Who I Am

- Daniel Leech
- From England
- Open Source Developer
- Bicycle Tourer

Open Source Developer

- Symfony CMF Core Team
- Sulu CMS
- PHPCR-ODM
- CMF Routing Auto
- PHPCR Shell
- Jackalope FS

Bicycle Tour 2015

Austria

Slovakia

Hungary

Romania

Bulgaria

Turkey

Greece

Albania

Montenegro

Bosnia and Herzegovina

Zagreb!

Why Benchmarking?

Jackalope 2

(this is not the real logo)

Benchmarking

What is Benchmarking?

"In computing, a benchmark is the act of running a computer program, a set of programs, or other operations, in order to assess the ***relative*** performance of an object, normally by running a number of ***standard tests*** and trials against it"

- Wikipedia

What I Talk About When I Talk About Benchmarking

“The measurement of time taken to execute some PHP code compared to the same measurement of equivalent PHP code”

- Me

Microtime!

```php
$start = microtime(true);
// do something
$timeTaken = microtime(true) - $start;
echo 'Time 1: ' . $timeTaken;

$start = microtime(true);
// do something else
$timeTaken = microtime(true) - $start;
echo 'Time 2: ' . $timeTaken;
```

About Microtime

- Amount of time elapsed since the UNIX epoch acurate to a microsecond.
- The symbol for microsecond is µs (Greek “mu”)
- 1 microsecond = 1,000,000th (10^6) of a second!
- Highest degree of precision available in PHP.

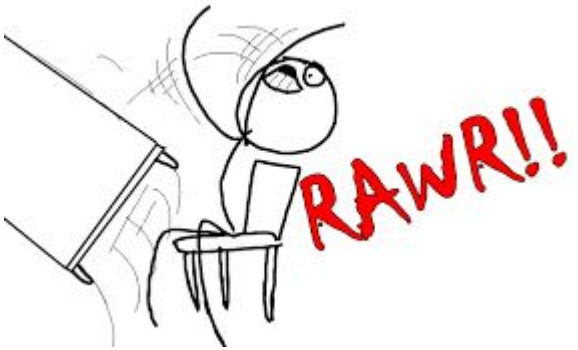
Microseconds

- Human eye blink takes 350,000 microseconds (just over 1/4 of one second).
- Human finger click takes 150,000 microseconds (just over 1/7 of one second).
- Some PHP functions execute < 1µs

Why Would You Want to Benchmark?

- Compare
  - time?
  - memory?
- What
  - algorithms
  - hardware
  - platforms
  - dependencies
- Prevent
  - regressions
- Satisfy
  - your curiosity

WIN



ARGUMENTS

(OBJECTIVELY)

