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Welcome!

Performance Workshop

PHP Quebec

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Questions

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Optimization Strategies

- Caching
- Optimizing Database Use
- Optimizing PHP Code
- Tuning the Webserver
- Reducing Bandwidth

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Caching

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What Is Caching?

Caching is the recognition and exploitation of the fact that most "dynamic" data does not change every time you request it.

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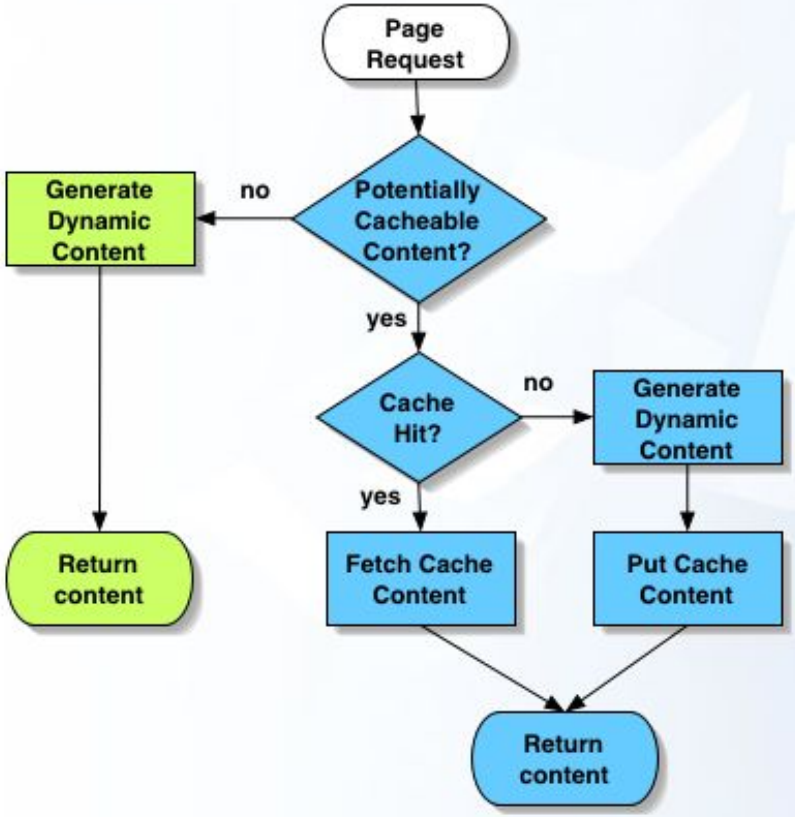
How Caching Works



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Caching Example

PEAR::Cache_Lite

```php
<?php
    /* Include the class */
    require_once('Cache/Lite.php');

    /* Set a key for this cache item */
    $id = 'newsitem1';

    /* Set a few options */
    $options = array(
        'cacheDir' => '/var/cache/news/',
        'lifeTime' => 3600
    );

    /* Create a Cache_Lite object */
    $Cache_Lite = new Cache_Lite($options);

    /* Test if there is a valid cache-entry for this key */
    if ($data = $Cache_Lite->get($id)) {
        /* Cache hit! */
    } else {
        /* Cache miss! */
        ob_start();
        /* Generate content */
        $data = ob_get_contents();
        $Cache_Lite->save($data);
    }
?>
```

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Pros and Cons of Caching

Pros:

- Potentially Immense Speed-Up
- Decreased Resource Consumption

Cons:

- Increase in Architectural Complexity
- Potential for Stale or Inconsistent Data

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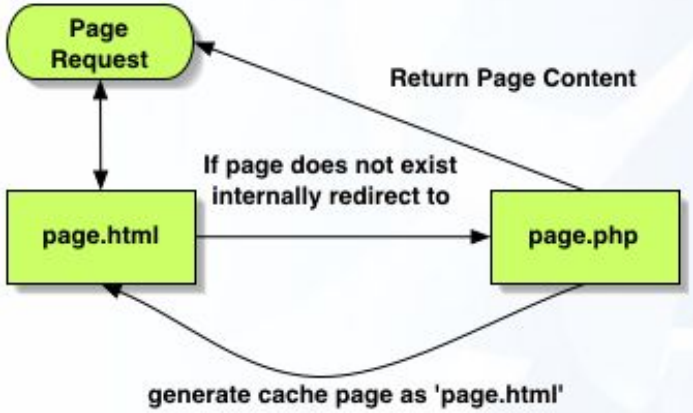
Total Page Caching



