

Einführung in PHPUnit & Continuous Integration

Markus Perl

Über mich

- Markus Perl
- PHP seit 12 Jahren
- Entwickler der Online Community <http://www.open-mmx.de>
- Senior Developer bei Traviangames in München
 - <http://www.travian.de/>
 - <http://www.imperion.de/>
- Freelancer im Bereich PHP-Anwendungsentwicklung

Agenda

- Warum überhaupt Code testen?
- Wie wird Code getestet
- Probleme und Best Practices
- Unittests und Zend Framework
- Continuous Integration

Warum Code Testen

- Um sicherzustellen, dass kritische Businesslogik korrekt funktioniert
- Um Bugs frühzeitig zu erkennen
- Um Bugs zu reproduzieren
- Wartbarkeit des Codes gewährleisten

Was kann getestet werden

- Backend
 - Business Logik
 - eigene Frameworks
- Frontend
 - Templates
 - Formular Verarbeitung
 - AJAX, Json

The Bottle Example

```
<?php
class Bottle
{
    private $_waterAmount = 0;

    public function __construct($waterAmount) {
        $this->_waterAmount = $waterAmount;
    }

    public function getWaterAmount () {
        return $this->_waterAmount;
    }

    public function addWater($ml) {
        $this->_waterAmount += $ml;
    }

    public function drinkWater($ml) {
        $this->_waterAmount -= $ml;

        if ($this->_waterAmount < 0 ) {
            throw new Exception('water out of range');
        }
    }
}
```

The Bottle Example

```
<?php
require_once 'Bottle.php';

class BottleTest extends PHPUnit_Framework_TestCase
{
}
```

The Bottle Example

```
<?php
require_once 'Bottle.php';

class BottleTest extends PHPUnit_Framework_TestCase
{
    public function testBottleWithInitialWaterAmount ()
    {
    }
}
```


The Bottle Example

```
<?php
require_once 'Bottle.php';

class BottleTest extends PHPUnit_Framework_TestCase
{
    public function testBottleWithInitialWaterAmount ()
    {
        $bottle = new Bottle(200);
        $bottle->addWater(100);
        $bottle->addWater(50);

        $this->assertEquals(350, $bottle->getWaterAmount());

        return $bottle;
    }
}
```

The Bottle Example

```
<?php
require_once 'Bottle.php';

class BottleTest extends PHPUnit_Framework_TestCase
{
    public function testBottleWithInitialWaterAmount ()
    {
        $bottle = new Bottle(200);
        $bottle->addWater(100);
        $bottle->addWater(50);

        $this->assertEquals(350, $bottle->getWaterAmount());

        return $bottle;
    }

    /**
     * @depends      testBottleWithInitialWaterAmount
     */
    public function testDrinkWater (Bottle $bottle)
    {
        $bottle->drinkWater(50);
        $bottle->drinkWater(70);

        $this->assertEquals(230, $bottle->getWaterAmount());
    }
}
```

