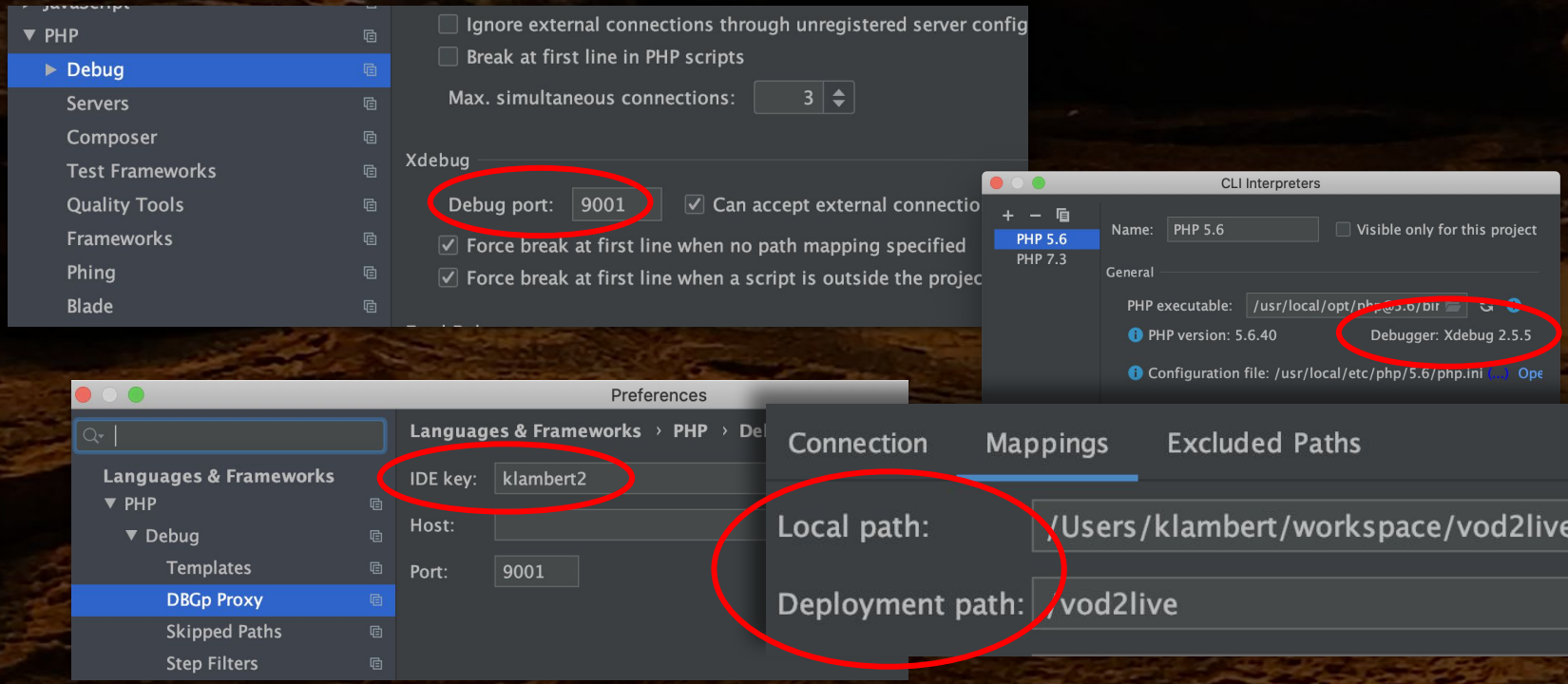
vs code Xdebug setup



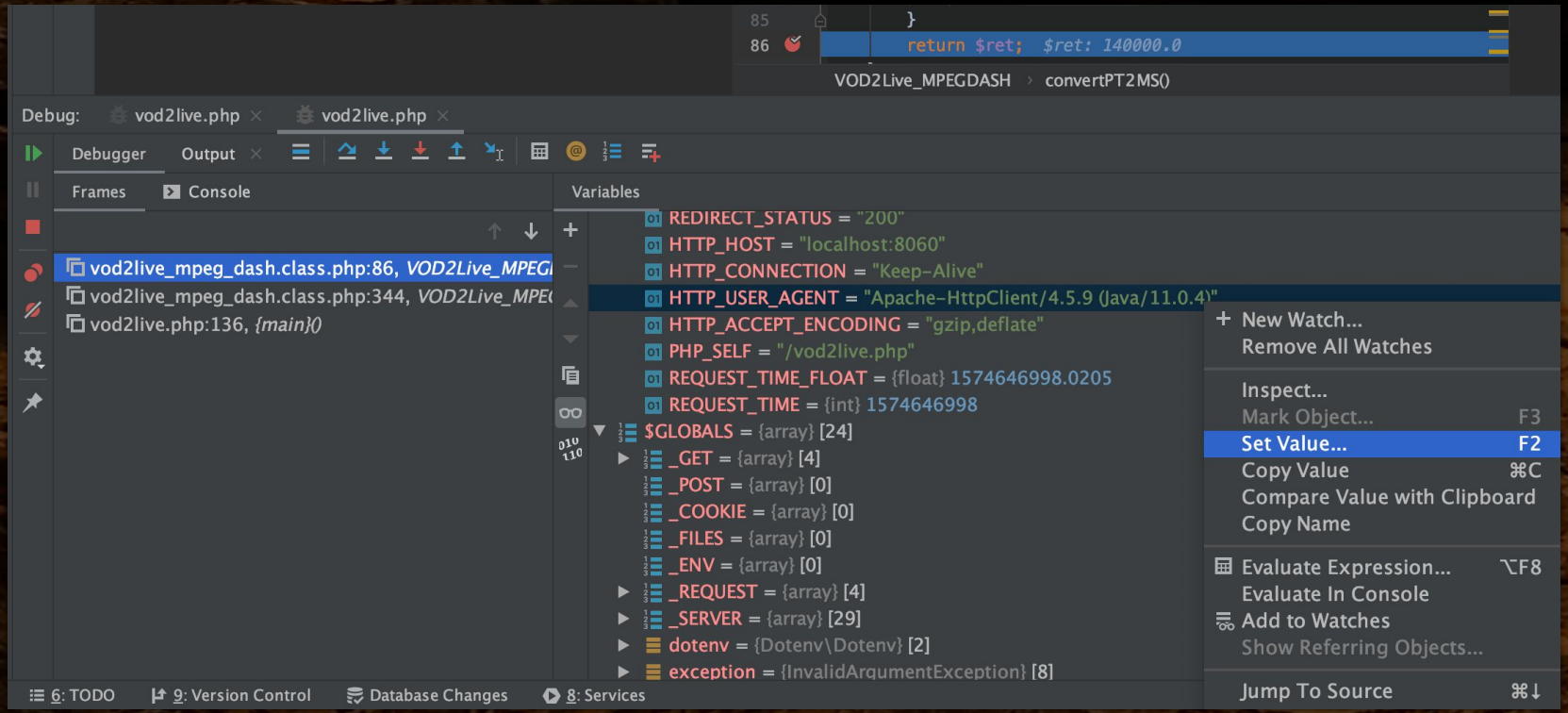




PHPStorm Remote server source mapping

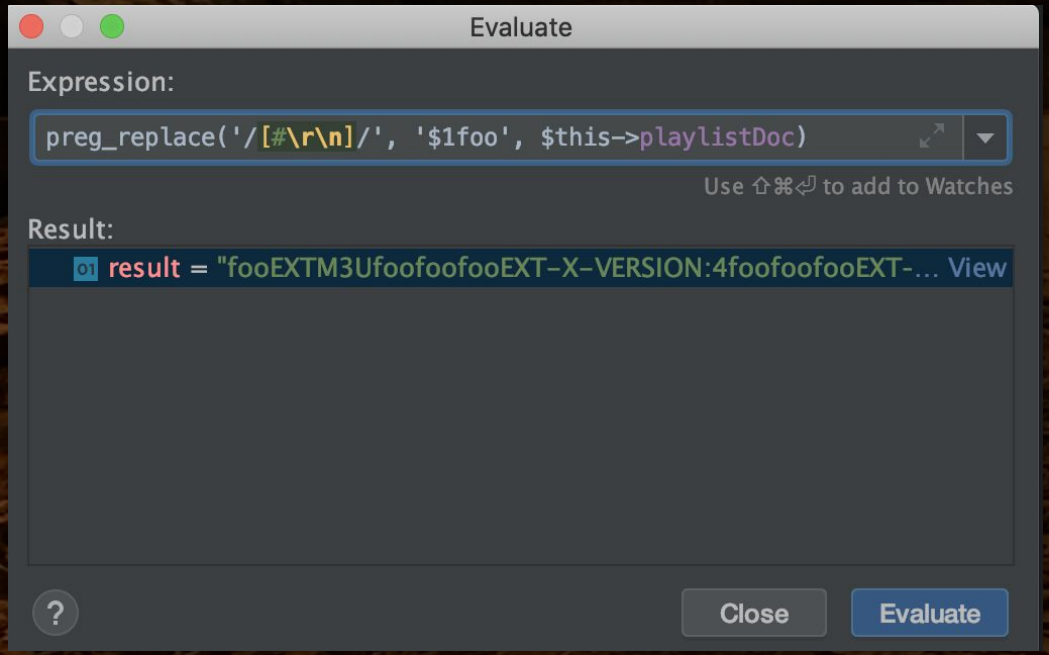


PHPStorm Bloody great debugger! *(but not free)*

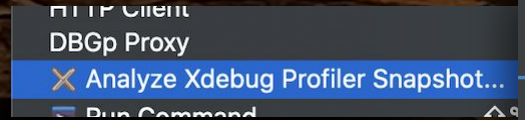


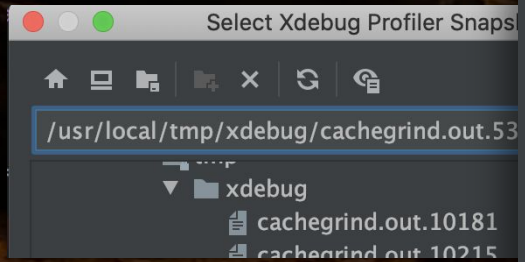
PHPStorm Evaluate (super powerful feature)

(re) Eval with real live data (regexp/xpath/sql)



PHPStorm Profiler (source map and quick view)





Server: vod2live.switch.tv ... Time: ms Refresh

Execution Statistics | Call Tree

Callable	Time	Own Time	Calls
/Users/klambert/workspace/vod2live/vod2live.php	544 100.0%	53 9.9%	1 0.0%