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Livedocs

An Example of On-Demand Page Generation

Set up a 404 error handler in .htaccess:

```
RewriteEngine on
RewriteRule /.*\.[^h][^t][^m][^l]$ /$1.html
ErrorDocument 404 /index.php
DirectoryIndex index.php
```

index.php:

```
<?php
if (!empty($_SERVER['REDIRECT_URL'])) {
    // This is the requested page that caused the error
    $current_page = substr($_SERVER['REDIRECT_URL'],
strlen(WEBBASE));
}

...

if (!FORCE_DYNAMIC) {
    $contents = ob_get_contents();
    ob_clean();
    $f = fopen($lang . "/" . $current_page . ".html", 'w');
    fwrite($f, $contents);
    fclose($f);
    echo $contents;
}
?>
```

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Static Squids

- Reverse Proxy
- Tied into Apache
- Static Generated
- Huge Performance Boost
- No 'Dynamic' Content

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Squid

Some effort to use with PHP:

```
<?php
$timestamp = /* timestamp for last updated part */;
$tsstring = gmdate("D, d M Y H:i:s ", $timestamp)."GMT";

if ($_SERVER["HTTP_IF_MODIFIED_SINCE"] == $tsstring) {
    /* The UA has the exact same page we have. */
    header("HTTP/1.1 304 Not Modified");
    exit();
} else {
    header("Last-Modified: ".$tsstring);
}
?>
```

Set Cache-Control headers so external caches know how to respect your content:

```
<?php
  header("Last-Modified: Mon, 13 Se4 2002 09:44:13 GMT");
  header("Expires: Mon, 13 Sep 2004 10:44:13 GMT");
  header("Cache-Control: must-revalidate, max-age=15, s-maxage=0,
private");
?>
```

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Static Cache in eZ publish

An Example of On-Publish Generation

```php
<?php
    function cacheURL($url, $nodeID = false, $skipExisting = false)
    {
        $fileName = "http://$hostname$dir$url";
        $content = @file_get_contents($fileName);
        $this->storeCachedFile($file, $content);
    }

    function storeCachedFile($file, $content)
    {
        $fp = fopen($tmpFileName, 'w');
        if ($fp) {
            fwrite($fp, $content);
            fclose($fp);
            rename($tmpFileName, $file);
        }
    }
```

Set up RewriteRules:

```
RewriteEngine on

RewriteCond   /dat/ez.no/static/index.html -f
RewriteRule   ^/$     /static/index.html [L]

RewriteCond   %{REQUEST_METHOD}       !^POST$
RewriteCond   /dat/ez.no/static$1/index.html -f
RewriteRule   ^(.*)$  /static$1/index.html [L]
```

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Server Tuning

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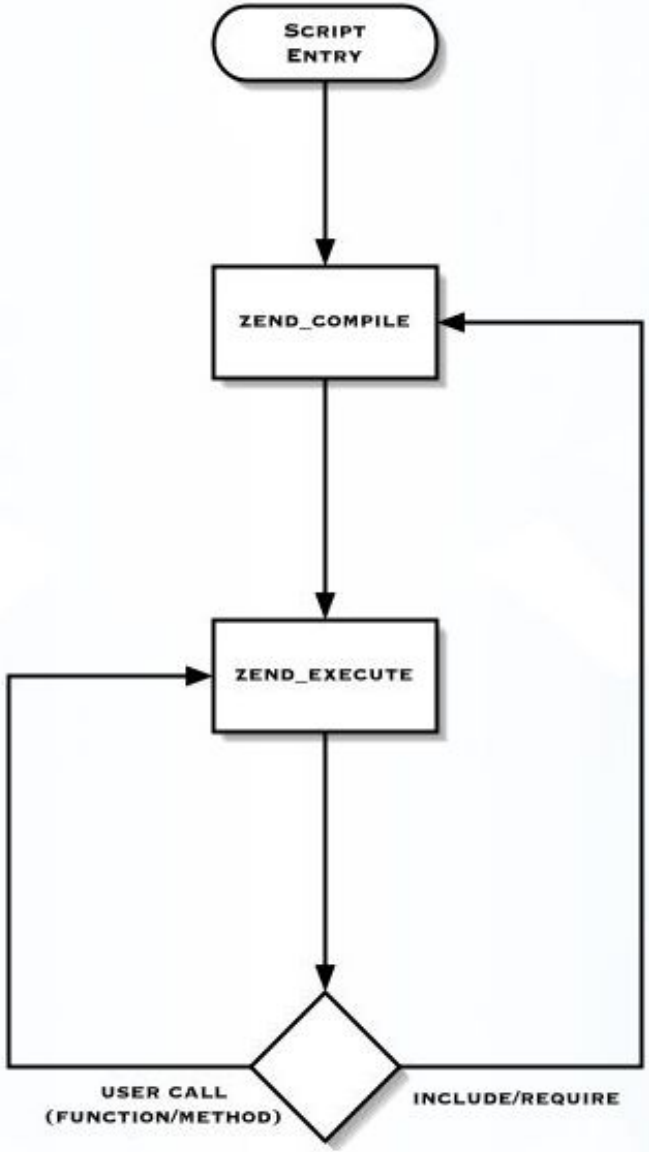
Compiler Caches