The Bottle Example

```
<?php
require_once 'Bottle.php';

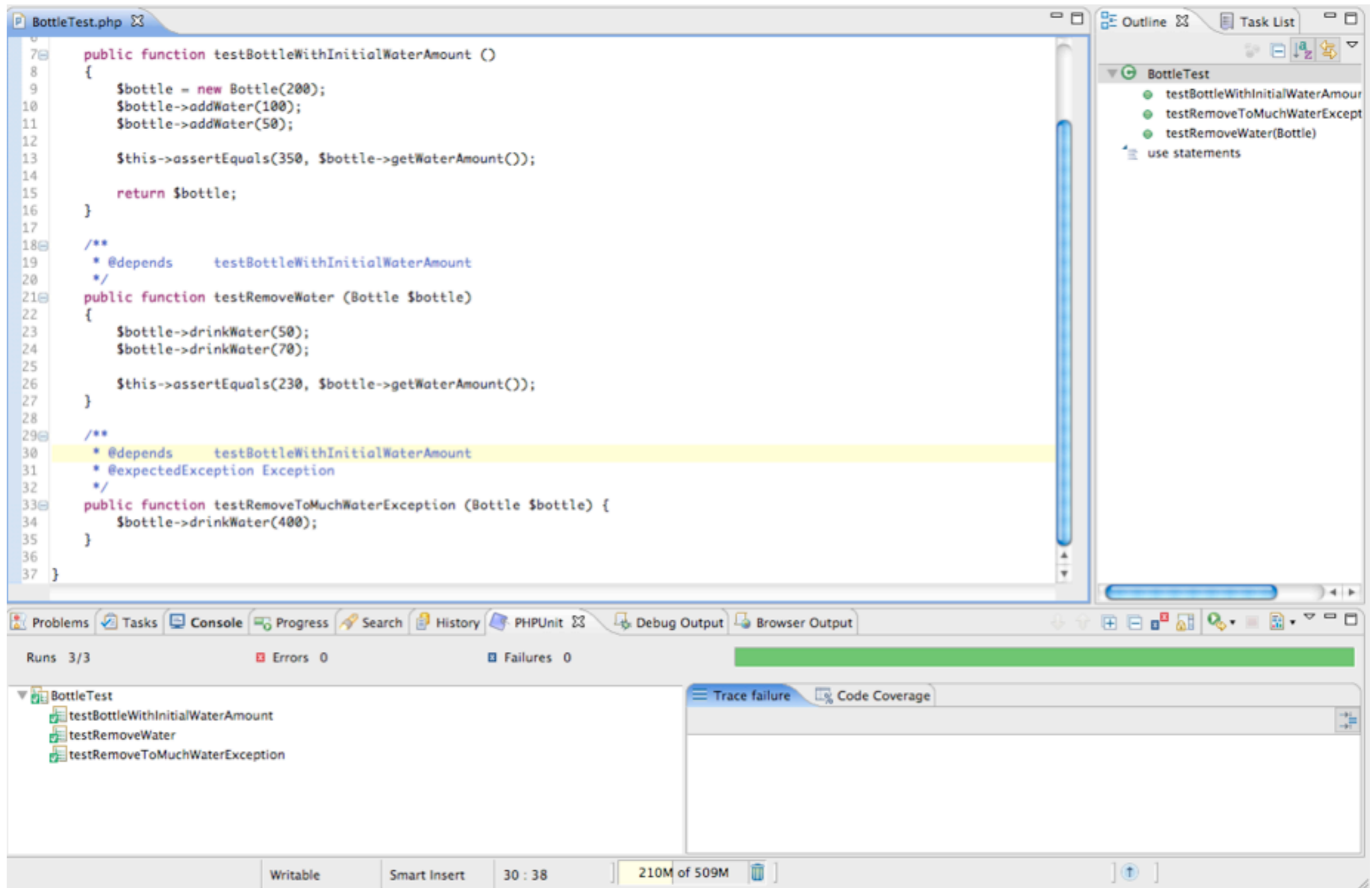
class BottleTest extends PHPUnit_Framework_TestCase
{
    public function testBottleWithInitialWaterAmount ()
    {
        $bottle = new Bottle(200);
        $bottle->addWater(100);
        $bottle->addWater(50);

        $this->assertEquals(350, $bottle->getWaterAmount());

        return $bottle;
    }

    /**
     * @depends      testBottleWithInitialWaterAmount
     * @expectedException Exception
     */
    public function testDrinkTooMuchWaterException (Bottle $bottle) {
        $bottle->drinkWater(400);
    }
}
```

The Bottle Example



```
78 public function testBottleWithInitialWaterAmount ()
79 {
80     $bottle = new Bottle(200);
81     $bottle->addWater(100);
82     $bottle->addWater(50);
83
84     $this->assertEquals(350, $bottle->getWaterAmount());
85
86     return $bottle;
87 }
88
89 /**
90  * @depends testBottleWithInitialWaterAmount
91  */
92 public function testRemoveWater (Bottle $bottle)
93 {
94     $bottle->drinkWater(50);
95     $bottle->drinkWater(70);
96
97     $this->assertEquals(230, $bottle->getWaterAmount());
98 }
99
100 /**
101  * @depends testBottleWithInitialWaterAmount
102  * @expectedException Exception
103  */
104 public function testRemoveToMuchWaterException (Bottle $bottle) {
105     $bottle->drinkWater(400);
106 }
107 }
```