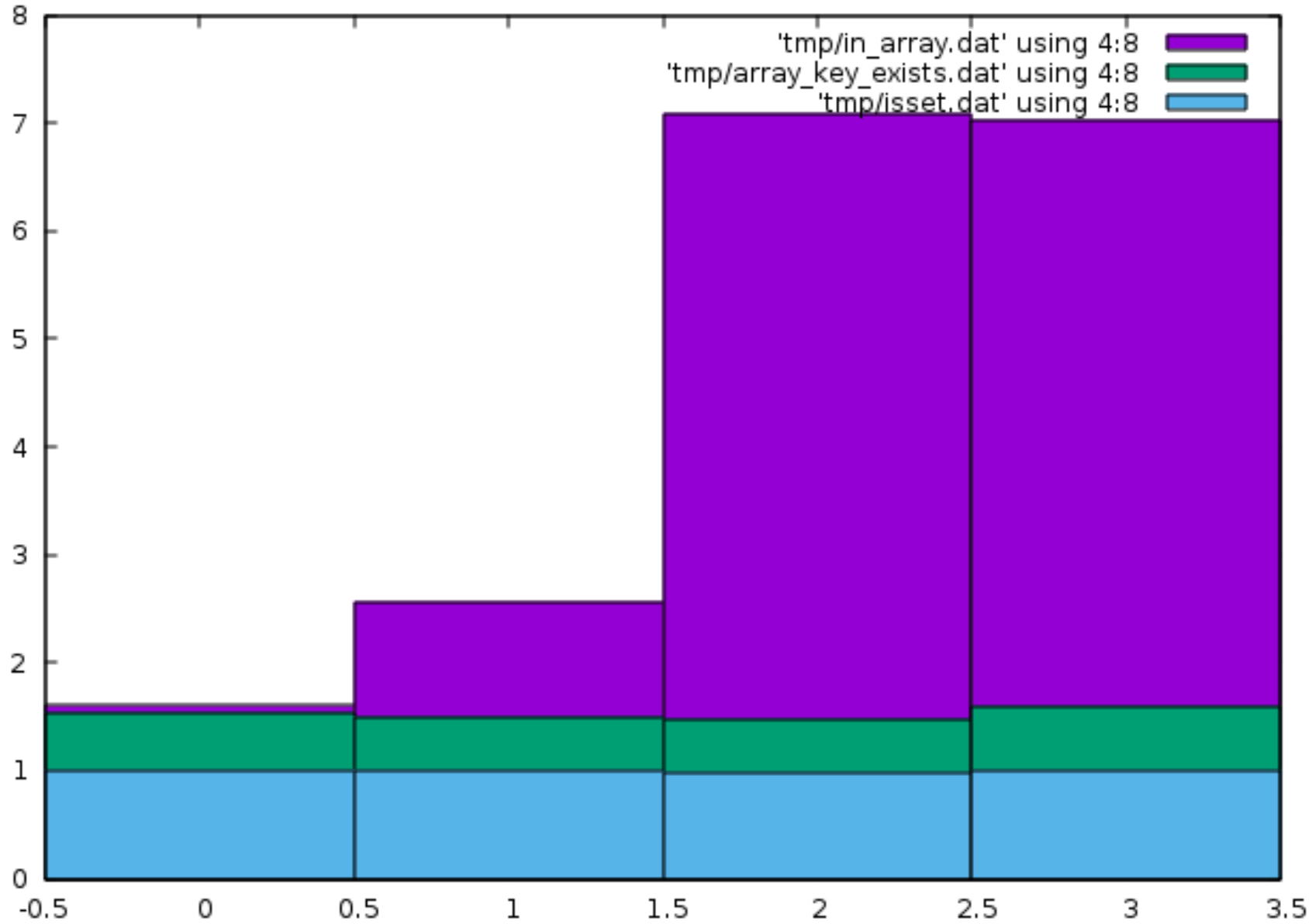
Comparing Stuff

Compare

```
isset($array['foo'])
```

Functions

```
array_key_exists('foo', $array)
```



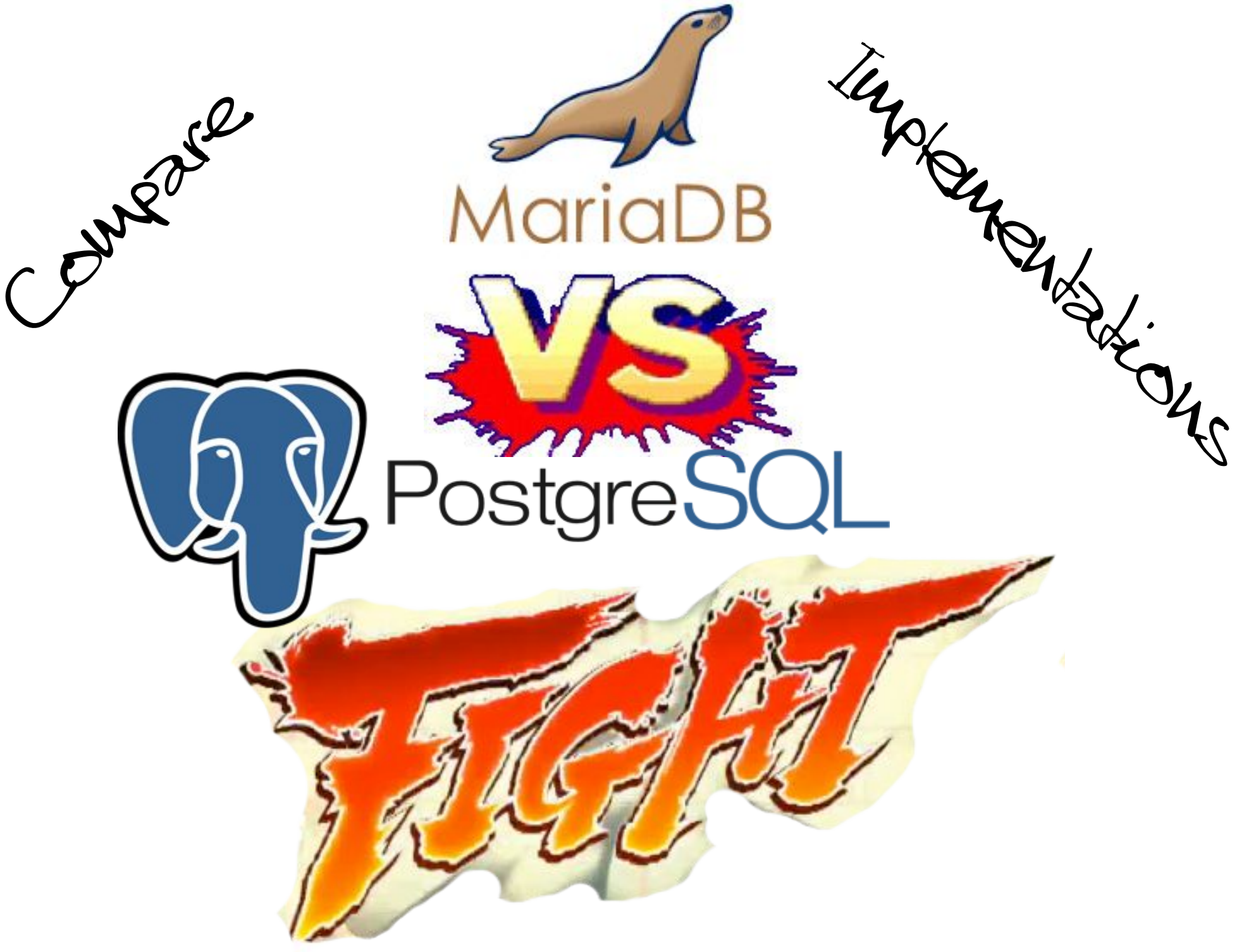
Elements	10	100	1000	10,000

Compare

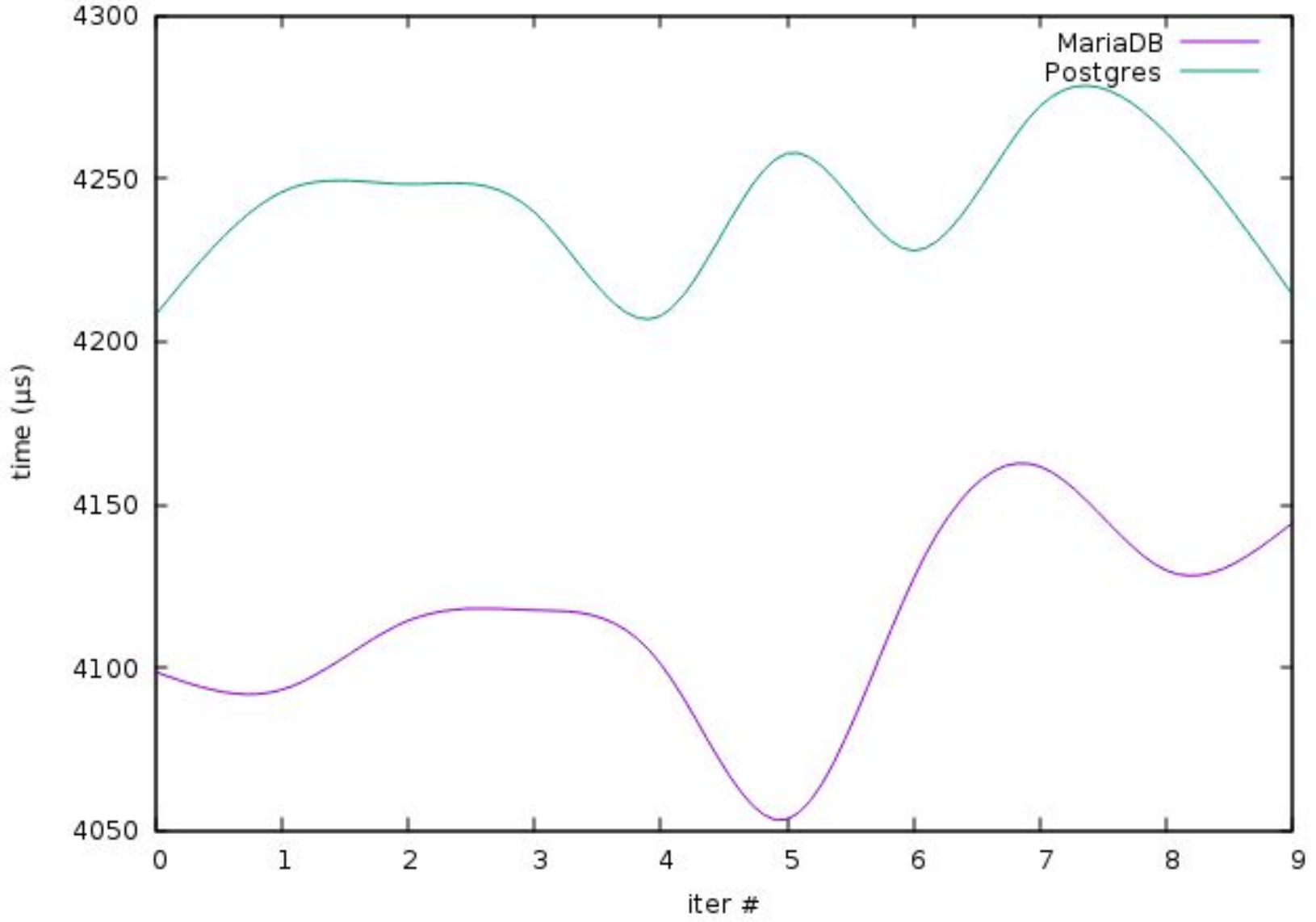
master

Branches

harder_better_stronger_faster

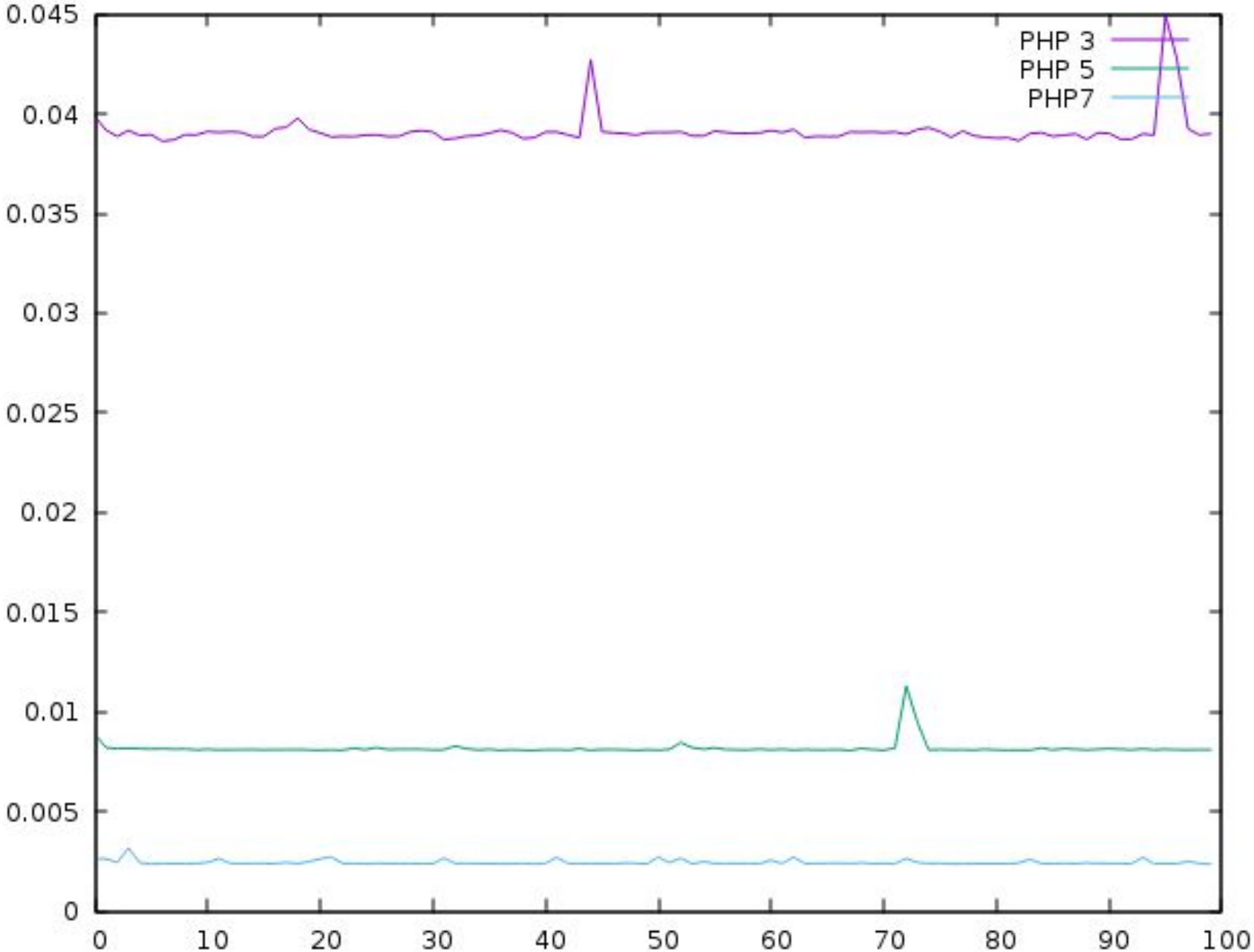

Compare
MariaDB
VS
PostgreSQL
FIGHT
Implementations

Find 100 entities with Doctrine ORM




Compare
Platforms
php 3
VS
php7
FIGHT

md5: PHP3 vs. PHP5 vs. PHP7



Compare

Hardware

Empirical Knowledge

Considerations

Considerations

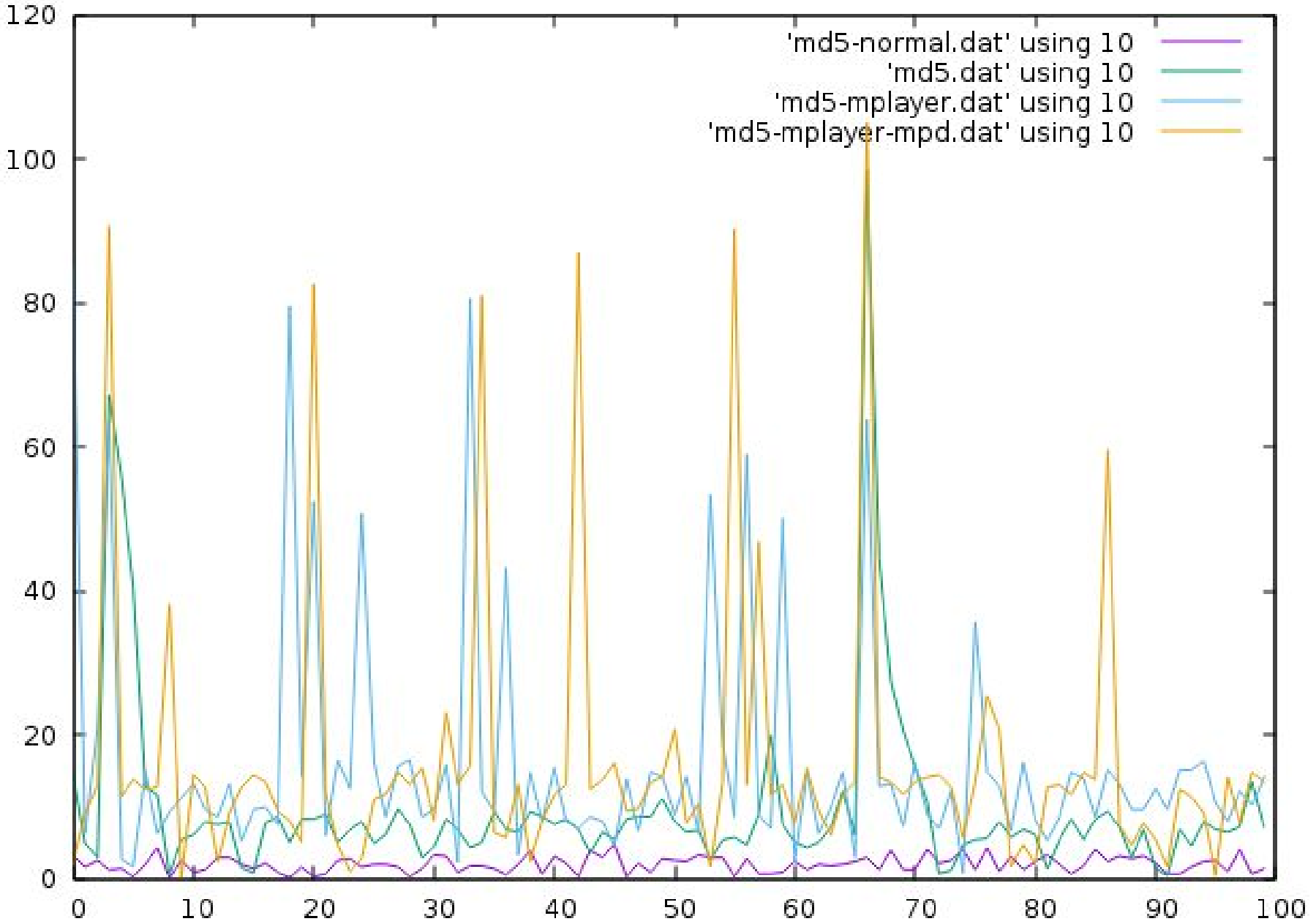
- Major: Stability
- Minor: Observer effect
- Minor: Recovery

Stability

Stability

- Accuracy of benchmarks depend on the ambient load on the machines resources.
- Most machines are not stable.
- Especially developer machines!

MD5 hashing algorithm



Don't watch films and play music when benchmarking.

Observer Effect

“In science, the term observer effect refers to changes that the act of observation will make on a phenomenon being observed.”

- Wikipedia

Observer Effect

- Is not the Uncertainty Prinicple
- Logging
- Profiling
- Benchmarking

Measuring time takes time.

```php
<?php

for ($i = 0; $i < 10; $i++) {
    $start = microtime(true);
    $end = microtime(true);
    echo $i . ': ' . ($end - $start) * (10 ** 6);
    echo PHP_EOL;
}

```

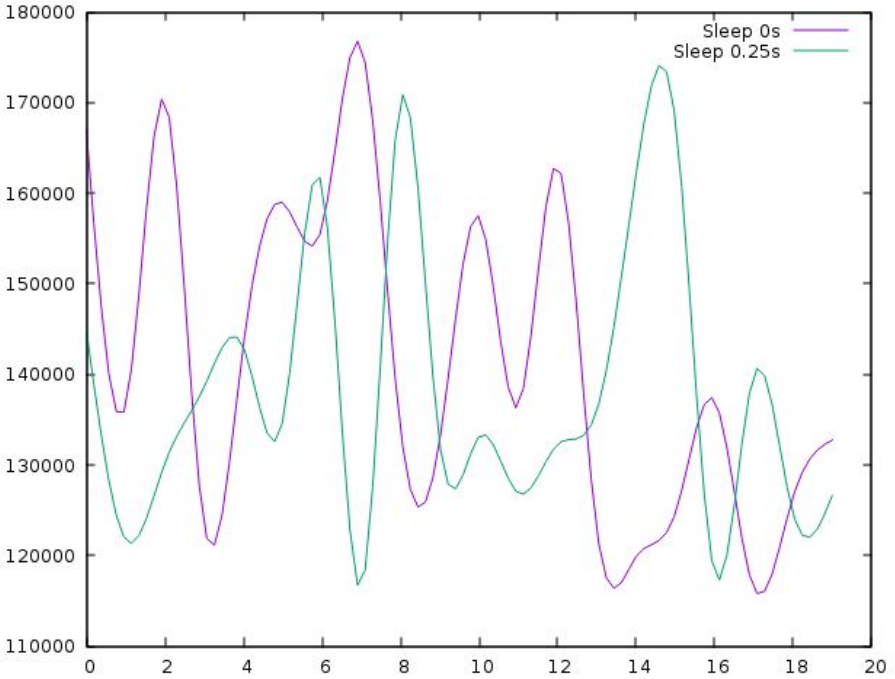
```
~/Tmp ››› php test.php
0: 1.9073486328125
1: 0
2: 1.1920928955078
3: 0.95367431640625
4: 0.95367431640625
5: 1.1920928955078
6: 0
7: 0
8: 0.95367431640625
9: 0
```