What can be optimized



- This cycle happens for every include file, not just for the "main" script
- Compilation can easily consume more time than execution

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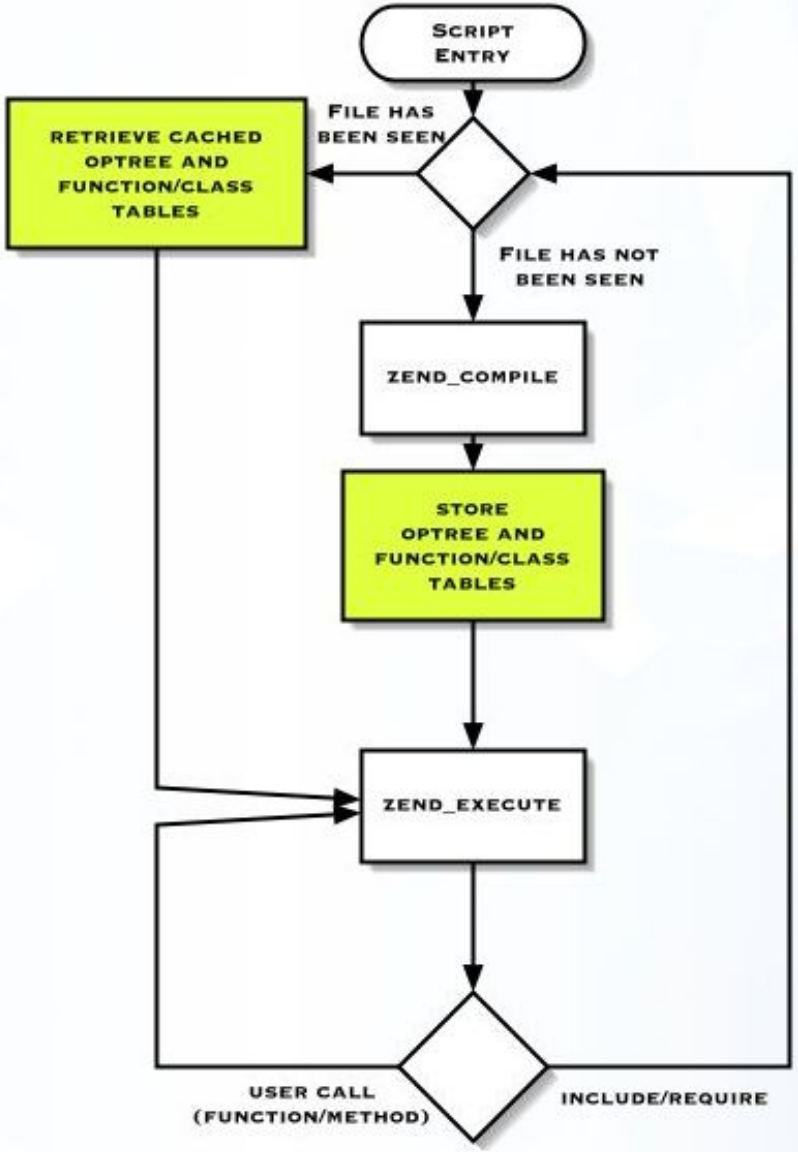
Compiler Caches

How it works



- In general, each source file is compiled once
- Compilation overhead becomes inconsequential
- Cache introduces its own overhead due to dynamic nature of includes