Outline

- BottleTest
 - testBottleWithInitialWaterAmour
 - testRemoveToMuchWaterExcept
 - testRemoveWater(Bottle)
 - use statements

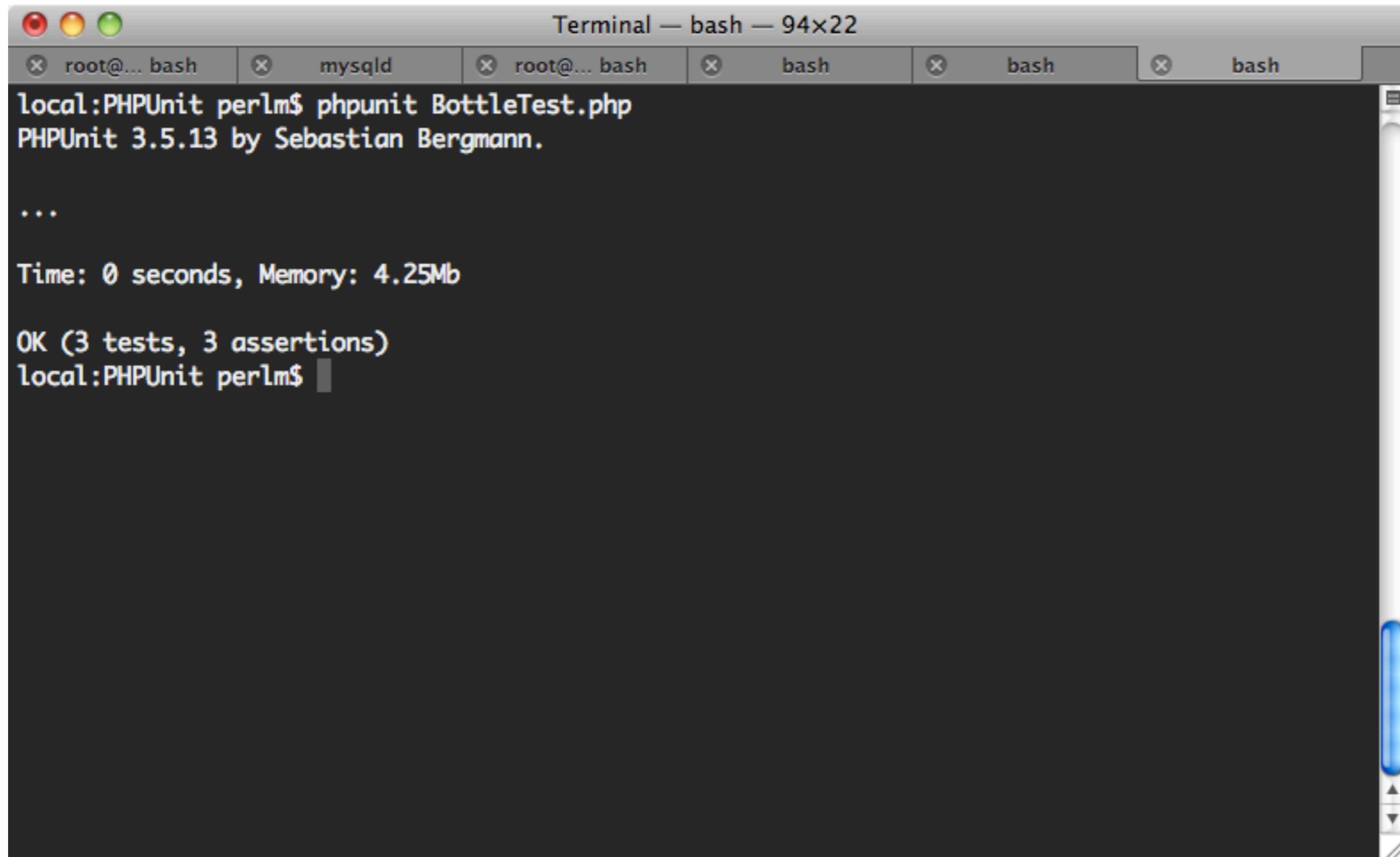
Runs 3/3 Errors 0 Failures 0

testBottleWithInitialWaterAmount
testRemoveWater
testRemoveToMuchWaterException

Trace failure Code Coverage

Writable Smart Insert 30 : 38 210M of 509M

The Bottle Example



```
Terminal — bash — 94x22
root@... bash  mysql  root@... bash  bash  bash  bash
local:PHPUnit perl$ phpunit BottleTest.php