Recovery

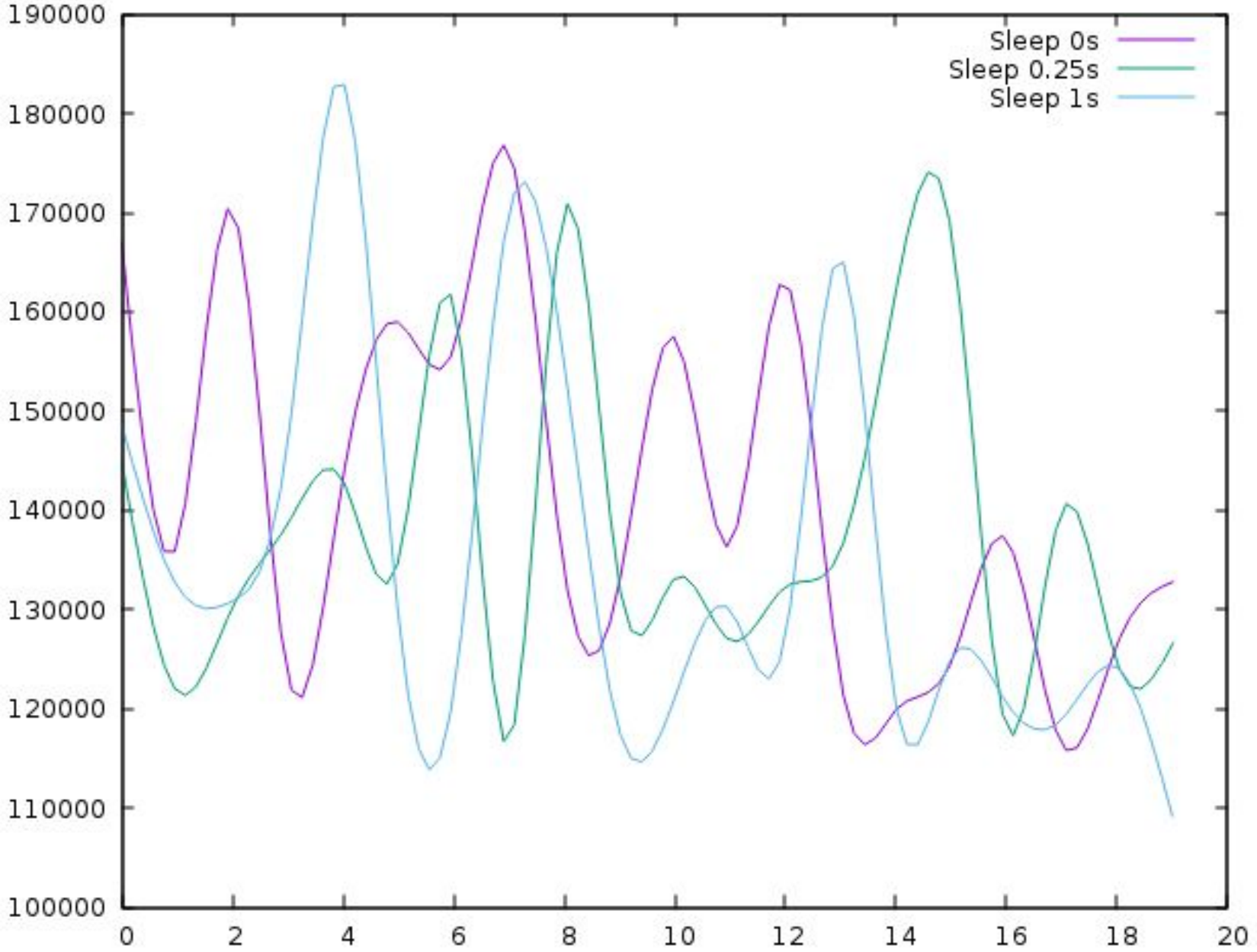
- Sometimes external services may need time to calm down between iterations.
- But many don't.

Sleep with Jackalope DBAL

- 50 iterations
- Querying 1000 nodes
- Sleep doesn't make much difference here.



Sleep with Jackalope DBAL

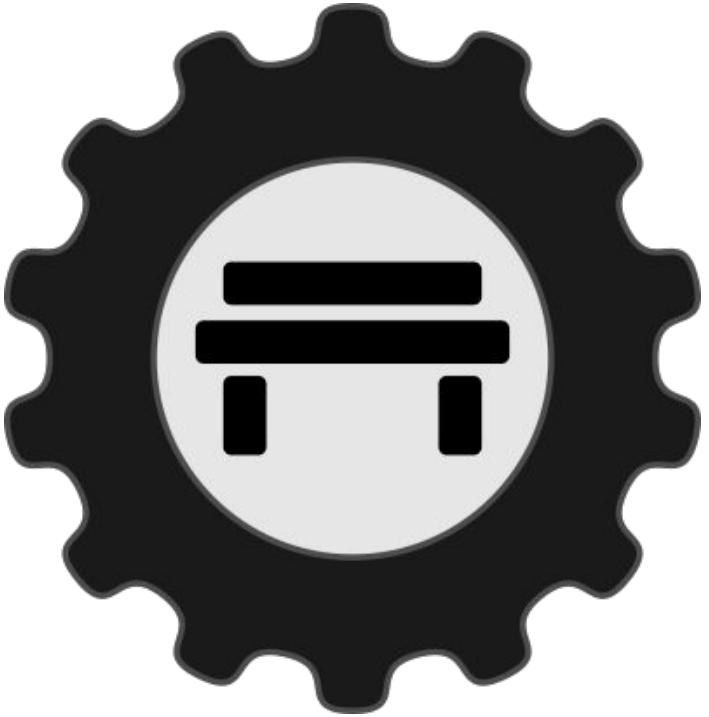


Conclusions

- We benchmark using microtime, because thats the best we have.
- Benchmarking can help you make smart decisions.
- A certain margin of error is unavoidable.
- Resource stability is important.

Questions?

PHPBench



“PHPBench is a Benchmark Runner for PHP which can Generate Reports”

- J. Lennon

What is a Benchmark Runner?

Program that runs *a series of processes* which return the time (and memory) that it took to execute a specified piece of code.

Writing benchmarks in PHPBench

Benchmark Classes

- Must be suffixed with “Bench”.
- Are similar to PHPUnit
- Have their own autoloading env.
- Do not depend on the PHPBench library (not abstract classes, no interfaces).

Benchmarking Hash Algorithms

```php
<?php

class HashBench
{
    public function benchMd5()
    {
        hash('md5', 'hello world');
    }

    public function benchSha256()
    {
        hash('sha256', 'hello world');
    }
}
```

Benchmarking Hash Algorithms

```
~/w/livecoding ❯❯❯ phpbench run HashBench.php --report=default
PhpBench 0.7.0-dev. Running benchmarks.

..
Done (2 subjects, 2 iterations, 0 rejects) in 0.14s


+-----------+-------------+-------+--------+------+-----------+------+-----------+--------+-----------+
| benchmark | subject     | group | params | revs | iter      | rej  | time      | memory | deviation |
+-----------+-------------+-------+--------+------+-----------+------+-----------+--------+-----------+
| HashBench | benchMd5    |       | []     | 1    | 0         | 0    | 11.0000µs | 576b   | 0.00%     |
| HashBench | benchSha256 |       | []     | 1    | 0         | 0    | 11.0000µs | 576b   | 0.00%     |
|           |             |       |        |      |           |      |           |        |           |
|           |             |       |        |      | stability |      | 100.00%   |        |           |
|           |             |       |        |      | average   | 0.00 | 11.0000µs | 576b   |           |
|           |             |       |        |      | sum       | 0.00 | 22.0000µs | 1,152b |           |
+-----------+-------------+-------+--------+------+-----------+------+-----------+--------+-----------+
```

Revolutions

Revolutions

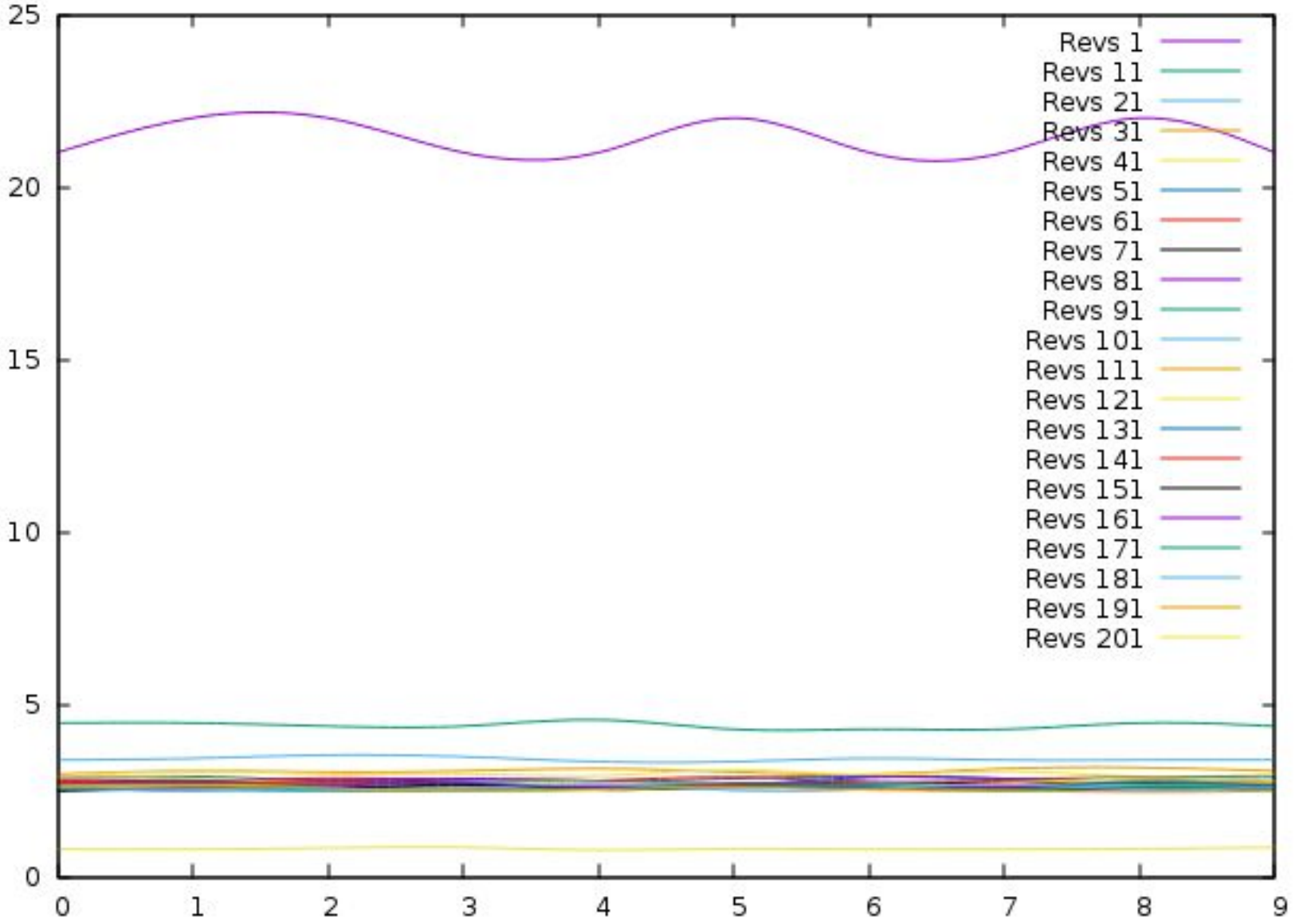
```php
<?php

$revolutions = 10000;

$start = microtime(true);

for ($i = 0; $i < $revolutions; $i++) {
    hash('md5', 'hello world');
}

$end = microtime(true);

$time = $end - $start;
```

Revolutions Increase Precision

time = total time / revolutions

Revolutions	MD5 Time	SHA256 Time
1	9ms	9ms
10	4.6ms	5.00ms
100	2.7ms	3.09ms
1000	1.87ms	2.20ms
10000	1.62ms	2.25ms

Revolutions by iteration against time.