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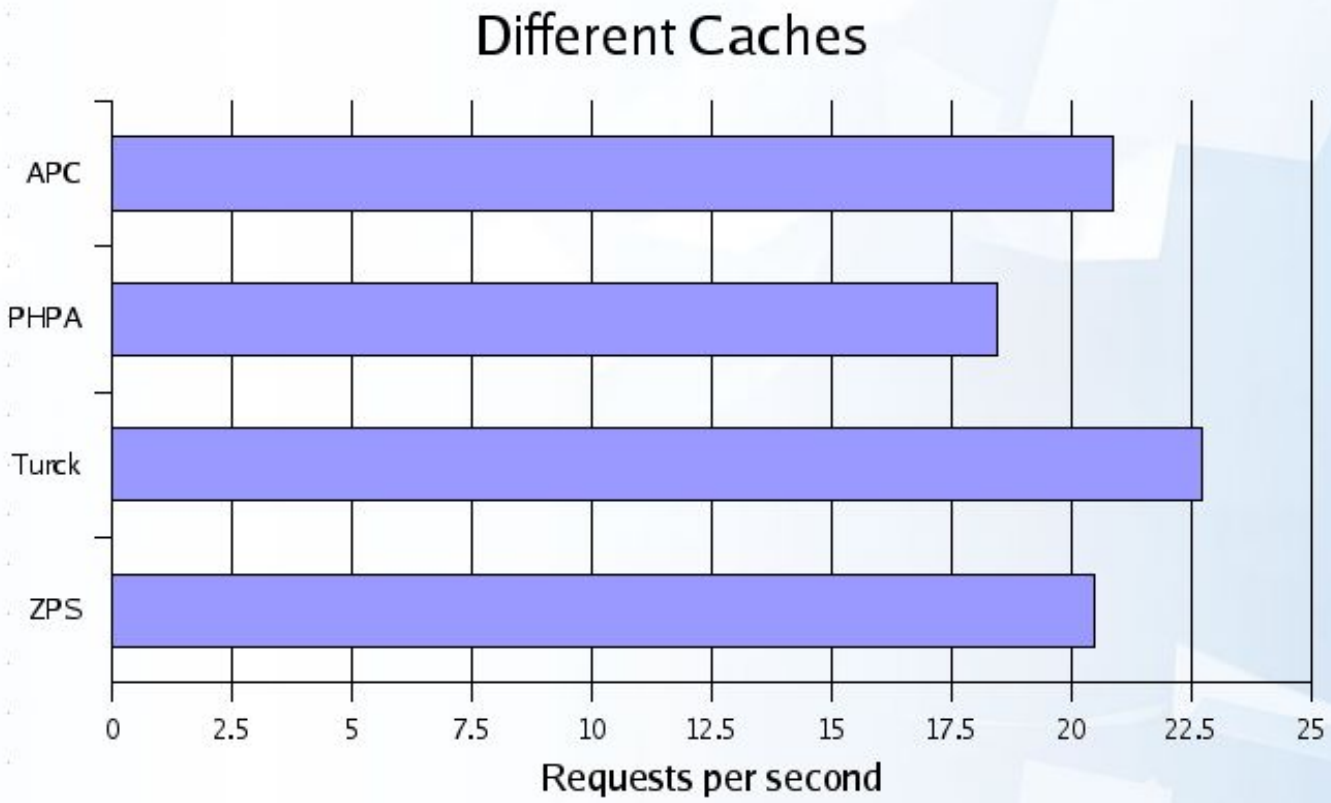
PHP Accelerators

- APC
- Zend Performance Suite
- Turck MM Cache
- PHP Accelerator



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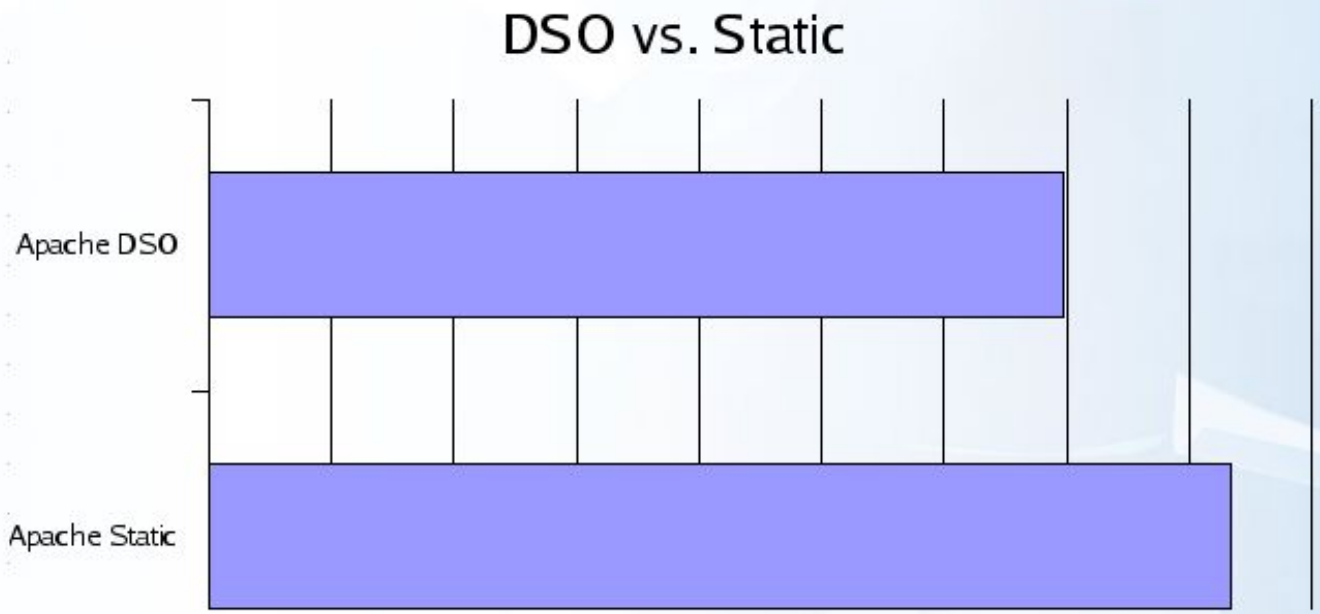
Apache Is Slow!