PHPUnit 3.5.13 by Sebastian Bergmann.

...

Time: 0 seconds, Memory: 4.25Mb

OK (3 tests, 3 assertions)
local:PHPUnit perl$
```

The Bottle Example

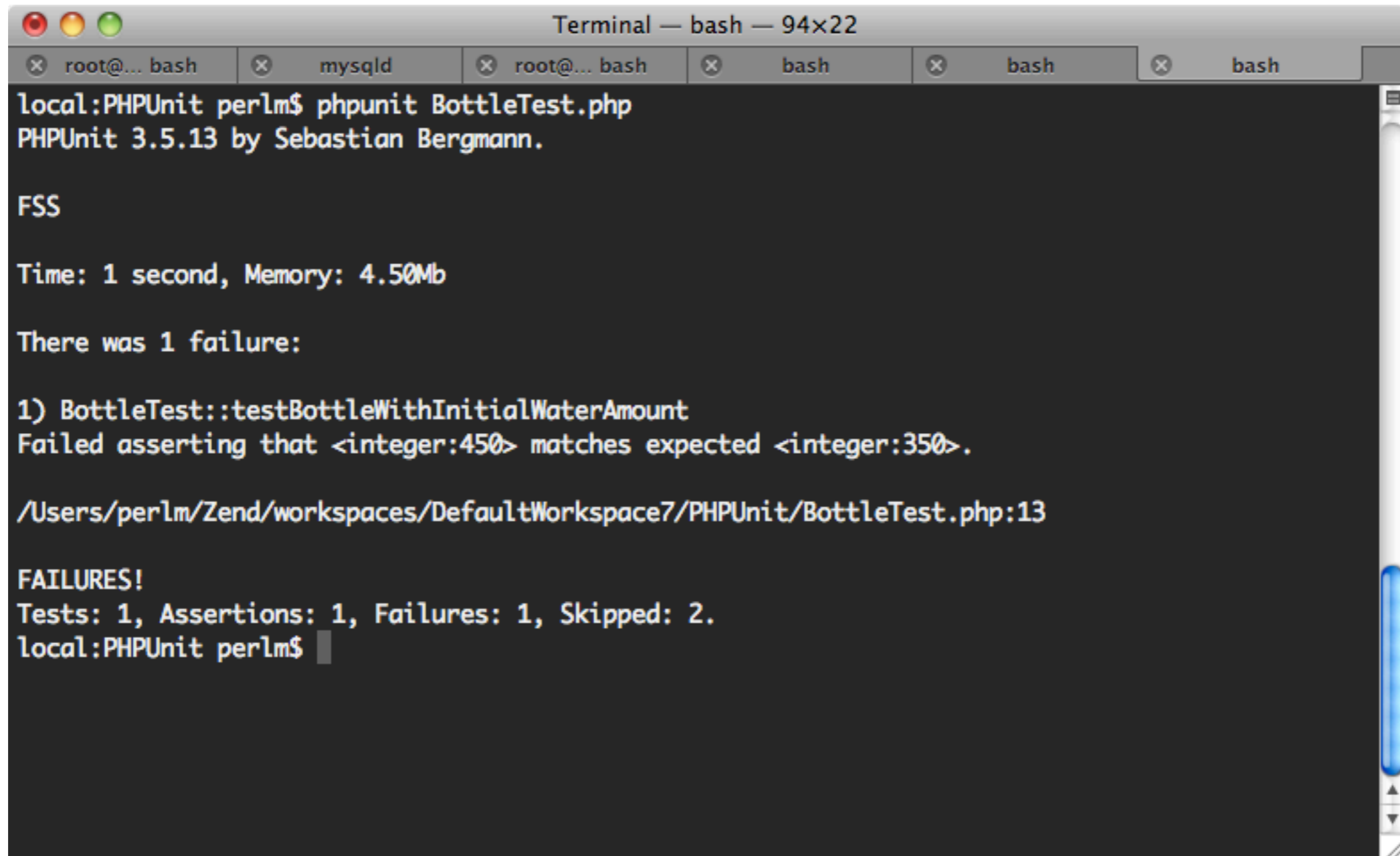
```
<?php
require_once 'Bottle.php';

class BottleTest extends PHPUnit_Framework_TestCase
{
    public function testBottleWithInitialWaterAmount ()
    {
        $bottle = new Bottle(200);
        $bottle->addWater(100);
        $bottle->addWater(150);

        $this->assertEquals(350, $bottle->getWaterAmount());

        return $bottle;
    }
}
```