Specifying Revolutions

```php
<?php

/**
 * @Revs(1000)
 */
class HashBench
```

Default revolutions for class

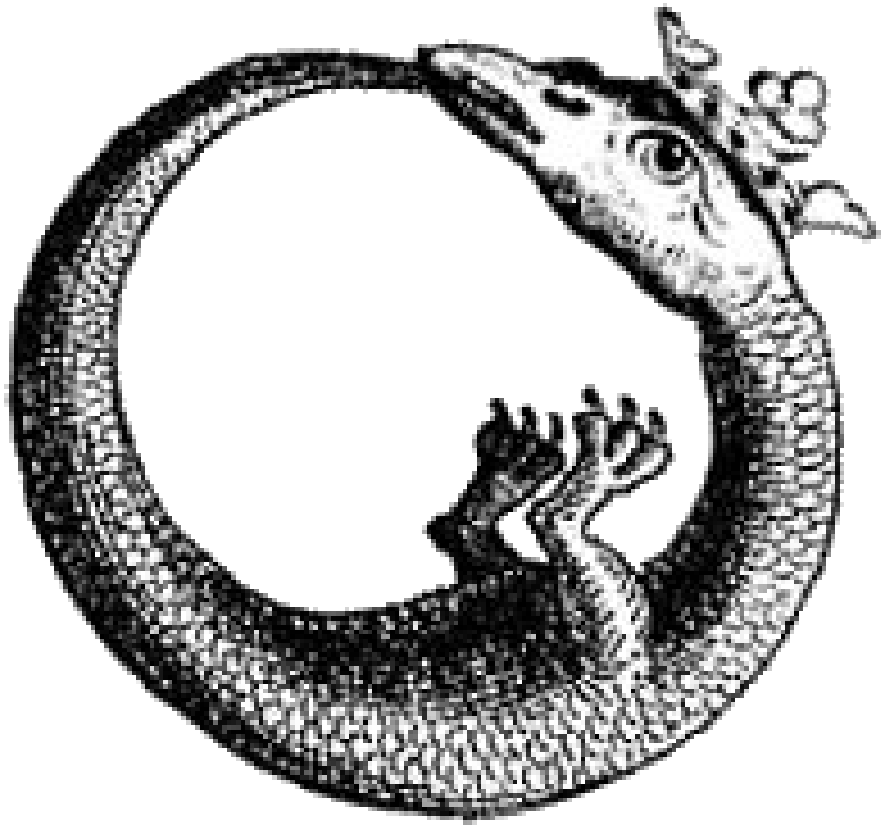
```php
    /**
     * @Revs(2000)
     */
    public function benchMd5()
    {
        hash('md5', 'hello world');
    }
```

Revolutions per method

```
./bin/phpbench run examples/HashBench.php --report=default --revs=1000
```

Revolutions overridden on command line

Iterations and Stability



Iterations Confirm Stability

```
PhpBench 0.7.0-dev. Running benchmarks.

.
Done (1 subjects, 4 iterations, 0 rejects) in 0.38s


+-----------+-----------+-------+--------+-------+-----------+-----+-----------+--------+-----------+
| benchmark | subject   | group | params | revs  | iter      | rej | time      | memory | deviation |
+-----------+-----------+-------+--------+-------+-----------+-----+-----------+--------+-----------+
| HashBench | benchMd5  |       | []     | 10000 | 0         | 0   | 3.0043µs  | 576b   | 3.09%     |
| HashBench | benchMd5  |       | []     | 10000 | 1         | 0   | 3.0631µs  | 576b   | 1.19%     |
| HashBench | benchMd5  |       | []     | 10000 | 2         | 0   | 3.1620µs  | 576b   | 2.00%     |
| HashBench | benchMd5  |       | []     | 10000 | 3         | 0   | 3.1708µs  | 576b   | 2.28%     |
|           |           |       |        |       |           |     |           |        |           |
|           |           |       |        |       | stability |     | 94.46%    |        |           |
|           |           |       |        |       | average   | 0.00 | 3.1001µs | 576b   |           |
|           |           |       |        |       | sum       | 0.00 | 12.4002µs | 2,304b |           |
+-----------+-----------+-------+--------+-------+-----------+-----+-----------+--------+-----------+
```

Stability 94.46%

Iterations Confirm Stability

```
PhpBench 0.7.0-dev. Running benchmarks.

.
Done (1 subjects, 4 iterations, 0 rejects) in 0.37s


+-----------+----------+-------+--------+-------+-----------+-----+-----------+--------+-----------+
| benchmark | subject  | group | params | revs  | iter      | rej | time      | memory | deviation |
+-----------+----------+-------+--------+-------+-----------+-----+-----------+--------+-----------+
| HashBench | benchMd5 |       | []     | 10000 | 0         | 0   | 3.2174µs  | 576b   | 12.17%    |
| HashBench | benchMd5 |       | []     | 10000 | 1         | 0   | 3.2385µs  | 576b   | 12.91%    |
| HashBench | benchMd5 |       | []     | 10000 | 2         | 0   | 1.7709µs  | 576b   | 38.26%    |
| HashBench | benchMd5 |       | []     | 10000 | 3         | 0   | 3.2463µs  | 576b   | 13.18%    |
|           |          |       |        |       |           |     |           |        |           |
|           |          |       |        |       | stability |     | 16.69%    |        |           |
|           |          |       |        |       | average   | 0.00 | 2.8683µs  | 576b   |           |
|           |          |       |        |       | sum       | 0.00 | 11.4731µs | 2,304b |           |
+-----------+----------+-------+--------+-------+-----------+-----+-----------+--------+-----------+
```

bad stability

Stability 16.69%

Specifying Iterations

```php
<?php

/**
 * @Revs(10000)
 * @Iterations(4)
 */
class HashBench
{
    public function benchMd5()
    {
        hash('md5', 'hello world');
    }

    public function benchSha256()
    {
        hash('sha256', 'hello world');
    }
}
```

as a class or method annotation

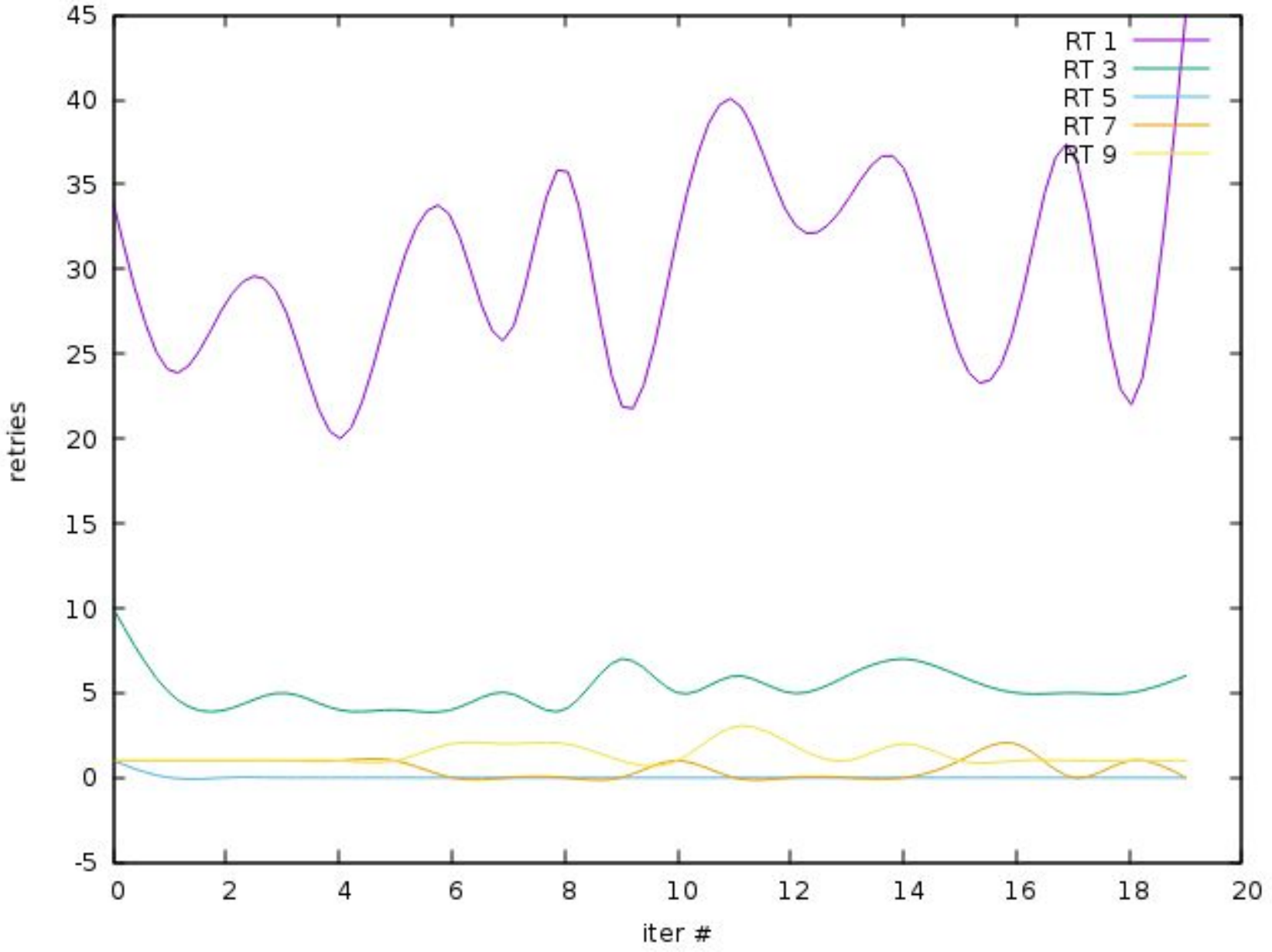
```
./bin/phpbench run examples/HashBench.php --report=default --iterations=10
```

as a command line override

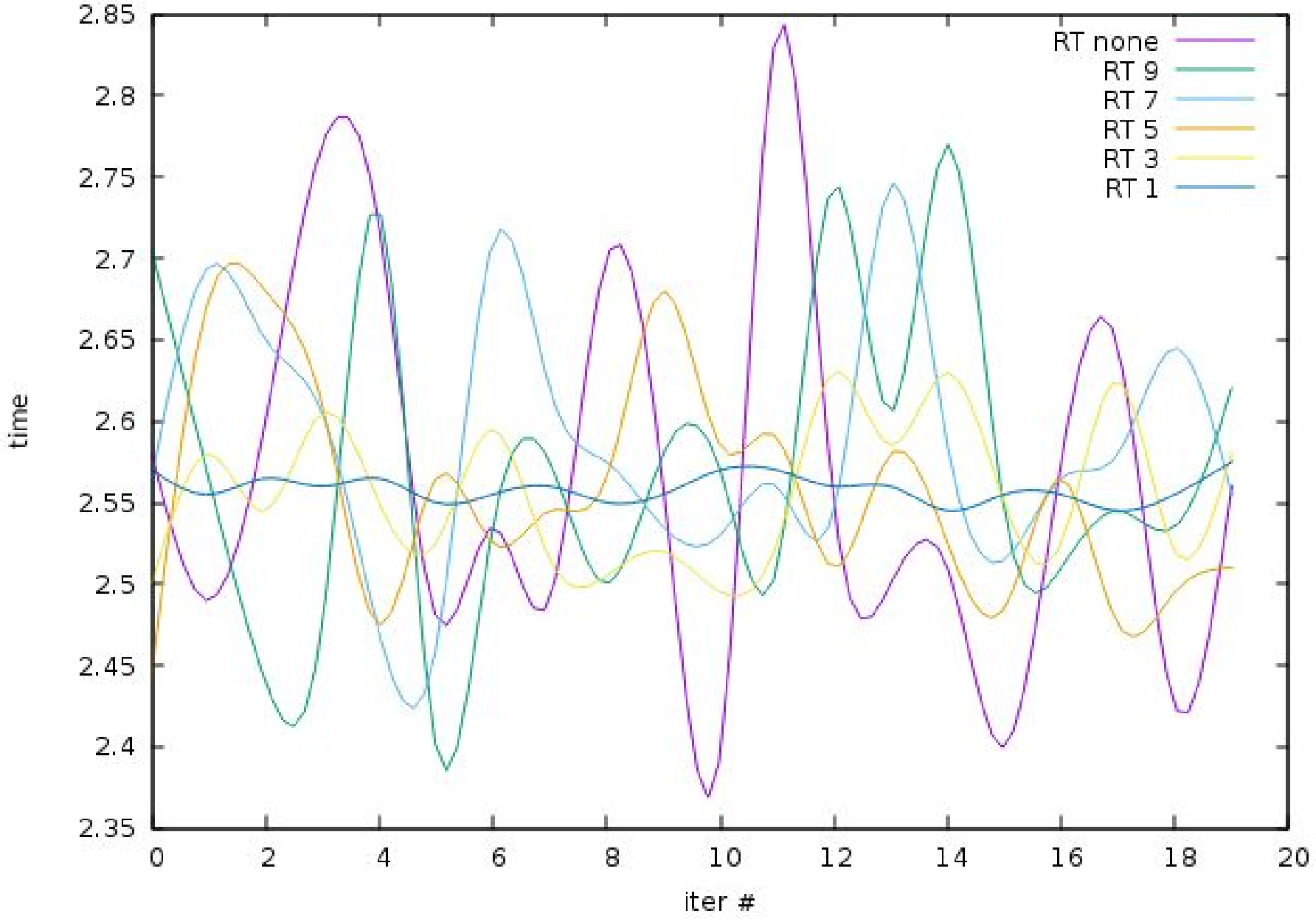
Enforcing Stability: RT

- Specify a retry threshold (RT).
- Rerun the iteration set until all measurements fall within this tolerance level.
- Stability at the cost of time.
- Can be set either from configuration the command line.