- Use static compiled modules or compile with --prefer-non-pic
- Enable all compiler optimizations with -O3
- Tell the compiler what CPU you use via -m*arch* -m*cpu*
- Use CPU specfic features -msse -mmmx -mfpmath=sse
- Other options: -fomit-frame-pointer



Say Squeeze

- Optimized `./configure`
- Memory Limit
- Shorter Path
- Use *include()* in a smarter way
- Ramdisk

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Application Performance

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CPU Usage

- Avoid Using frequent array accesses, remember, each array access is a hash lookup.

```
<?php
$ar = array();
$ar['name'] = 'Optimization';

for ($i = 0; $i < count($entries); $i++) {
    print $ar['name'];
}
?>
```

- Shorten "required" executions, such as loops.
- Avoid rebuilding large data structures.
- Look for alternatives to regular expressions

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CPU Usage (2)

- Everything has a cost: include_path, open_basedir, variables_order, magic_quotes, always_populate_raw_post_data
- Cache expensive operations, like generating images
- Function calls are expensive
- User defined functions are more expensive
- Passing parameters take time

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Bandwidth Optimizations

Optimizing HTML

- Remove All Comments!
- Use CSS
- Fully qualify links (ie, personal/images/ not personal/images)
- `ext/tidy`

```
<?php
    $opts = array("clean" => true,
                  "drop-proprietary-attributes" => true,
                  "drop-font-tags" => true,
                  "drop-empty-paras" => true,
                  "hide-comments" => true,
                  "join-classes" => true,
                  "join-styles" => true);

    $tidy = tidy_parse_file("php.html", $opts);
    tidy_clean_repair($tidy);

    echo $tidy;
?>
```

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File I/O

File I/O Problems

- Disk access is slower than memory access
- Simultaneous write/write operations cause data corruption. Therefore locking must occur—which is slow

Tips:

- Use the disk in concentrated bits, meaning do all your writing together.
- Try and put write operations where they will cause the least loss in user experience (remember, web pages are chunked!)
- Close the session handler ASAP with *session_write_close()*

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The Hunt for Speed

- Xdebug: a tool to debug PHP
- Tracing function calls
- Profiling Applications

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Tracing the Problems

- Xdebug's Trace Features
- Trace function calls
- Provides details on memory usage

```
/dat/ez.no-33/var/ezno
13:52:21]
-> {main}() /dat/ez.no-33/index.php:0
  -> microtime() /dat/ez.no-33/index.php:24
  -> ob_start() /dat/ez.no-33/index.php:35
  -> error_reporti /dat/ez.no-33/index.php:74
  -> include_once(/dat/ez.no-33/lib/ezutils/classes/ezsys.php) /dat/ez.no-33/index.php:77
    -> include_once(/dat/ez.no-33/lib/ezutils/classes/ezsys.php) /dat/ez.no-33/lib/ezutils/cl
      -> define('EZ_SYS_DEBUG_INTERNALS', FALSE) /dat/ez.no-33/lib/ezutils/classes/ezsys.php:
    -> define('EZ_LEVEL_NOTICE', 1) /dat/ez.no-33/lib/ezutils/classes/ezdebug.php:85
    -> define('EZ_LEVEL_WARNING', 2) /dat/ez.no-33/lib/ezutils/classes/ezdebug.php:86
t [RO]                                                                    2,1          Top
    -> eztextcodec::internalcharset /dat/ez.no-33/lib/ezi18n/classes/eztextcodec.php:581
      -> ezcharsetinfo::realchar de('iso-8859-15') /dat/ez.no-33/lib/ezi18n/classes/eztex
        -> ezcharsetinfo::aliastab /dat/ez.no-33/lib/ezi18n/classes/ezcharsetinfo.php:212
          -> is_array(array ('ascii' => 'us-ascii', 'latin1' => 'iso-8859-1', 'latin2' => 'is
        -> strtolower('iso-8859-15') /dat/ez.no-33/lib/ezi18n/classes/ezcharsetinfo.php:213
  -> include_once(/dat/ez.no-33/lib/ezlocale/classes/ezlocale.php) /dat/ez.no-33/index.php:24
    -> define('EZ_LOCALE_DEBUG_INTERNALS', FALSE) /dat/ez.no-33/lib/ezlocale/classes/ezlocale
  -> ezini::instance() /dat/ez.no-33/index.php:246
    -> eval('class ezlocale { var $Charset = 'iso-8859-1'; var $BlockValues = array ('Databa
  -> ezini->variable('RegionalSettings', 'Debug') /dat/ez.no-33/index.php:247
t [RO]                                                                    349,5        1%
```