The Bottle Example



```
Terminal — bash — 94x22
root@... bash  mysql  root@... bash  bash  bash  bash
local:PHPUnit perl$ phpunit BottleTest.php
PHPUnit 3.5.13 by Sebastian Bergmann.

FSS

Time: 1 second, Memory: 4.50Mb

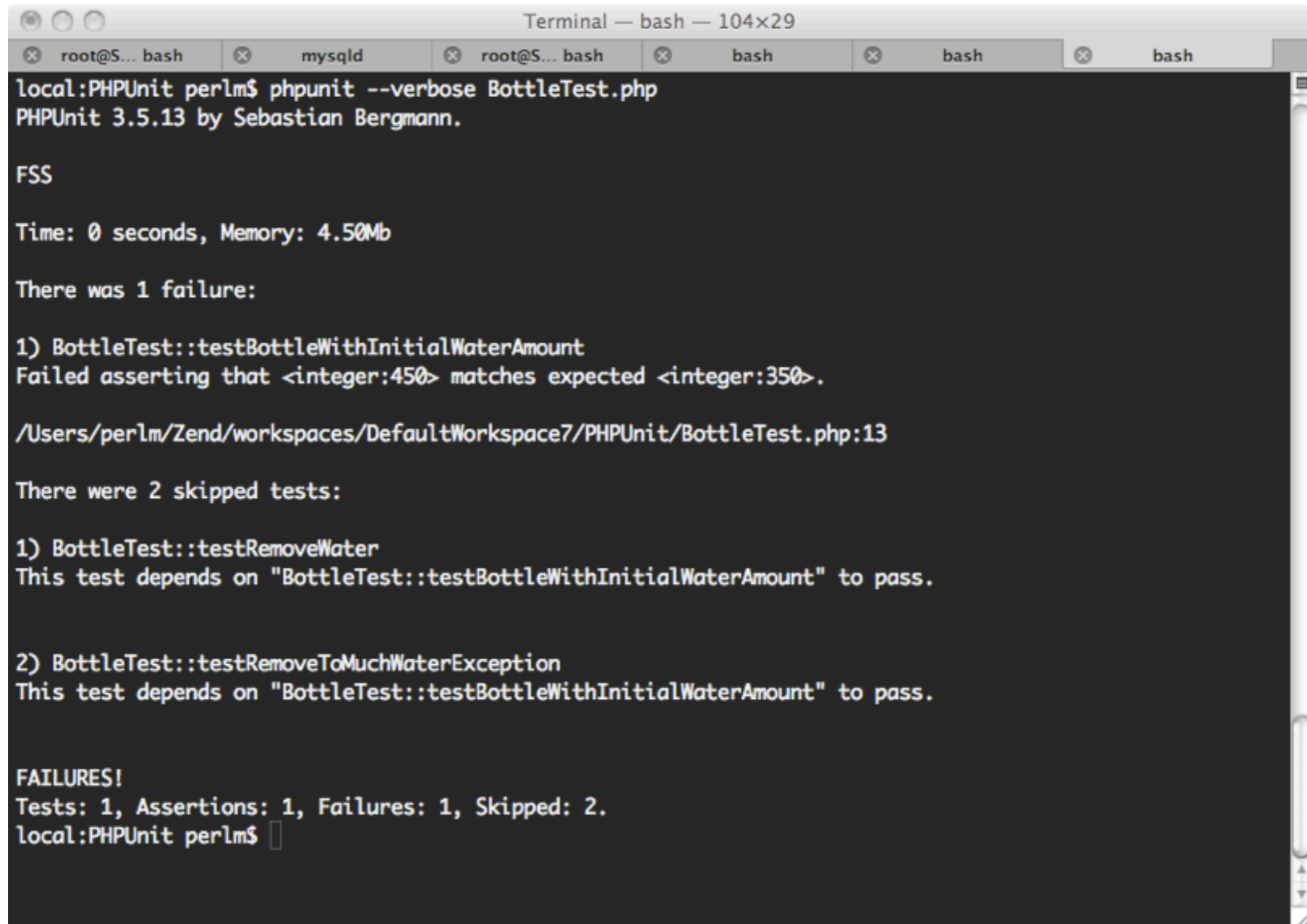
There was 1 failure:

1) BottleTest::testBottleWithInitialWaterAmount
Failed asserting that <integer:450> matches expected <integer:350>.

/Users/perl/Zend/workspaces/DefaultWorkspace7/PHPUnit/BottleTest.php:13

FAILURES!
Tests: 1, Assertions: 1, Failures: 1, Skipped: 2.
local:PHPUnit perl$
```