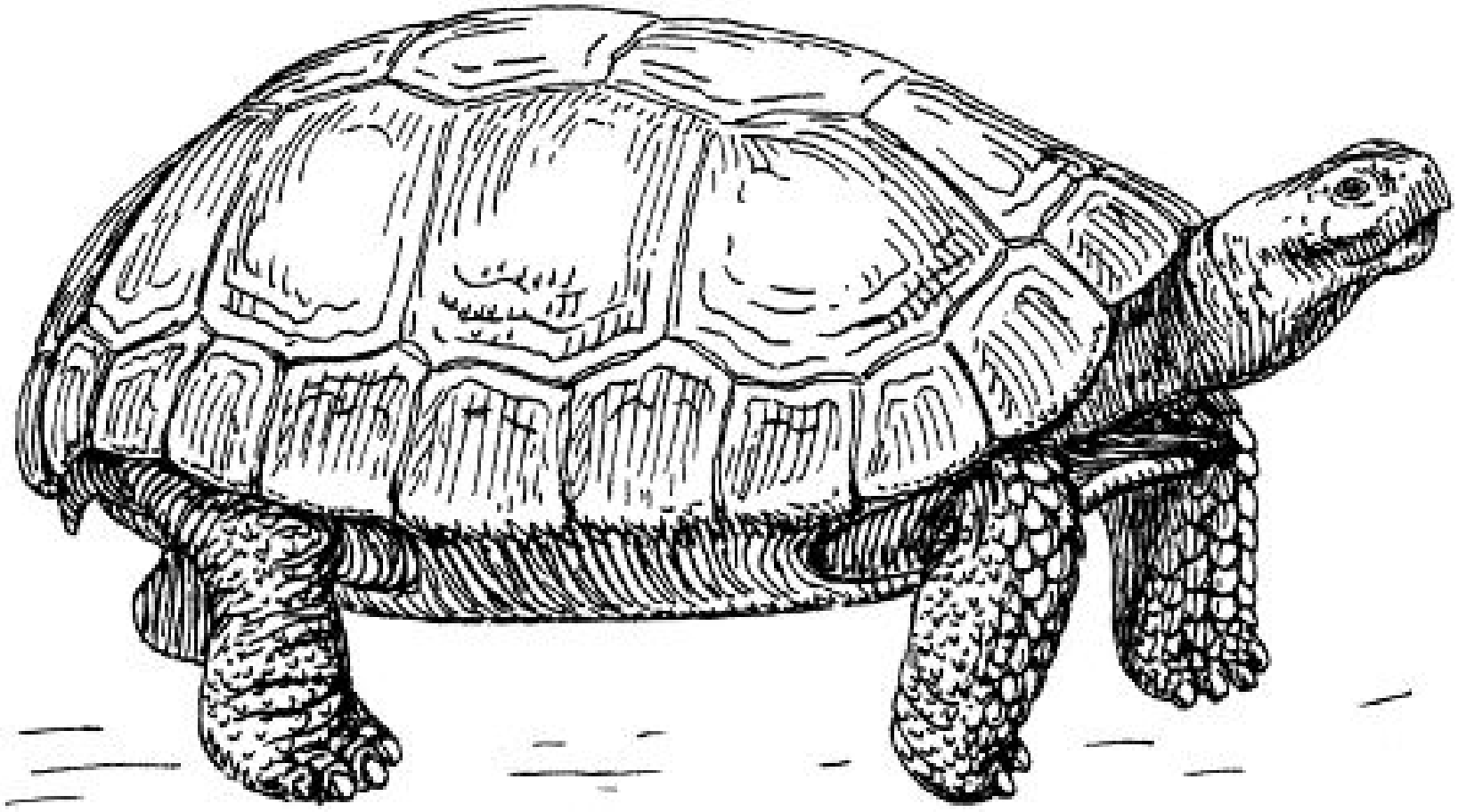
Retry count by retry threshold



Effect of retry threshold feature



Benchmarks Can Be Slow



Benchmarking Slow Things

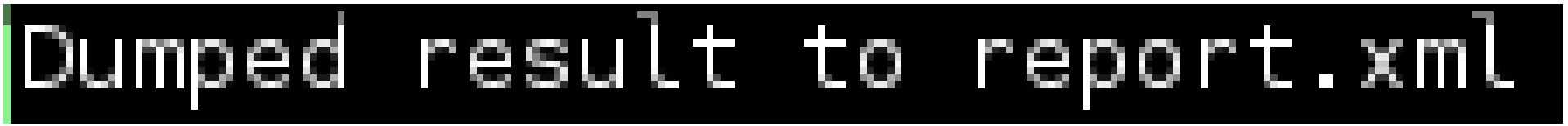
Indexing a large number of documents
in different search implementations

```
~/w/m/MassiveSearchBundle ❯❯❯ ./vendor/bin/phpbench run --config=phpbench.json --dump-file=report.xml
PhpBench 0.5. Running benchmarks.
Using configuration file: phpbench.json

......
Done (6 subjects, 18 iterations) in 106.91s
Dumped result to report.xml
```

1 minute 46 seconds!

Dumping the Results to XML

```
~/w/m/MassiveSearchBundle ❯❯❯ ./vendor/bin/phpbench run --config=phpbench.json --dump-file=report.xml
PhpBench 0.5. Running benchmarks.
Using configuration file: phpbench.json

......
Done (6 subjects, 18 iterations) in 106.91s
Dumped result to report.xml
```



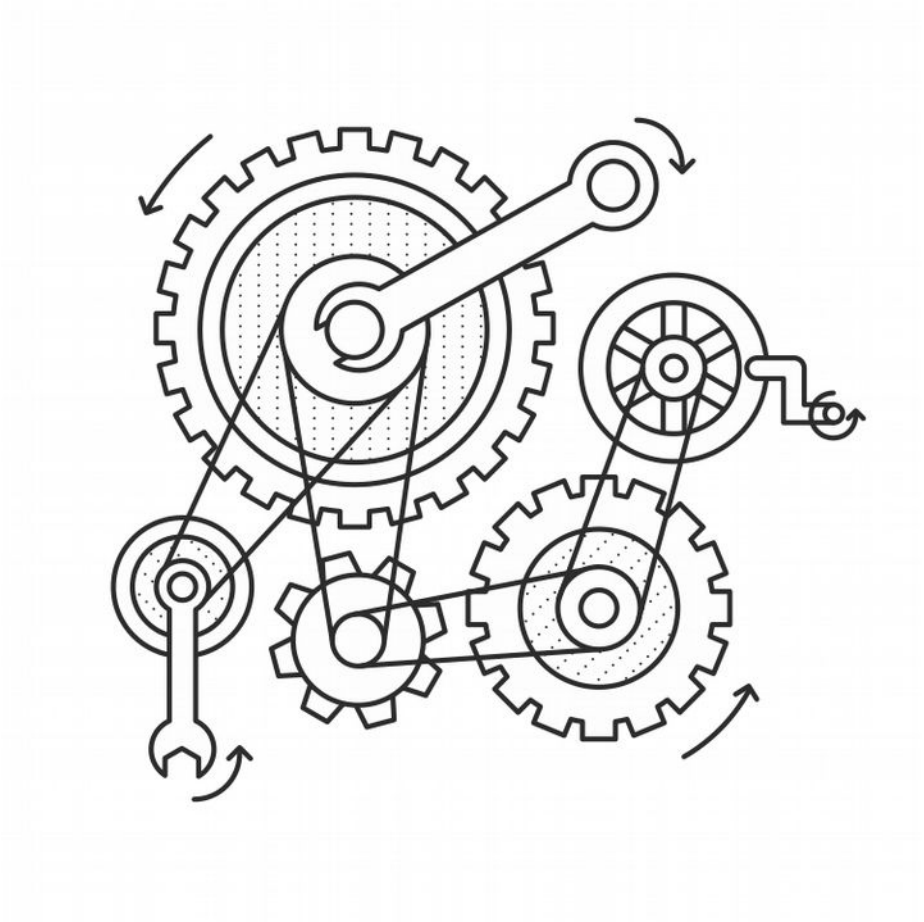
Reporting on the XML file

```
./vendor/bin/phpbench report report.xml --report=aggregate
```

```
~/w/m/MassiveSearchBundle ❯❯❯ ./vendor/bin/phpbench report report.xml --report=aggregate
+-----------------+------------+-------+--------+------+-------+-----------------+------------+------------+-----------+
| benchmark       | subject    | group | params | revs | iters | time            | memory     | deviation  | stability |
+-----------------+------------+-------+--------+------+-------+-----------------+------------+------------+-----------+
| TestBench       | benchIndex |       | []     | 1    | 1     | 465,830.00µs    | 6,914,832b | 0.00%      | 100.00%   |
| ZendLuceneBench | benchIndex |       | []     | 1    | 1     | 45,079,632.00µs | 8,477,904b | +9,577.27% | 100.00%   |
| ElasticBench    | benchIndex |       | []     | 1    | 1     | 4,141,092.00µs  | 7,952,808b | +788.97%   | 100.00%   |
+-----------------+------------+-------+--------+------+-------+-----------------+------------+------------+-----------+
```

Instant Report!

Configuration



JSON Configuration File

```
{
    "bootstrap": "../vendor/autoload.php",
    "path": "./",
    "reports": {
    }
}
```

- Automatically uses phpbench.json if present
- Config can be specified using --config

Reporting

Reporting

- **Generators**: Produce a report document from a suite result document.
- **Reports**: Configurations for generators
- **Tabular**: Configuration language for creating reports.
- **Renderers**: For rendering to different output mediums.

Generators

```php
interface ReportGeneratorInterface
{
    /**
     * Generate the report.
     *
     * @param SuiteDocument $collection
     * @param array $config
     */
    public function generate(SuiteDocument $collection, array $config);
}
```

(simplified)

- ConsoleTableGenerator: Generates easy reports
- ConsoleTableCustomGenerator: Definition of complex reports
- CompositeGenerator: Generate multiple reports

Reports

Reports are configured using an array

```
            {
    "generator": "console_table_custom",
    "title": "Comparison of array location functions",
    "description": "This benchmark creates an array with
x of the current revolution. (or in the case of in_arrey,
    "file": "reports/array_keys.json"
},
```

report using a specified generator

```
                {
    "extends": "aggregate",
    "title": "Cost of Setting",
    "description": "Comparison of different ways of setting properties",
    "selector": "//subject[group/@name='cost_of_setting']//variant",
    "exclude": ["benchmark"]
},
```

report extending another report

Reports

- Can be named and defined in the PHPBench configuration
- Can be specified directly on the command line:

```
~/w/p/phpbench ››› ./bin/phpbench run examples/HashBench.php \
    --report='{"extends": "aggregate", "exclude": ["benchmark", "subject", "group", "params"]}'
PhpBench 0.5. Running benchmarks.

..
Done (2 subjects, 20 iterations) in 0.54s

+-------+-------+--------+--------+-----------+-----------+
| revs  | iters | time   | memory | deviation | stability |
+-------+-------+--------+--------+-----------+-----------+
| 10000 | 10    | 2.65µs | 616b   | 0.00%     | 86.54%    |
| 10000 | 10    | 3.10µs | 592b   | +17.16%   | 87.77%    |
+-------+-------+--------+--------+-----------+-----------+
```