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Xgui

- Simple Tracefile Browser

xGUI profiling frontend for xDebug

File Edit Help

Function	Nr.	Memory	Time	Filename
strlen	8	0	5.6e-05	/home/httpd/pres2/show.php:11
require_once	9	1194408	0.054128	/home/httpd/pres2/show.php:16
require_once	10	104552	0.005591	/home/httpd/pres2/XML_Presentation.php:23
require_once	22	926400	0.03976	/home/httpd/pres2/XML_Presentation.php:24
require_once	23	0	0.000131998	/home/httpd/pres2/objects.php:4
require_once	24	40	0.000185002	/home/httpd/pres2/objects.php:6
_pear_call_destructors	489			/usr/local/lib/php/PEAR.php:0
is_array	490			/usr/local/lib/php/PEAR.php:505
sizeof	491			/usr/local/lib/php/PEAR.php:506

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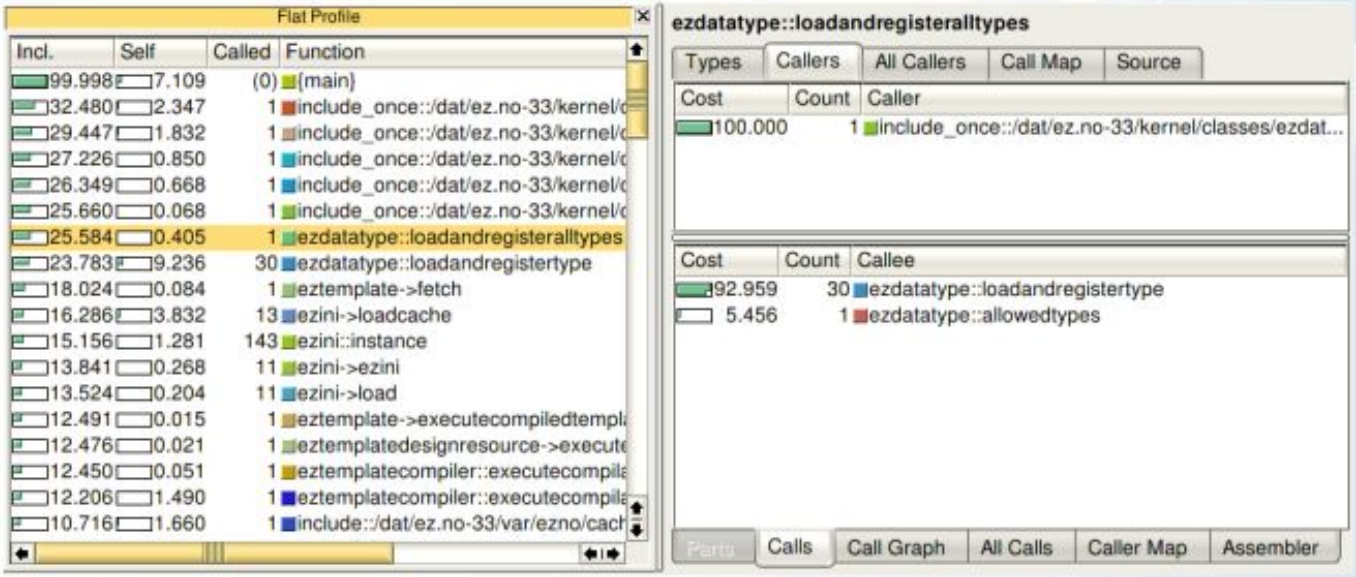
Finding the Bottleneck

- Xdebug's Profiling Features
- GUI analysing with KCachegrind
- Provides details on CPU usage



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Regular Expressions

Its often beneficial to replace regular expressions with simpler functions that have the same effect.

With Regular Expression:

```
<?php
if (preg_match ('/(.*)\@(.*)/', $data, $matches)) {
    print $matches[2];
}
?>
```

Without Regular Expression:

```
<?php
$pos = strrpos ('@', $data);
if ($pos !== false) {
    print substr ($data, $pos);
}
?>
```

In other cases it may help to use regular expressions instead of custom parse routines in your PHP code.