The Bottle Example



```
Terminal — bash — 104x29
root@S... bash  mysql  root@S... bash  bash  bash  bash
local:PHPUnit perl$ phpunit --verbose BottleTest.php
PHPUnit 3.5.13 by Sebastian Bergmann.

FSS

Time: 0 seconds, Memory: 4.50Mb

There was 1 failure:

1) BottleTest::testBottleWithInitialWaterAmount
Failed asserting that <integer:450> matches expected <integer:350>.

/Users/perl/Zend/workspaces/DefaultWorkspace7/PHPUnit/BottleTest.php:13

There were 2 skipped tests:

1) BottleTest::testRemoveWater
This test depends on "BottleTest::testBottleWithInitialWaterAmount" to pass.

2) BottleTest::testRemoveTooMuchWaterException
This test depends on "BottleTest::testBottleWithInitialWaterAmount" to pass.

FAILURES!
Tests: 1, Assertions: 1, Failures: 1, Skipped: 2.
local:PHPUnit perl$
```


Probleme beim Testen

- Private Methoden
- Singletons
- Code im Constructor
- globale Variablen
- statische Variablen und Methoden
- Datenbanken, Dateisysteme
- Verteilte Daten wie memcached

Private Methoden

```
/**
 * @covers ClassWithPrivates::doSomethingPublic
 * @covers ClassWithPrivates::doSomethingPrivate
 */
public function testDoSomething ()
{
    $doSomething = new ClassWithPrivates();
    $this->assertEquals('result', $doSomething-> doSomethingPublic());
}
```

Code im Constructor

```
<?php
class Bottle
{
    private $_waterAmount = 0;

    public function __construct() {
        $this->_waterAmount = file_get_contents('http://www.waterdata.de/level');
    }
}
```

Globals

```
<?php
class Bottle
{
    private $_waterAmount = 0;

    public function __construct() {
        global $waterAmount;
        $this->_waterAmount = $waterAmount;
    }
}

<?php
require_once 'Bottle.php';

class BottleTest extends PHPUnit_Framework_TestCase
{
    /**
     * @backupGlobals enabled
     */
    public function testBottleWithInitialWaterAmount ()
    {

    }
}
```

Statische Methoden und Singletons

```
<?php
class Bottle
{
    private $_waterAmount = 0;

    public function __construct() {
        $waterAmount = BottleManager::getWaterAmount();
        $this->_waterAmount = $waterAmount;
    }
}
```