The Default Reports

Default Report

```
~/w/p/phpbench ❯❯❯ ./bin/phpbench run examples/HashBench.php --report=default --iterations=10 --revs=1000
PhpBench 0.5. Running benchmarks.

..
Done (2 subjects, 20 iterations) in 0.55s

+-----------------+------------+-------+--------+------+--------------+---------+---------+-----------+
| benchmark       | subject    | group | params | revs | iter         | time    | memory  | deviation |
+-----------------+------------+-------+--------+------+--------------+---------+---------+-----------+
| HashingBenchmark | benchMd5   |       | []     | 1000 | 0            | 2.55µs  | 576b    | -8.34     |
| HashingBenchmark | benchMd5   |       | []     | 1000 | 1            | 2.56µs  | 576b    | -7.98     |
| HashingBenchmark | benchMd5   |       | []     | 1000 | 2            | 2.66µs  | 576b    | -4.3      |
| HashingBenchmark | benchMd5   |       | []     | 1000 | 3            | 2.93µs  | 576b    | +5.56%    |
| HashingBenchmark | benchMd5   |       | []     | 1000 | 4            | 2.45µs  | 576b    | -11.83    |
| HashingBenchmark | benchMd5   |       | []     | 1000 | 5            | 2.42µs  | 576b    | -12.83    |
| HashingBenchmark | benchMd5   |       | []     | 1000 | 6            | 2.51µs  | 576b    | -9.56     |
| HashingBenchmark | benchMd5   |       | []     | 1000 | 7            | 2.65µs  | 576b    | -4.63     |
| HashingBenchmark | benchMd5   |       | []     | 1000 | 8            | 2.98µs  | 576b    | +7.07%    |
| HashingBenchmark | benchMd5   |       | []     | 1000 | 9            | 2.66µs  | 576b    | -4.2      |
| HashingBenchmark | benchSha256 |       | []     | 1000 | 0            | 2.96µs  | 576b    | +6.35%    |
| HashingBenchmark | benchSha256 |       | []     | 1000 | 1            | 3.04µs  | 576b    | +9.48%    |
| HashingBenchmark | benchSha256 |       | []     | 1000 | 2            | 2.80µs  | 576b    | +0.81%    |
| HashingBenchmark | benchSha256 |       | []     | 1000 | 3            | 2.84µs  | 576b    | +2.21%    |
| HashingBenchmark | benchSha256 |       | []     | 1000 | 4            | 2.77µs  | 576b    | -0.35     |
| HashingBenchmark | benchSha256 |       | []     | 1000 | 5            | 2.92µs  | 576b    | +4.91%    |
| HashingBenchmark | benchSha256 |       | []     | 1000 | 6            | 3.00µs  | 576b    | +7.90%    |
| HashingBenchmark | benchSha256 |       | []     | 1000 | 7            | 2.82µs  | 576b    | +1.42%    |
| HashingBenchmark | benchSha256 |       | []     | 1000 | 8            | 3.19µs  | 576b    | +14.73%   |
| HashingBenchmark | benchSha256 |       | []     | 1000 | 9            | 2.88µs  | 576b    | +3.58%    |
|                 |            |       |        |      |              |         |         |           |
|                 |            |       |        |      | stability >> | 68.37%  |         |           |
|                 |            |       |        |      | average >>   | 2.78µs  | 576b    |           |
|                 |            |       |        |      | sum >>       | 55.57µs | 11,520b |           |
+-----------------+------------+-------+--------+------+--------------+---------+---------+-----------+
```

Aggregate Report

```
~/w/p/phpbench ❯❯❯ ./bin/phpbench run examples/HashBench.php --report=aggregate --iterations=10 --revs=1000
PhpBench 0.5. Running benchmarks.

..
Done (2 subjects, 20 iterations) in 0.63s

+------------------+-------------+-------+--------+-------+-------+--------+--------+-----------+-----------+
| benchmark        | subject     | group | params | revs  | iters | time   | memory | deviation | stability |
+------------------+-------------+-------+--------+-------+-------+--------+--------+-----------+-----------+
| HashingBenchmark | benchMd5    |       | []     | 10000 | 10    | 2.90µs | 576b   | 0.00%     | 85.26%    |
| HashingBenchmark | benchSha256 |       | []     | 10000 | 10    | 3.71µs | 576b   | +27.87%   | 70.04%    |
+------------------+-------------+-------+--------+-------+-------+--------+--------+-----------+-----------+
```

Plain Report

benchmark	subject	group	params	revs	iter	rej	time	memory	deviation
SortingBench	benchSort	sort	[]	1000	0	0	198.412	584	0.5636087176888
SortingBench	benchSort	sort	[]	1000	1	0	198.272	584	0.49265078560568
SortingBench	benchSort	sort	[]	1000	2	0	196.188	584	0.5636087176888
SortingBench	benchSort	sort	[]	1000	3	0	196.328	584	0.49265078560568
SortingBench	benchNatSort	sort	[]	1000	0	0	184.857	584	0.013119969269515
SortingBench	benchNatSort	sort	[]	1000	1	0	184.429	584	0.21844072546667
SortingBench	benchNatSort	sort	[]	1000	2	0	185.031	584	0.10725913021367
SortingBench	benchNatSort	sort	[]	1000	3	0	185.014	584	0.09806162598349
SortingBench	benchASort	sort	[]	1000	0	0	192.099	584	0.6251697425087
SortingBench	benchASort	sort	[]	1000	1	0	191.514	584	0.92779638658614
SortingBench	benchASort	sort	[]	1000	2	0	197.536	584	2.1874474606521
SortingBench	benchASort	sort	[]	1000	3	0	192.081	584	0.63448133155723

using console renderer

```
SortingBench    benchSort       sort    []      1000    0       0       197.827 584     6.8291987957269
SortingBench    benchSort       sort    []      1000    1       0       255.247 584     20.213962173956
SortingBench    benchSort       sort    []      1000    2       0       199.439 584     6.0699933710817
SortingBench    benchSort       sort    []      1000    3       0       196.796 584     7.314770007147
SortingBench    benchNatSort    sort    []      1000    0       0       188.78  584     1.4661204043488
SortingBench    benchNatSort    sort    []      1000    1       0       185.058 584     0.53439289231923
SortingBench    benchNatSort    sort    []      1000    2       0       185.243 584     0.43495845925002
SortingBench    benchNatSort    sort    []      1000    3       0       185.128 584     0.49676905277953
SortingBench    benchASort      sort    []      1000    0       0       193.645 584     0.9078817265516
SortingBench    benchASort      sort    []      1000    1       0       190.724 584     0.61424341235339
SortingBench    benchASort      sort    []      1000    2       0       191.096 584     0.42039522622787
SortingBench    benchASort      sort    []      1000    3       0       192.146 584     0.12675691202966
```

using delimited renderer

Custom Reports

```
{
    "includes": [
        [ "console_classes.json", ["classes"] ]
    ],
    "rows": [
        {
            "group": "body",
            "cells": [
                {
                    "name": "time",
                    "class": "time",
                    "expr": "number(descendant-or-self::iteration/@time) div
                },
                {
                    "name": "memory",
                    "class": "memory",
                    "expr": "number(descendant-or-self::iteration/@memory)"
                },
                {
                    "name": "deviation",
                    "class": "deviation",
                    "expr": "deviation(average(//iteration/@time), number(de
                }
            ],
            "with_query": "//iteration"
        },
        {
            "cells": [
            ]
```

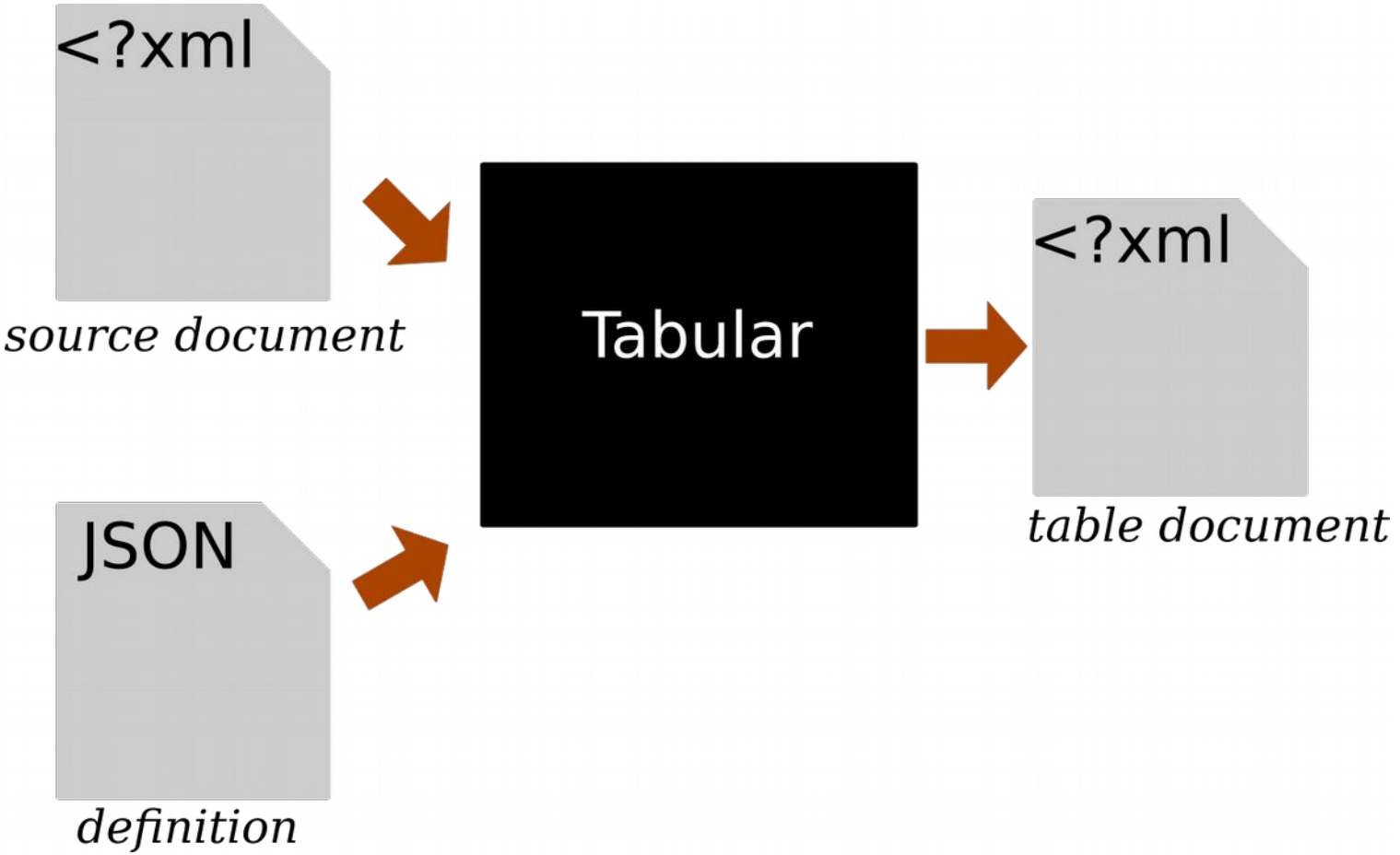
- New reports can be registered in the configuration file.
- The “console_table_custom” generator allows you to specify a custom Tabular report definition.

Tabular


451 368
39 164 94
235 166 172
46 83 74 29 10
45 73 38 99 25 73
54 91 85 40 78 49
10 30 62 49 32 31
433 896 2.132
870 2.845 1.001
2.427 1.133 1.308
2.424 2.697 1.710
1.692 1.844 1.725
1.199 1.903 1.442
2.032 1.198 2.453
2.390 3.850 2.175 1.389 2.833 3.928
1.920 1.748 2.387 2.930 1.389 1.253
3.928 3.176 2.514 2.635 2.119 1.373
1.287 1.272 2.303 2.738 2.115 2.001
2.110 1.928 1.902 1.627 2.736 2.353
3.292 3.393 2.990 2.117 2.617 2.001
1.272 1.928 1.837 2.119 2.519 3.565
290 92 266
243 430 159
249 277 324
175 304
2.402
1.988

Tabular

- Developed for PHPBench but usable anywhere.
- Library for creating tabular *data*
- Accepts any XML document as its input
- Uses Xpath queries and expressions.
- Transforms it according to a Tabular JSON given definiton.