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Break

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Database Performance

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MySQL Table Types

MyISAM

- Efficient For **either** High Volume writes **or** reads
- Table level locking
- No Transaction support

InnoDB

- Efficient locking (Row-level update, non-locking read)
- Foreign Keys, Transactions
- High Concurrency

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Visitation model 1

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Directory structure:

Stored as:

Id	Parent	Name
3	1	Countries
4	3	Belgium
5	3	Netherlands
6	3	Germany
7	5	Business and Economy

Retrieve list with:

```
<?php
function gimmeParent($id) {
    global $dir;
    $res = mysql_query("SELECT parent, name FROM dir WHERE
id=$id");
    if (mysql_num_rows($res) > 0) {
        $dir[] = ($row = mysql_fetch_row($res));
        gimmeParent($row['parent']);
    }
}
gimmeParent(7);
```

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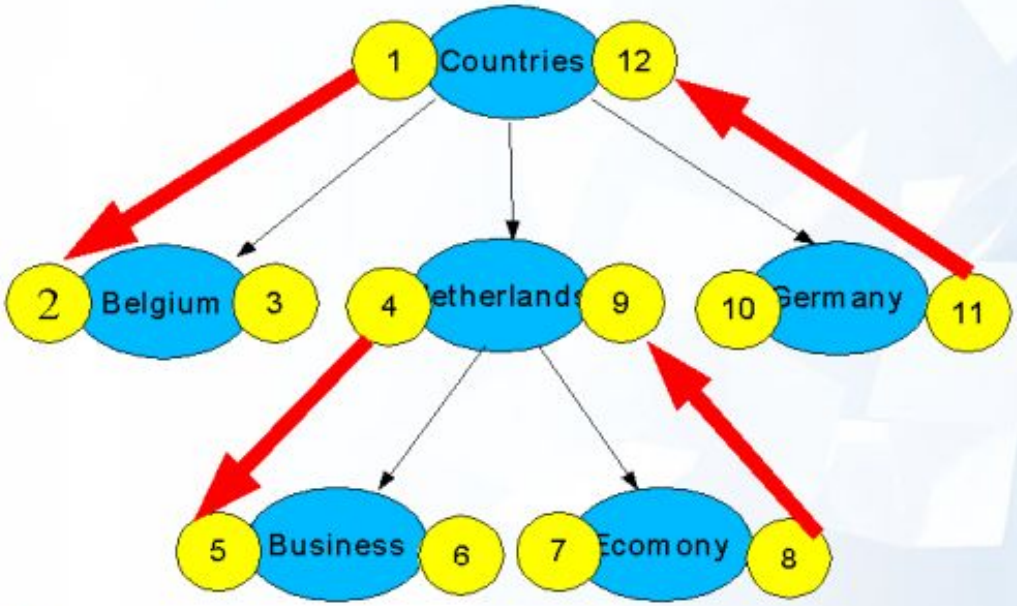
Visitation model 2

Visitation:



Stored as:

Id	Parent	Name	Left	Right
3	1	Countries	1	12
4	3	Belgium	2	3
5	3	Netherlands	4	9
6	3	Germany	10	11
7	5	Business	5	6
8	5	Economy	7	8

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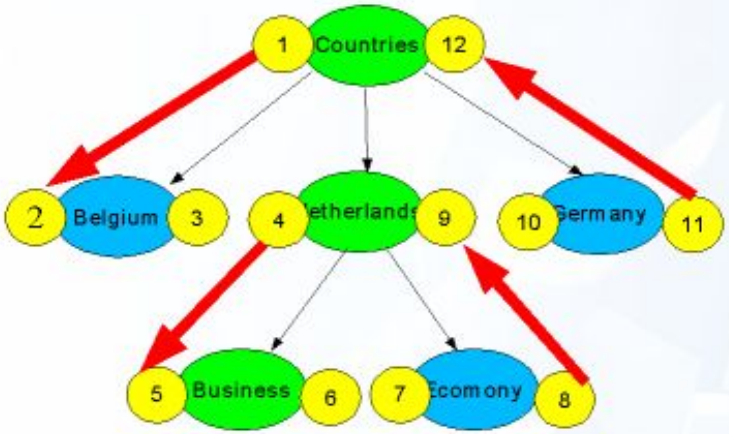
Visitation model 3

Select the path:



Query:

```
  SELECT * FROM directory
WHERE
    left <= 5 AND right >= 6
```

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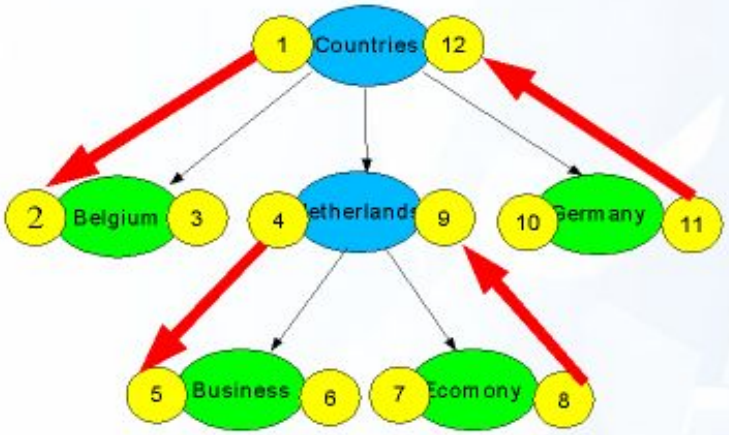
Visitation model 4