Dateisysteme oder Memcache

```
<?php
class Bottle
{
    private $_waterAmount = 0;

    public function __construct() {
        $waterAmount = file_get_contents('/tmp/wateramount');
        // $waterAmount = Cache::get('wateramount');
        $this->_waterAmount = $waterAmount;
    }
}
```

Datenbanken

```
<?php
class Bottle
{
    private $_waterAmount = 0;

    public function __construct() {
        $waterAmount = DB::query('SELECT water_amount FROM bottles LIMIT 1');
        $this->_waterAmount = $waterAmount;
    }
}
```

Datenbanken

```
<?php
require_once 'PHPUnit/Extensions/Database/TestCase.php';

class DatabaseTest extends PHPUnit_Extensions_Database_TestCase
{
    protected function getConnection()
    {
        $pdo = new PDO('mysql:host=localhost;dbname=testdb', 'root', '');
        return $this->createDefaultDBConnection($pdo, 'testdb');
    }

    protected function getDataSet()
    {
        return $this->createFlatXMLDataSet(dirname(__FILE__).'../fixtures/waterAmount.xml');
    }
}
```


Datenbanken

```
<?xml version="1.0" encoding="UTF-8" ?>
<dataset>
  <table name="water_amount">
    <column>id</column>
    <column>amount</column>
    <row>
      <value>1</value>
      <value>150</value>
    </row>
    <row>
      <value>2</value>
      <value>400</value>
    </row>
  </table>
</dataset>
```

Unittests mit Zend Framework

application
library
public

tests
 |_application
 |_controller
 |_models
 |_library
 |_bootstrap.php

Application Bootstrap

```
// Define path to application directory
defined('APPLICATION_PATH') || define('APPLICATION_PATH', realpath(dirname(__FILE__) . '/../application'));
// Define application environment
defined('APPLICATION_ENV') || define('APPLICATION_ENV', 'testing');
// Ensure library/ is on include_path
set_include_path(implode(PATH_SEPARATOR, array(
    realpath(APPLICATION_PATH . '/../library'),
    get_include_path()
)));

/** Zend_Application */
require_once 'Zend/Application.php';

$application = new Zend_Application(APPLICATION_ENV, APPLICATION_PATH);
$application->bootstrap();
```

Controllertest

```
<?php
require_once dirname(__FILE__) . '/../../bootstrap.php';

class Default_IndexControllerTest extends Zend_Test_PHPUnit_ControllerTestCase
{
    public function setUp()
    {
        $this->bootstrap = new Zend_Application('testing', APPLICATION_PATH);
        parent::setUp();
    }

    public function testIndexAction()
    {
        $this->dispatch('/index/index/');
        $this->assertController('index');
        $this->assertAction('index');
        $this->assertQuery('input[id=username]')
    }
}
```

Modeltest

```
<?php
require_once dirname(__FILE__) . '/../../bootstrap.php';

class Default_Model_UserTest extends Zend_Test_PHPUnit_DatabaseTestCase
{
    /**
     * @var Default_Model_DbTable_User */
    private $_handle;

    protected function setUp()
    {
        $this->_handle = new Default_Model_DbTable_User();
        parent::setUp();
    }

    protected function tearDown()
    {
        $this->_handle = null;
        parent::tearDown();
    }

    protected function getConnection();

    protected function getDataSet();

    public function testAddUser()
    {
        $this->_handle->addUser('Heinz', array('email' => $email = 'heinz@localhost', 'password' => $password = 'test'));
        $user = $this->_handle->getUser('Heinz');
        $this->assertEquals($email, $user['email']);
        $this->assertEquals($password, $user['password']);
    }
}
```

Modeltest

```
<?php
require_once dirname(__FILE__) . '/../../bootstrap.php';

class Default_Model_UserTest extends Zend_Test_PHPUnit_DatabaseTestCase
{

    public function testAddUser()
    {
        $this->_handle->addUser('Heinz', array('email' => $email = 'heinz@localhost', 'password' =>
$password = 'test'));

        $ds = new Zend_Test_PHPUnit_Db_DataSet_DbTableDataSet();
        $ds->addTable($this->_handle);

        $this->assertDataSetsEqual(
            $this->createFlatXmlDataSet(dirname(__FILE__) . "/fixtures/addUserAssertion.xml"), $ds
        );
    }
}
```