<?xml
source document
JSON
definition
Tabular
<?xml
table document

Given an XML file

```xml
<?xml version="1.0"?>
<store>
    <book>
        <title>War and Peace</title>
        <price>5.00</price>
    </book>
    <book>
        <title>One Hundered Years of Soliture</title>
        <price>7</price>
    </book>
</store>
```

And a Tabular definition

```
{
    "rows": [
        {
            "cells": [
                {
                    "name": "title",
                    "expr": "string(./title)"
                },
                {
                    "name": "price",
                    "expr": "number(./price)"
                }
            ],
            "with_query": "//book"
        },
        {
            "cells": [
                {
                    "name": "price",
                    "expr": "sum(//price)"
                }
            ]
        }
    ]
}
```

It generates data

Book	Price
War and Peace	5
One Hundred Years of Solitude	7
	12

- Generated data returned as an XML document
- Does not render tables

It does other stuff!

- Formats cells
- Iterate over Xpath queries
- Iterate over items
- “Compiler” passes
- Split tables into distinct groups (e.g. header, body, footer).
- Sorting
- Include other definitions

Renderers

```php
/**
 * Implementors render the DOM Document generated by a generator to some visual medium.
 *
 * This might be either direct output (e.g. to the console, streaming markup) or to a file.
 *
 * Example implementors might be XsltRenderer, ConsoleRenderer, etc
 */
interface RendererInterface extends ConfigurableInterface
{
    public function render(Document $report, array $config);

    public function getDefaultOutputs();
}
```

- Render reports to different mediums
- Console
- HTML
- Markdown
- Delimited file (csv, tsv, etc)

HTML Output

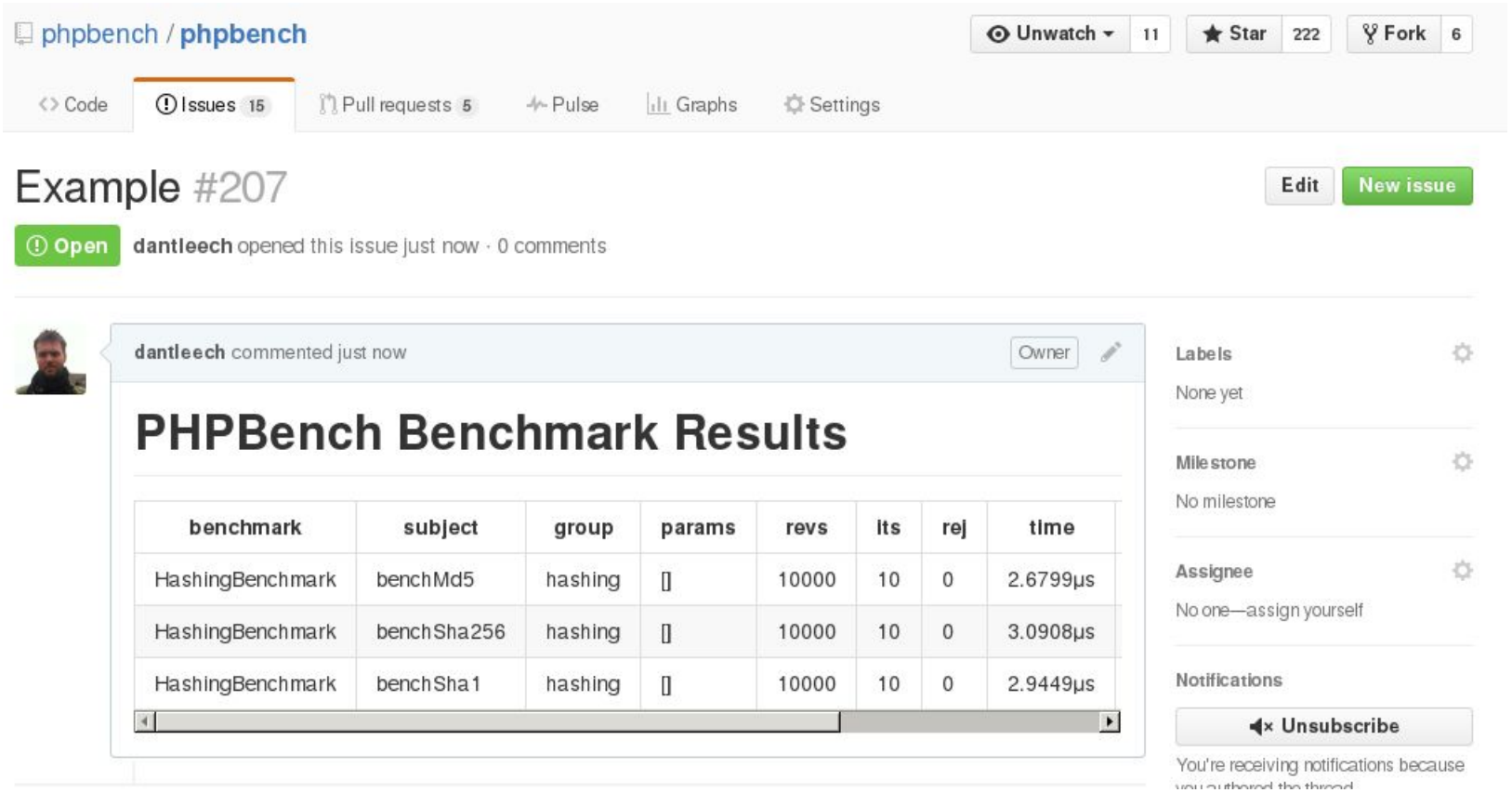
PHPBench Benchmark Results

benchmark	subject	group	params	revs	its	rej	time	memory	deviation	stability
HashingBenchmark	benchMd5	hashing	[]	10000	10	0	2.6861µs	576b	0.00%	79.45%
HashingBenchmark	benchSha256	hashing	[]	10000	10	0	3.0700µs	576b	14.29%	80.72%
HashingBenchmark	benchSha1	hashing	[]	10000	10	0	2.9019µs	576b	8.03%	77.14%

Generated 2015-11-19 12:07:17 by PHPBench v0.6

- XSLT
- Specify custom layout

Markdown Output



- Github flavored

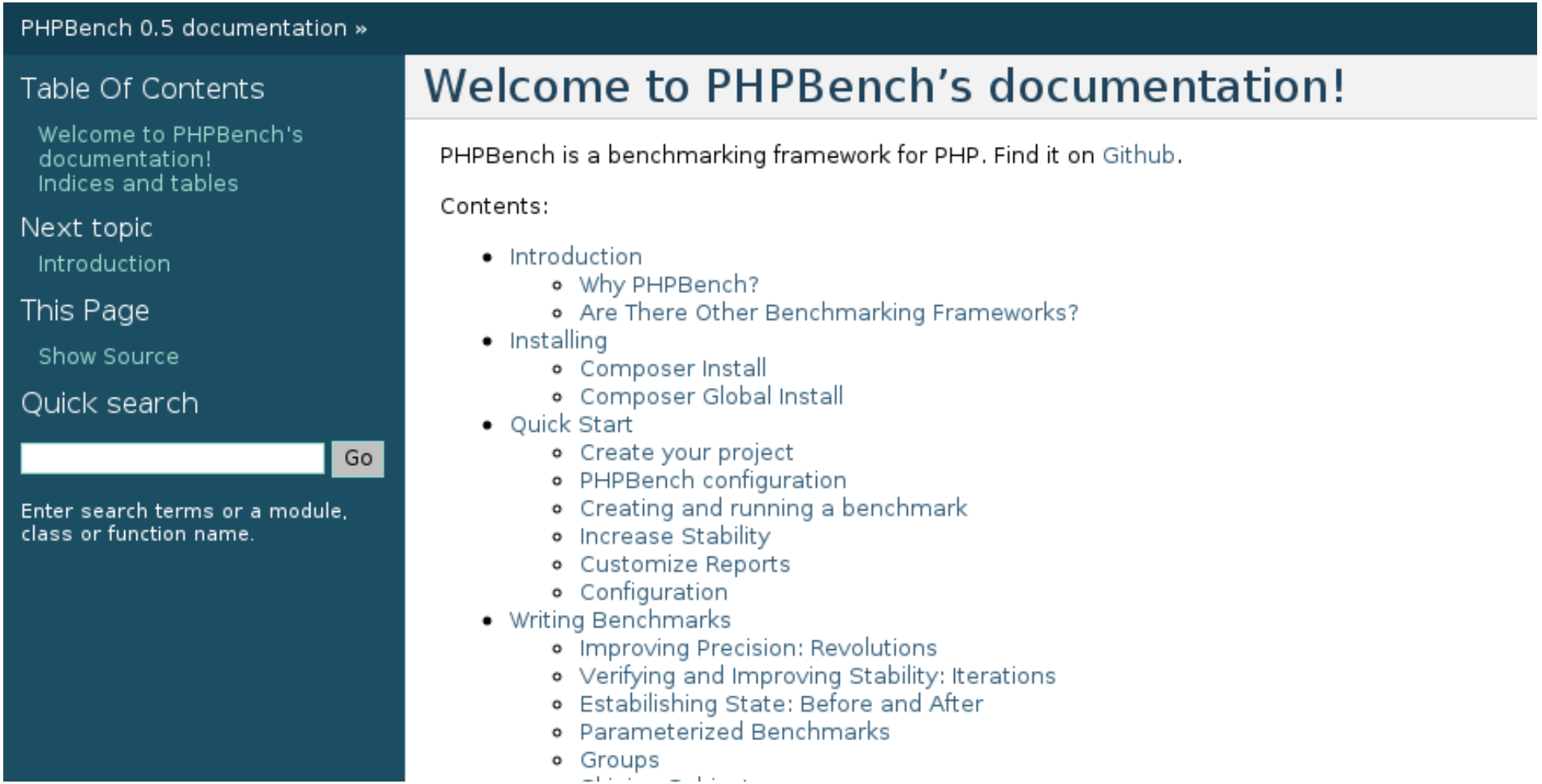
Delimited Output

- Output to a delimited list
- To file or STDOUT
- Import into:
  - GNUPlot (make graphs)
  - Spreadsheets
  - Whatever ..

Conclusion

- Benchmarking can help you make ***smart decisions***.
- PHPBench can be used to obtain more ***reliable*** benchmark results.
- Tabular can be used to generate ***sexy*** reports.

Documentation



phpbench.readthedocs.org

Questions?

Live Coding!

The End

- Twitter: @**phpbench** @**dantleech**
- Website: www.dantleech.com
- PHPBench: github.com/phpbench/phpbench
- Docs: phpbench.readthedocs.org
- Tabular: github.com/phpbench/tabular

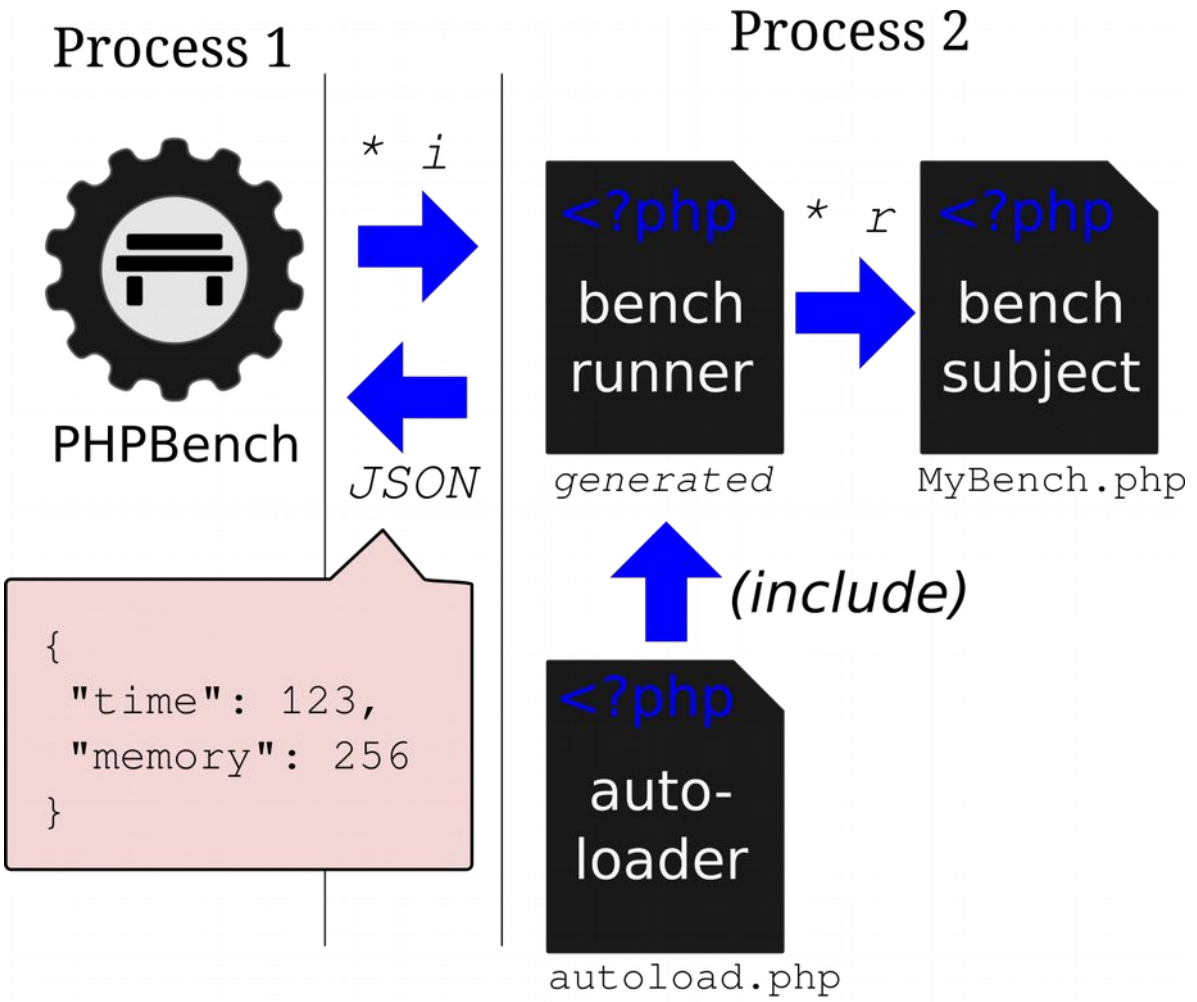
Suggestions welcome – PHPBench and this talk are works in progress :)

Extra

Benchmark Process Isolation

- Benchmarks executed by a generated script in a separate process.
- PHPBench does add additional overhead to your benchmarks.

