

Welcome!

Advanced Date/Time Handling

FrOsCon - Sankt Augustin, Germany

Derick Rethans - derick@php.net - twitter: @derickr
<http://derickrethans.nl/talks.html>

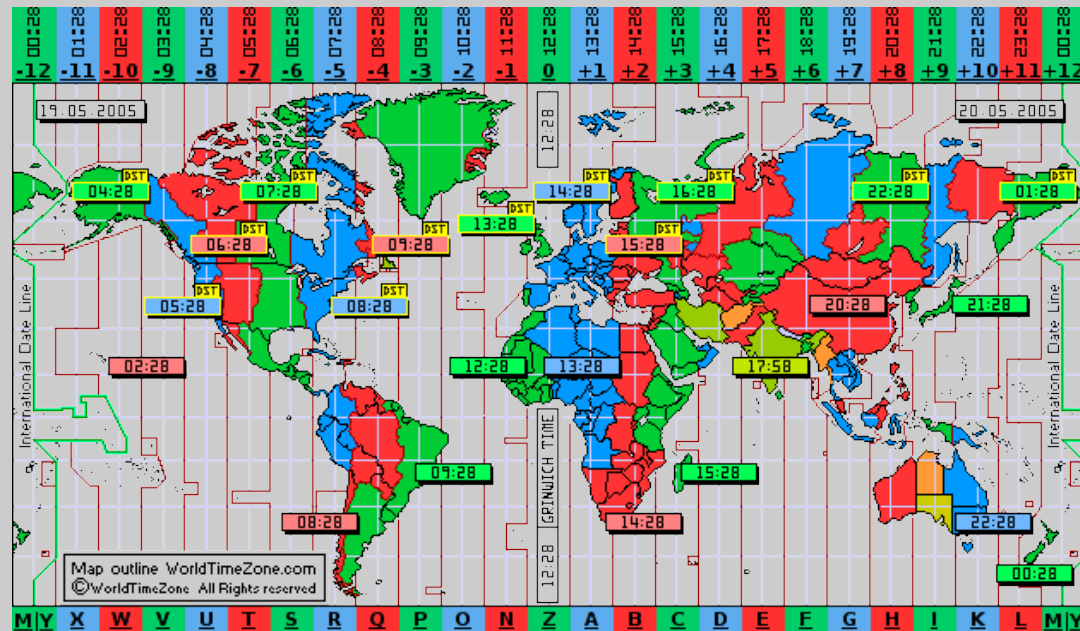
Derick Rethans



- Dutchman living in London
- PHP development
- Author of the `mcrypt`, `input_filter`, `dbus`, `translit` and `date/time` extensions
- Author of `Xdebug`
- Contributor to the Apache Zeta Components Incubator project (formerly eZ Components)
- Freelancer doing PHP (internals) development

Problems

Timezones



- Most places have whole-hour timezone offsets
- Some places change timezones during the year
- One identifier can mean different zones: PST: Pacific Standard Time, Pakistan Standard Time
EST: Eastern Standard Time (USA), Eastern Standard Time (Australia) and Eastern Brazil Standard Time



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No Fortitude For Longitude, Part 3

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Me: "Welcome, how can I help you?"

Customer: "Yes, what's the time in the UK now?"

Me: "Its 9pm. They're ten hours behind."

Customer: "Oh, so if I call the UK in another half hour, what time will it be?"

Me: "It'll be 9:30pm."

Customer: "You mean if half an hour passes here, it will also be half an hour later there?"

Me: "Yes."