Modeltest

```
<?php
require_once dirname(__FILE__) . '/../../bootstrap.php';

class Default_Model_Calculate extends Zend_Test_PHPUnit_DatabaseTestCase
{

    public function testCalculateDataProvider()
    {
        return array(
            array(1, 2, 3),
            array(5, 5, 10),
            array(1000, 50, 1050)
        );
    }

    /**
     * @dataProvider testCalculateDataProvider
     */
    public function testCalculate($b, $a, $expectedResult)
    {
        $this->assertEquals($this->_handle->calculate($a, $b), $expectedResult);
    }
}
```

Continuous Integration

The screenshot shows the Hudson web interface. The browser title is 'Hudson - Microsoft Internet Explorer' and the address bar shows 'http://kohsuke.sfbay/hudson/'. The main heading is 'Hudson' with a sub-heading 'Hudson' and a link 'ENABLE AUTO REFRESH'. On the left, there are links for 'New Job', 'Configure', and 'Reload Config.'. Below these are two tables: 'Build Queue' and 'Build Executor Status'.

Build Queue

Job	Status
hudson	⊘
jaxb-ri	⊘

Build Executor Status

No.	Status
1	Idle
2	Idle
3	Building javanet-maven-repository-daemon #826 ⊘
4	Building jaxb-ri #3181 ⊘
5	Building glassfish #105 ⊘
6	Idle

Jobs List

Job	Last Success	Last Failure	Last Duration
Common annotations	4 days (#16)	9 months (#3)	39 seconds
bsh	6 months (#11)	10 months (#2)	59 seconds
dtd-parser	6 months (#8)	N/A	1 minute
fi	28 days (#586)	1 month (#567)	7 minutes
fi (weekly)	6 days (#53)	13 days (#52)	5 minutes
glassfish	4 hours (#104)	1 day (#88)	1 hour
hudson	4 minutes (#201)	N/A	1 minute
istack-commons	12 days (#19)	16 days (#5)	14 seconds
iapex	3 days (#55)	9 hours (#64)	1 minute
java-ws-xml-community-discussion-updater	4 minutes (#16146)	10 hours (#16125)	1 minute
java.net acl processor	18 hours (#162)	N/A	0 seconds

Continuous Integration



Jenkins

A Jenkins community resource

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Meet Jenkins

Find out what Jenkins is and get started.



Use Jenkins

See how to get more out of your Jenkins.



Extend Jenkins

Learn how to build Jenkins or extend Jenkins by writing plugins.





Download jenkins.war

Latest and greatest

[changelog](#) | [past releases](#)

upgrading from Hudson?

Or native package

-  Windows
-  Ubuntu/Debian
-  Red Hat/Fedora/CentOS
-  Mac OS X
-  openSUSE
-  FreeBSD
-  OpenBSD
-  Gentoo

Continuous Integration



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-  FreeBSD
-  OpenBSD
-  Gentoo

Continuous Integration

- Checkt das Projekt aus
- Führt Tests aus
- Erstellt Code Metriken, Reports und Artefakte
- Baut Softwarepackete
- Archiviert Builds
- Übernimmt das Staging und Deployment
- Informiert Entwickler über Probleme

Hudson

- Java basierte Webanwendung
- Unterstützt unter anderem SVN, Git, Perforce, CVS
- Open Source Lizenz (MIT)
- Aktuell sind über 200 Plugins verfügbar
- über 180 Personen haben bereits Code zu dem Projekt beigetragen
- Erste Version 2006 / 2007

Continuous Integration

- ebay
- Oracle
- Yahoo
- HP
- Goldman Sachs
- Allianz
- Lucene

Continuous Integration und PHP

- `phpunit`
- `phpcpd`
- `phpdepend`
- `phploc`
- `phpcs`

Vielen Dank