Select all end points:



Query:

```
  SELECT * FROM directory
 WHERE
     right - left = 1
```

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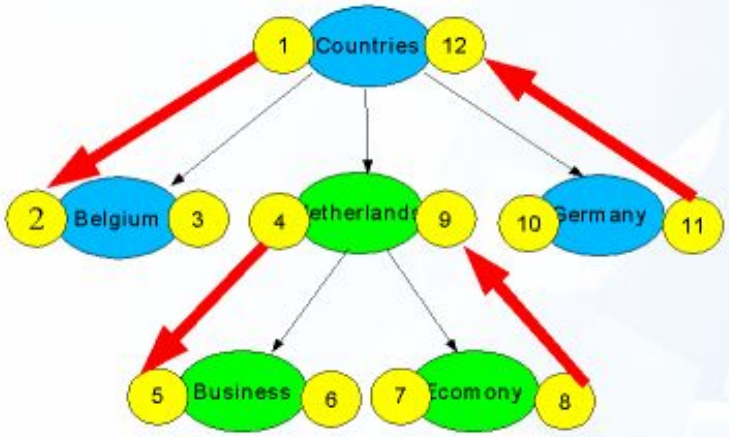
Visitation model 5

Select a subtree:



Query:

```
  SELECT * FROM directory
 WHERE
     left >= 4 AND right <= 9
```

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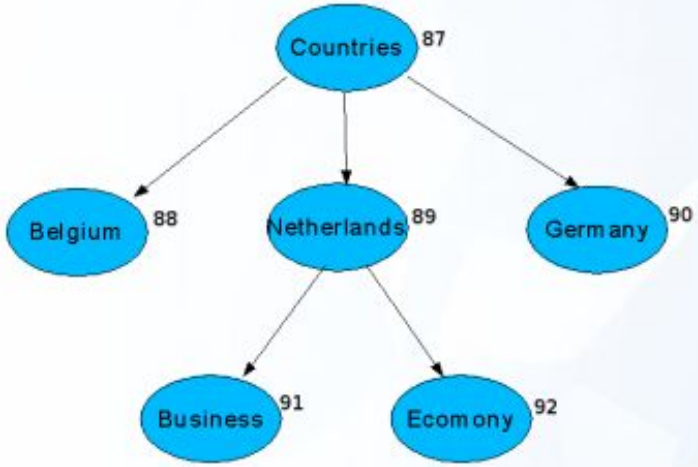
Different Approach



Path strings:

Id	ParentId	PathString	Path Identification String	Depth
87	2	/87/	countries	2
88	87	/87/88/	countries/belgium	3
89	87	/87/89/	countries/netherlands	3
91	89	/87/89/91/	countries/netherlands/business	4
92	89	/87/89/92/	countries/netherlands/economy	4
90	87	/87/90/	countries/germany	3

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Break

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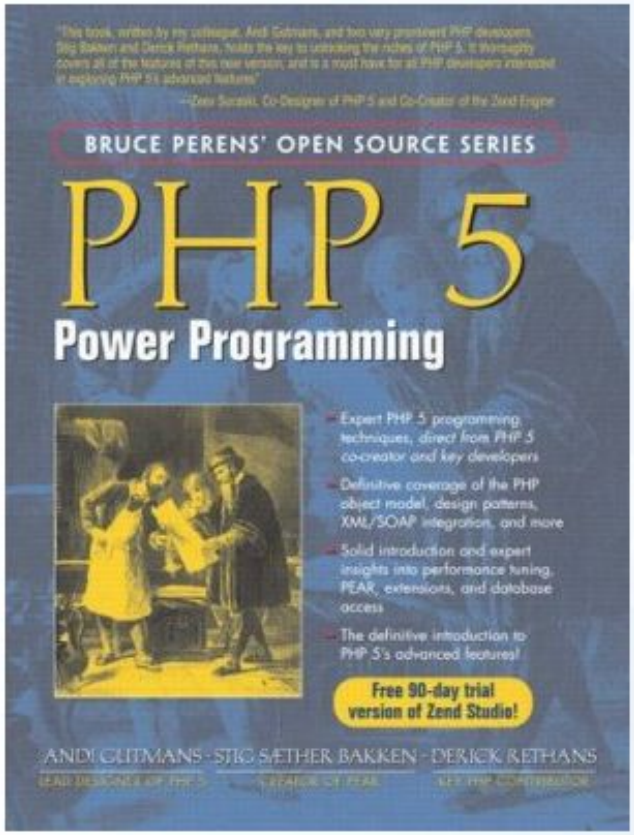
PHP 5 Power Programming



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- Meant for people familiar with PHP (or another language) wanting to know how to use PHP in the most efficient way
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