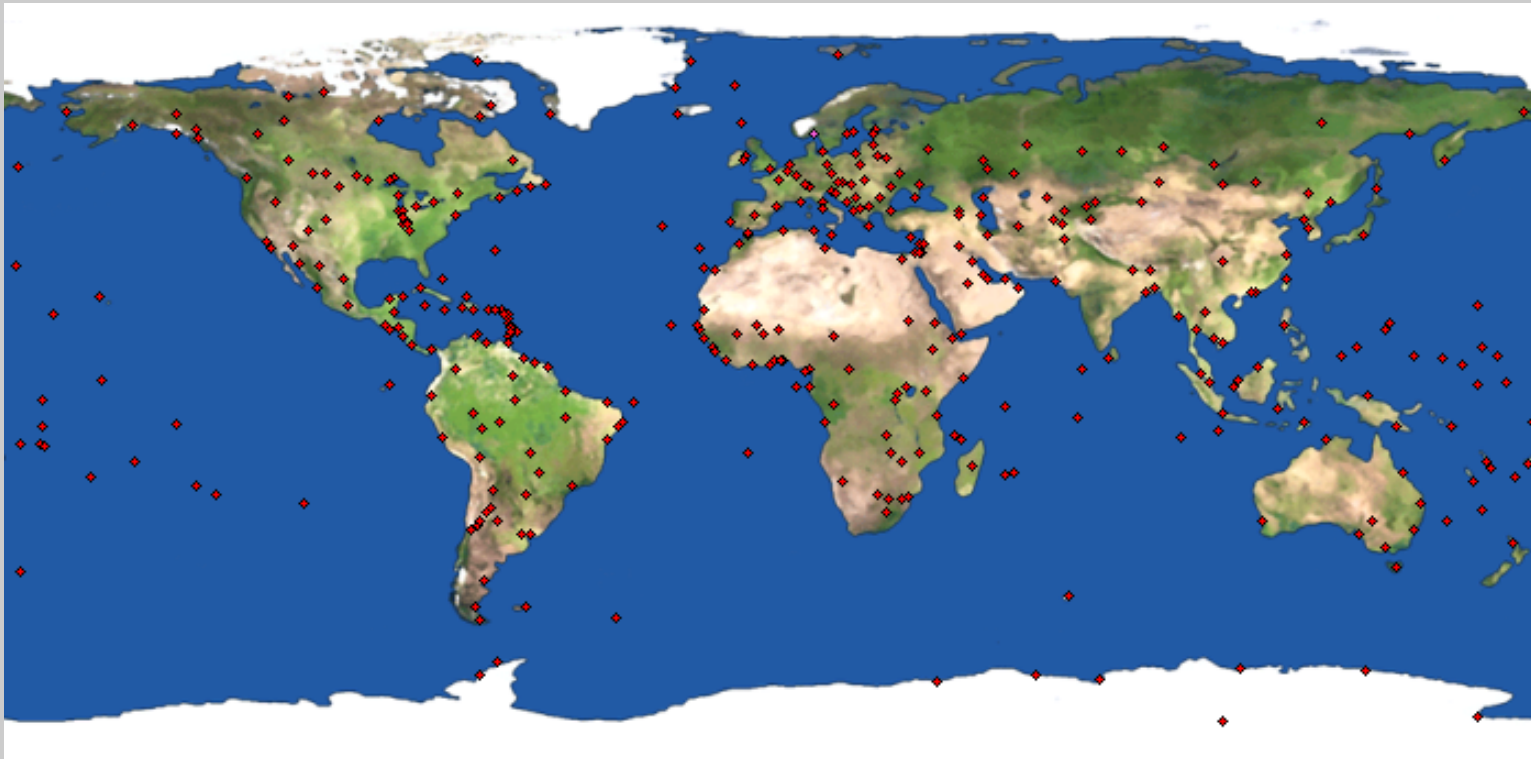
Customer: **surprised** "Oh! So that's how it works?"

Date/Time Functions in PHP

- Internally, a 64 bit signed integer is used to store the number of seconds since the epoch
- `strtotime()` and functions dealing with timestamps have been replaced with classes (such as new `DateTime()`)
- Nothing is Operating System dependent
- Full support for timezones, DST, date modifications
- Advanced date handling functions

Timezone Support

- Bundled timezone database with 564 zones
- Not dependent on timezone abbreviations
- Timezones have the format: Continent/Location or Continent/Location/Sublocation - Like: Europe/Amsterdam, America/Indiana/Knox



Changing Timezone Definitions

- An updated database is released about 20 times a year.
- Some of the changes are very sudden.
- PHP releases will therefore often have an outdated version.
- The PECL extension `timezonedb` provides a drop in replacement for the `timezone` database.
- `pecl install timezonedb`

Setting a default timezone:

```
<?php
    date_default_timezone_set("Europe/Oslo");
    $ts = new DateTime("1978-12-22 09:15");
    echo $ts->format("e");
?>
```

Getting a default timezone:

```
<?php
    $default_identifier = date_default_timezone_get();
    echo $default_identifier;
?>
```

Default timezone is 'guessed' in the following order:

- `date_default_timezone_set()` value
- TZ environment variable
- `php.ini`'s `date.timezone` setting
- System's rendering of timezone abbreviation

Problems with timestamps and timezones

```
<?php
    $date = strtotime( '2010-03-07 20:48:21 America/Toronto' );
    echo date( 'Y-m-d', $date ), "\n";
?>
```

Explanation:

2010-03-07 20:48:21 America/Toronto

1268012901 string is turned into a number

2010-03-08 01:48:21 Europe/London number is
converted to a date/time string using the default
timezone

Parsing strings for date time information by instantiating a DateTime object:

```
<?php
    $dt = new DateTime("2010-03-08 08:43:57");
?>
```

This function will not return the timestamp as an integer, but instead returns a DateTime object which is a wrapper around a 64 bit integer, which you can access (as string) through:

```
<?php
    $dt = new DateTime("2010-03-08 08:44:12");
    echo $dt->format( 'U' ), "\n";
?>
```

The DateTime class is what you can do the really cool things with.