How it works



i = iterations, r = revolutions

The Benchmarking Script

- Gererated in /tmp
- Executed with the Symfony Process component

PHPBench Benchmarking Script

```php
<?php

gc_disable();

$class = '{{ class }}';
$file = '{{ file }}';
$subject = '{{ subject }}';
$revolutions = {{ revolutions }};
$bootstrap = '{{ bootstrap }}';

if ($bootstrap) {
    require_once($bootstrap);
}

require_once($file);

$benchmark = new $class();
$startMemory = memory_get_usage();
$startTime = microtime(true);

for ($i = 0; $i < $revolutions; $i++) {
    $benchmark->$subject();
}

$endTime = microtime(true);
$endMemory = memory_get_usage();

echo json_encode(array(
    'memory' => $endMemory - $startMemory,
    'time' => ($endTime * 1000000) - ($startTime * 1000000),
));
```

script template (simplified)

- Does not require PHPBench to be autoloaded
- Generated in tmp directory
- Disables Garbage Collection

What About Profiling?

- Provides detailed analaysis of the whole lifecycle, including timings
- Essential for a deeper understanding of code performance
- Tools
  - Xdebug with a visualiser (e.g. KCacheGrind)
  - Blackfire.io

Benchmarking vs. Profiling

- Profiling (using tools such as Xdebug and Blackfire) measures time taken per function call.
- It tells you which parts of your code are slow.
- Benchmarking measures time taken to do something specific.
- It helps you to compare different ways of doing something.

/tmp/root.1226574391.592.prof

File View Go Settings Help

Open Reload Force Dump Up Back Forward Show Absolute Costs Percentage Relative to Parent Skip Cycle Detection Ticks

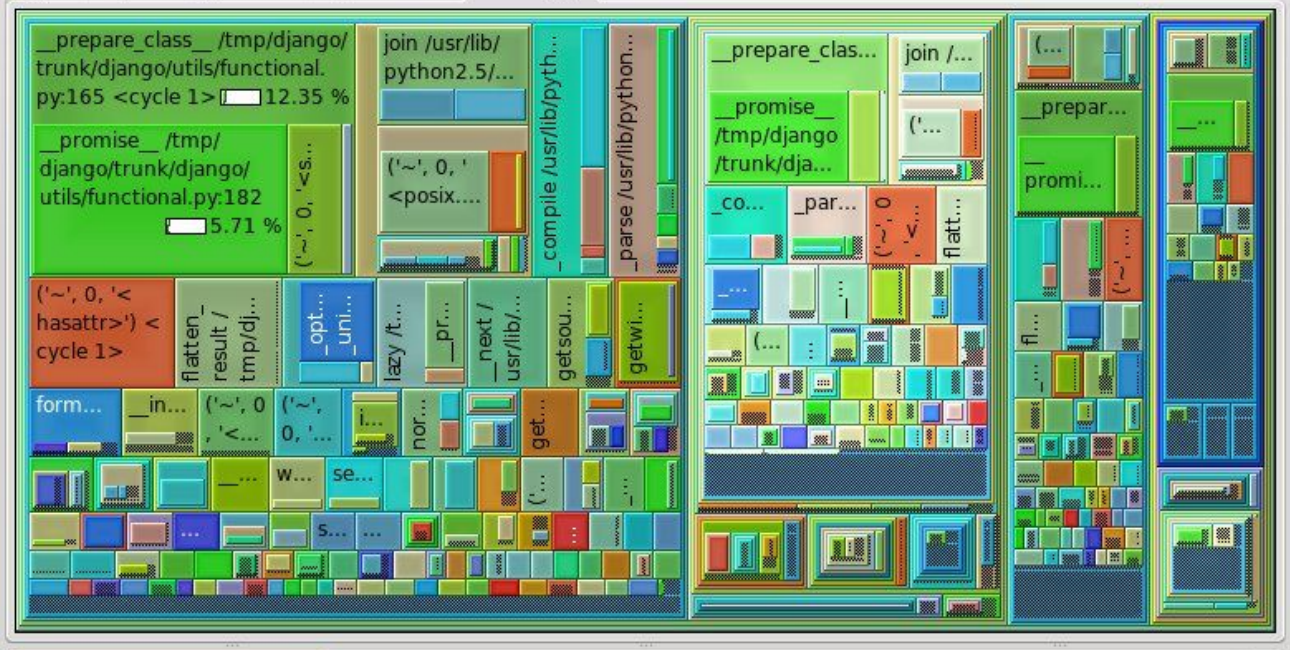
Flat Profile

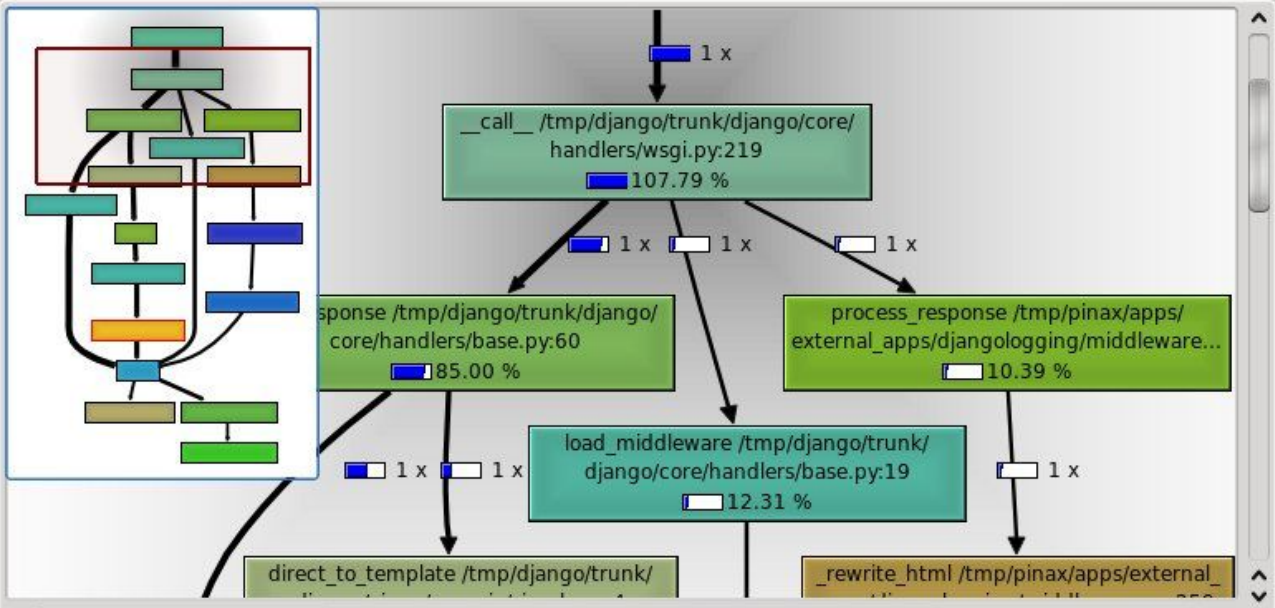
Search: (No Grouping)

Incl.	Self	Called	Function	Location
107.79	0.00	1	__call__ /tmp/django/trunk/d...	wsgi.py
107.79	0.00	(0)	__call__ /tmp/django/trunk/d...	basehttp.py
96.63	54.79	4 843	<cycle 1>	(unknown)
85.00	0.00	1	get_response /tmp/django/tr...	base.py
57.44	0.00	1	resolve /tmp/django/trunk/dj...	urlresolvers.
27.85	0.19	3	<cycle 4>	(unknown)
27.39	0.00	1	direct_to_template /tmp/dja...	simple.py
24.08	0.02	243	render_node /tmp/django/tr...	debug.py
23.77	0.00	8	render /tmp/django/trunk/dj...	defaulttags.
20.78	8.72	675	__prepare_class__ /tmp/djan...	functional.p
12.31	0.00	1	load_middleware /tmp/djang...	base.py
11.29	1.82	868	realpath /usr/lib/python2.5/...	posixpath.p
10.39	0.00	1	process_response /tmp/pina...	middleware
10.37	0.00	1	_rewrite_html /tmp/pinax/ap...	middleware
9.61	9.61	36 450	__promise__ /tmp/django/tru...	functional.p
7.67	0.00	5	sql_to_html /tmp/pinax/apps...	middleware
7.67	0.00	1	_get_and_clear_records /tm...	middleware
4.88	3.35	1 907	_compile /usr/lib/python2.5/...	sre_compile
4.66	3.33	1 449	_parse /usr/lib/python2.5/sr...	sre_parse.py
4.22	1.24	5 216	islink /usr/lib/python2.5/posi...	posixpath.p
4.05	4.05	45 720	('~', 0, '<hasattr>') <cycle ...	~
3.88	2.65	5 577	join /usr/lib/python2.5/posix...	posixpath.p
2.99	2.91	216	flatten_result /tmp/django/tr...	regex_helpe
2.62	0.68	357	_optimize_charset /usr/lib/py...	sre_compile
2.57	0.00	2	render_to_string /tmp/djang...	loader.py
2.55	0.00	5	__init__ /tmp/django/trunk/d...	__init__.py
2.55	0.00	5	compile_string /tmp/django/...	__init__.py
2.52	1.46	675	lazy /tmp/django/trunk/djan...	functional.p
2.52	0.00	5	get_template_from_string /t...	loader.py
2.23	2.23	5 216	('~', 0, '<posix.lstat>')	~
2.21	2.21	15 798	__next /usr/lib/python2.5/sr...	sre_parse.py
2.14	2.16	38 757	('~', 0, '<setattr>')	~
1.89	1.19	602	getsourcefile /usr/lib/python...	inspect.py
1.85	0.27	331	_compile_info /usr/lib/pytho...	sre_compile
1.85	0.27	5	<cycle 3>	(unknown)
1.82	0.15	1 458	abspath /usr/lib/python2.5/...	posixpath.p
1.70	0.27	64	parse /tmp/django/trunk/dja...	__init__.py

__call__ /tmp/django/trunk/django/core/handlers/wsgi.py:219

Types Callers All Callers Source Code Callee Map





Caller Map Parts Call Graph Callees All Callees Assembly Code

Profiling vs. Benchmarking

- Profiling
  - Is necessarily slower.
  - Mesaurements are the result of a single execution
  - Feedback is not instantaneous
- Benchmarking
  - Code runs at its natural speed
  - Units and Services can be timed in isolation
  - Feedback available instantaneously

Continuous Benchmarking?

- Automated performance regression testing
- Would require a VM that runs at a constant speed.
- Travis CI does not currently meet this requirement.

Calculating Stablity

#	Time
1	1
2	1
3	1

= 100% stability

#	Time
1	1
2	0.5
3	1

= 50% stability

Improving Stability

- Multiple iterations show correlations in samples.
- We can remove the sample with a deviation > a given threshold.
- We can then use the avergage of the remaining samples.