require_once::/Users/klambert/workspace/vod2live/lib/vod2live_hls.class.php	301 55.3%	47 8.7%	1 0.0%
VOD2Live_MPEGDASH->generateLiveMaster	136 25.1%	38 7.1%	1 0.0%
require_once::/Users/klambert/workspace/lib/v2/classes/playlist.class.php	136 25.1%	2 0.4%	1 0.0%
require_once::/Users/klambert/workspace/lib/v2/classes/playlistItem.class.php	134 24.7%	81 15.0%	1 0.0%
require_once::/Users/klambert/workspace/vod2live/lib/vod2live.class.php	84 15.5%	0 0.1%	1 0.0%
require::/Users/klambert/workspace/vod2live/vendor/autoload.php	83 15.4%	13 2.6%	1 0.0%
ComposerAutoloaderInit8efddde39bf7eb58d4b048a3fbff29bc::getLoader	69 12.8%	9 1.8%	1 0.0%
composerRequire8efddde39bf7eb58d4b048a3fbff29bc	59 11.0%	56 10.4%	7 0.2%
php::spl_autoload_call	58 10.7%	0 0.1%	27 0.6%
Composer\Autoload\ClassLoader->loadClass	57 10.5%	0 0.1%	26 0.6%

Callees | Callers

Callable	Time	Calls
php::floor	0 0.0%	397 8.8%
php::DateInterval->format	0 0.0%	3 0.1%
php::hash	0 0.0%	21 0.5%
▼ VOD2Live->getCurrentVodID	47 8.6%	1 0.0%
▼ VOD2Live->getAssetBuffer	47 8.6%	1 0.0%
▼ dbTool->getSingleRowAssoc	8 1.6%	2 0.0%
php::mysqli_result->fetch_assoc	0 0.0%	6 0.1%
php::mysqli_result->close	0 0.0%	5 0.1%
▼ dbTool->doQuery	18 3.4%	5 0.1%
php::mysqli->query	18 3.4%	5 0.1%
▶ dbTool->__construct	0 0.1%	2 0.0%

Thanks!

Slides are here:
https://tinyurl.com/**tcln32s**

DBGp reference:
https://xdebug.org/docs/dbgp
Also www.phpinternalsbook.com

php@pyrmontbrewery.com.au