Parsing Dates

"22apr2006 8:36:14 #^ Europe/Oslo CEST"

"22apr2006 8:36:14 #^ Europe/Oslo CEST"

"22apr2006 8:36:14 Europe/Oslo CEST"

"22apr2006 8:36:14 Europe/Oslo CEST"

Parsing strings with the `date_parse()` function:

```
<?php
$date = "22apr2006 8:36:14.43 #^ Europe/Oslo CEST";
$t = date_parse( $date );

echo $t['year'], '-', $t['month'], '-', $t['day'], " ";
echo $t['hour'], ':', $t['minute'], ':', $t['second'] +
$t['fraction'], " ";
echo $t['tz_id'], "\n";

if ( $t['warning_count'] )
    echo "Warnings:\n";
    foreach( $t['warnings'] as $pos => $message )
        echo "- $message @$pos\n";
if ( $t['error_count'] )
    echo "Errors:\n";
    foreach( $t['errors'] as $pos => $message )
        echo "- $message @$pos\n";
```

Parsing Dates

08/03/10

08/03/10

August 3rd, 2010

(default)

08/03/10

2008 March 10

08/03/10

8 March 2010

Parsing Dates

With user-defined format

Creating strings with the `date_create_from_format()` function:

```
<?php
$date = "06/08/04";
echo DateTime::createFromFormat( '!d/m/y', $date )-
>format( DateTime::ISO8601 ), "\n";
?>
```

Parsing strings with the `date_parse_from_format()` function:

```
<?php
$date = "06/08/04";
print_r( date_parse_from_format( '!y*d*m', $date ) );
?>
```

Example:

Pattern String Y M D

!y*d*m 06/08/04 false false false

!y*d*m 06/08/04 1970 01 01

!y*d*m 06/08/04 2006 01 01

!y*d*m 06/08/04 2006 01 01

!y*d*m 06/08/04 2006 01 08

Updating Dates and Times

```
<?php
    $date = new DateTime( '2010-03-08 15:48:21' );

    $date->setTime( 15, 0, 7 );
    $date->setDate( 2008, 07, 22 );
    $date->setIsoDate( 2008, 45, 2 );
    $date->setTimestamp( 1200128314 );
?>
```

Result:

```
2010-03-08T15:48:21+0000
2010-03-08T15:00:07+0000
2008-07-22T15:00:07+0100
2008-11-04T15:00:07+0000
2008-11-15T08:58:34+0000
```

Modifying dates and times:

```
<?php
    date_default_timezone_set("Europe/London");
    $ts = new DateTime("2010-03-08 15:53:55");

    $ts->modify("+2 days");

    $ts->modify("Friday +3 weeks");

    $ts->modify("next friday");
?>
```

Result:

Mon, 08 Mar 2010 15:53:55 +0000

Wed, 10 Mar 2010 15:53:55 +0000

Fri, 02 Apr 2010 15:53:55 +0100

Fri, 09 Apr 2010 15:53:55 +0100

Using Timezones

The Timezone Object

Creating a timezone resource:

```
<?php
    $tz = new DateTimeZone("Asia/Singapore");
?>
```

Using the timezone when parsing a string with a date representation:

```
<?php
    $tz = new DateTimeZone("Pacific/Honolulu");
    $ts = new DateTime("1978-12-22 09:15", $tz);
?>
```

A passed timezone object does not override a parsed timezone:

```
<?php
    $tz = new DateTimeZone("Pacific/Honolulu");
    $ts2 = new DateTime("1978-12-22 09:15 Europe/London", $tz);
    echo $ts2->format( DateTime::RFC2822 );
?>
```

Using Timezones

Changing timezones

Using the timezone when parsing a string with a date representation:

```
<?php
    $tz1 = new DateTimeZone("Pacific/Honolulu");
    $tz2 = new DateTimeZone("Australia/Melbourne");

    $ts = new DateTime("1978-12-22 09:15", $tz1);
    echo $ts->getTimezone()->getName(), ': ',
        $ts->format(DateTime::RFC2822), "<br/>";

    $ts->setTimezone($tz2);

    echo $ts->getTimezone()->getName(), ': ',
        $ts->format(DateTime::RFC2822), "<br/>";
?>
```

Timezones Utilities

Transition Times and Location Information

```
<?php
    $tz = new DateTimeZone("Europe/Berlin");
    $trs = $tz->getTransitions(
        strtotime('1938-01-01 UTC'), strtotime('1948-01-01 UTC')
    );

    foreach ($trs as $tr) {
        printf("%20s %7d %d %s\n",
            $tr['time'], $tr['offset'], $tr['isdst'], $tr['abbr']);
    }

    $loc = $tz->getLocation();
    echo 'Info: ', join( ' - ', $loc ), "\n";
```

All supported timezone identifiers:

```
<?php
    $ids = timezone_identifiers_list();
    echo "Number of identifiers: ", count($ids), "\n";
    echo implode(", ", array_slice($ids, 0, 5)), "... \n";
    echo implode(", ", array_slice($ids, -5));
?>
```

Restrict by continent:

```
<?php
    $ids = timezone_identifiers_list( DateTimeZone::EUROPE );
    echo implode( ", ", $ids );
?>
```

Restrict by country:

```
<?php
    $ids = timezone_identifiers_list( DateTimeZone::PER_COUNTRY, 'US'
);
    echo implode( ", ", $ids );
?>
```

Intervals (PHP 5.3)

Creating an interval

```
<?php
// full notation
$i = new DateInterval( 'P0003-01-15T06:12:30' );

// abbreviated notation
$i = new DateInterval( 'P3DT6H' );

// from a difference
$d1 = new DateTime();
$d2 = new DateTime( "2009-09-09 09:09 Europe/Amsterdam" );
$i = $d1->diff( $d2 );

// displaying the difference
echo $i->format( '%a days, %h hours, %i minutes' ), "\n";
?>
<?php
// create from string
$i = DateInterval::createFromDateString( "next weekday" );
?>
```

Intervals (PHP 5.3)

Applying an interval

```
<?php
$d = new DateTime( 'August 27th, 2009' );
echo $d->format( "l Y-m-d\n" );

$i = DateInterval::createFromDateString( "next weekday" );
echo $d->add( $i )->format( "l Y-m-d\n" );
echo $d->add( $i )->format( "l Y-m-d\n" );

$i = DateInterval::createFromDateString( "3 months 10 days" );
echo $d->sub( $i )->format( "l Y-m-d\n" );
?>
```

Result:

Thursday 2009-08-27

Friday 2009-08-28

Monday 2009-08-31

Thursday 2009-05-21

Relative Time

Weekday manipulations

```
<?php
$ds = '2010-03-10 14:30';
echo date_create( $ds )->format( 'D Y-m-d H:i' ), "\n";
echo date_create( $ds )->modify( 'Tuesday' )->format( 'D Y-m-d H:i' ), "\n";
echo date_create( $ds )->modify( 'this week Tuesday' )->format( 'D Y-m-d H:i' ), "\n";
echo date_create( $ds )->modify( 'next Tuesday' )->format( 'D Y-m-d H:i' ), "\n";
echo date_create( $ds )->modify( 'next week Tuesday' )->format( 'D Y-m-d H:i' ), "\n";
echo date_create( $ds )->modify( 'last Tuesday' )->format( 'D Y-m-d H:i' ), "\n";
echo date_create( $ds )->modify( 'last week Tuesday' )->format( 'D Y-m-d H:i' ), "\n";
echo date_create( $ds )->modify( '1 week ago Tuesday' )->format( 'D Y-m-d H:i' ), "\n";
?>
```

Relative Time

Weekday manipulations

```
<?php
$ds = '2010-03-10 14:30';
echo date_create( $ds )->format( 'D Y-m-d H:i' ), "\n";
echo date_create( $ds )->modify( 'Wednesday' )->format( 'D Y-m-d H:i' ), "\n";
echo date_create( $ds )->modify( 'this week Wednesday' )->format( 'D Y-m-d H:i' ), "\n";
echo date_create( $ds )->modify( 'next Wednesday' )->format( 'D Y-m-d H:i' ), "\n";
echo date_create( $ds )->modify( 'next week Wednesday' )->format( 'D Y-m-d H:i' ), "\n";
echo date_create( $ds )->modify( 'last Wednesday' )->format( 'D Y-m-d H:i' ), "\n";
echo date_create( $ds )->modify( 'last week Wednesday' )->format( 'D Y-m-d H:i' ), "\n";
echo date_create( $ds )->modify( '1 week ago Wednesday' )->format( 'D Y-m-d H:i' ), "\n";
?>
```

Relative Time

"previous month" / "next month"

```
<?php
    $date = new DateTime( '2010-01-31 15:48:21' );
    echo $date->modify( 'next month' )->format( 'Y-m-d' ), "\n";
?>
```

Explanation:

2010-01-31 15:48:21

2010-02-31 15:48:21 "next month" increases month number by 1

2010-03-03 15:48:21 February only has 28 days, so days are overflowed into the next month

Relative Time

"first day next month"

```
<?php
    $date = new DateTime( '2010-01-31 15:48:21' );
    echo $date->modify( 'first day next month' )->format( 'Y-m-d' ),
    "\n";
?>
```

Explanation:

2010-01-31 15:48:21

2010-02-31 15:48:21 "next month" increases month number by 1

2010-03-03 15:48:21 February only has 28 days, so days are overflowed into the next month

2010-03-04 15:48:21 "first day" adds one more day

Relative Time

"first day *of* next month"

```
<?php
    $date = new DateTime( '2010-01-31 15:48:21' );
    echo $date->modify( 'first day of next month' )->format( 'Y-m-
d' ), "\n";
?>
```

Explanation:

2010-01-31 15:48:21

2010-02-31 15:48:21 "next month" increases month
number by 1

2010-02-01 15:48:21 "first day of" resets the day
number to 1

Relative Time

"last day of third month"

```
<?php
    $date = new DateTime( '2010-01-31 15:48:21' );
    echo $date->modify( 'last day of third month' )->format( 'Y-m-
d' ), "\n";
?>
```

Explanation:

2010-01-31 15:48:21

2010-04-31 15:48:21 "third month" increases month number by 3

2010-05-00 15:48:21 "last day of" resets the day number to 0 and increases the month number by 1

2010-04-30 15:48:21 Day count is less than 1, so the algorithm corrects this to a proper date

Periods (PHP 5.3)

Initializing a period

```
<?php
// start, interval and count
$db = new DateTime( '2008-07-31' ) ;
$di = DateInterval::createFromDateString( 'next weekday' );
$p = new DatePeriod( $db, $di, 3 );

// start, interval and end
$de = new DateTime ( '2008-08-05' );
$p = new DatePeriod( $db, $di, $de );

// ISO 8601 string
$s = "2008-10-04T20:56:18Z/P0000-00-20T03:15:54/2008-12-
22T00:00:00Z";
$p = new DatePeriod( $s );
?>
```

Periods (PHP 5.3)

Iterating over a period

```
<?php
$db = new DateTime( '2008-12-31' );
$de = new DateTime( '2009-12-31' );
$di = DateInterval::createFromDateString( 'third tuesday of next
month' );
$dp = new DatePeriod( $db, $di, $de,
DatePeriod::EXCLUDE_START_DATE );
foreach ( $dp as $dt )
{
echo $dt->format( "F jS\n" );
}
?>
```

User's Timezone

with a little javascript...

```
<?php
if (!isset($_GET['tzinfo'])) {
?>
<html>
<script type="text/javascript">
var d = new Date()
var tza = d.toLocaleString().split(" ").slice(-1)
var tzo = d.getTimezoneOffset()
window.location = window.location + '?tzinfo=' + tza + '|' + tzo
</script>
</html>
<?php
} else {
    list( $abbr, $offset ) = explode( '|', $_GET['tzinfo'] );
    echo timezone_name_from_abbr( $abbr, $offset * -60 );
}
?>
```

Sunset/Sunrise

```
<p><?php
date_default_timezone_set('Europe/Berlin');
if (isset($_POST['country'])) {
mysql_connect('localhost', 'root', 'weel23');
mysql_select_db('geolocation');
$re = mysql_query( "SELECT * FROM city where
country='{$_POST['country']}' AND normalized_name='{$_POST['city']}' "
);
$info = mysql_fetch_assoc( $re );
if ($info) {
    $lat = $info['lat']; $lon = $info['lon'];

    $info = date_sun_info(time(), $lat, $lon);
    echo "Sunrise is at ", date(DateTime::RSS, $info['sunrise']),
"\n";
    echo "Sunset is at ", date(DateTime::RSS, $info['sunset']), "\n";
    echo "Day length is ",
    round(($info['sunset'] - $info['sunrise']) / 3600, 1), "hrs";
}
}
?></font>
<form method="post">
Country: <input name="country"/> City: <input name="city"/><br/>
<input type="submit" value="Check"/></form></p>
```

php | architect's
Guide to
Date and Time
Programming



Derick Rethans

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<http://derickrethans.nl/talks.html>
- World timezones:
<http://www.worldtimezone.com/index24.php>
- Geonames: <http://www.geonames.org/>
- Questions?: derick@php.net

Thanks!

Derick Rethans - derick@php.net - twitter: @derickr
<http://derickrethans.nl/talks.html>