PHP on Java: An Introduction and Update to Caucho's Quercus

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Overall Presentation Goal

Learn when, why, and how to use PHP on Java with Caucho's Quercus
Speaker’s qualifications

- **Caucho Technology** is the maker of **resin**, **quercus**, **hessian**, and **bam**

- **Emil Ong...**
  - is the Chief Evangelist for Caucho Technology, Inc.
  - was and is an engineer at Caucho working on Quercus
  - presents frequently at conferences on Caucho products including Resin, Quercus, and BAM
  - has published articles on Hessian and Quercus in various publications
Quercus provides the best of both worlds. We get to use PHP, one of the most popular website building languages, for the front-end of our application and Java Enterprise Edition for the backend of our application. We could not have taken our application to the next level without it.

David Berry, LiveProcess

CTO
Introduction to Quercus

- 100% Java implementation of PHP
- Interpreted PHP
- PHP compiled to Java
- All modules/libraries rewritten in Java
- Runs custom and popular open source PHP apps
Top 3 Questions about Quercus

1) Why?
2) Why?
3) Why?
When and Why to use Quercus

• When you need to get an application ready right away and there’s a popular PHP application available, but you’re a Java shop
  • WordPress
  • MediaWiki
  • Drupal
  • phpBB3
  • Moodle (new!)
I just switched my apps to Resin, and I'm loving it. But Quercus is simply causing me to give writing or maintaining something in Java pause when there are excellent free PHP alternatives available. I wrote a blogging app, but now since I have Quercus, I decided to download Wordpress. The entire thing is less than 1.5 megs and took 5 minutes to get going.

- David Lee

Post on JavaLobby

2008/04/10
When and Why to use Quercus

- You want to unify existing but separate PHP and Java deployments into one
When and Why to use Quercus

- Moving a PHP-only site to Quercus for improved performance, reliability, and monitoring
- Apache/mod_php has a reputation for being
  - Hard to scale
  - Slow
  - Memory/process heavy
  - Hard to monitor
  - Brutal on databases
When and Why to use Quercus

• You need PHP for the frontend and Java libraries on the backend
• You also want them to be able to talk to each other easily
• Examples
  • Spring w/WordPress
  • JMS w/eCommerce
  • Mule w/Customer support
PHP naturally makes business sense because of existing skills available at the marketplace. It is cheap to buy web developers by the dozen with existing scripting skills, compared to guys who have skills in Java MVC-frameworks. Prototyping with PHP is also lightning fast - and as all the important code has been dropped down to the business logic-layer, it is harder to shoot oneself to the foot with clever scripting tricks.

- Heimo Laukkanen,
resin-interest mailing list
2008/09/04
Case study: Caucho.com

- http://blog.caucho.com
- WordPress
- http://forum.caucho.com
- Drupal
- http://wiki.caucho.com
- MediaWiki
Installing an Open Source Application

Four easy steps

1) Create a new webapp
2) Install JDBC driver
3) Unpack application in webapp root
4) Install using standard PHP application instructions
A Technical look at Quercus

- Pages served from a Java Servlet
- Similar to JSP
- Interpreted mode
- Compiled mode
- Libraries in 100% Java
- Language compatible with PHP5
- Unicode support of PHP6
A Technical look at Quercus
Libraries implemented in Quercus

- apc
- array
- bcmath
- calendar
- classes/objects
- ctype
- curl
- datetime
- dom
- ereg
- error
- exception
- filesystem
- gd
- gettext
- hash
- html
- iconv
- json
- mail
- math
- mbstring
- mcrypt
- mhash
- mysql
- Mysqli
- network
- ob
- options
- oracle
- pdf
- pdo
- postgres
- preg
- reflection
- sessions
- simplexml
- socket
- spl (partially)
- string
- token
- unicode
- variable
- xmlreader/xmlwriter
- zip
- zlib
Performance of Quercus

- Compiled PHP runs directly on JVM
- Free improvements with JVM upgrades
- Compared to mod_php w/APC

<table>
<thead>
<tr>
<th>Application</th>
<th>Performance Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>MediaWiki</td>
<td>14.00%</td>
</tr>
<tr>
<td>phpBB3</td>
<td>39.30%</td>
</tr>
<tr>
<td>Drupal</td>
<td>87.60%</td>
</tr>
<tr>
<td>WordPress</td>
<td>112.60%</td>
</tr>
<tr>
<td>bench.php</td>
<td>487.30%</td>
</tr>
</tbody>
</table>
Performance Profiling

• Most applications spend 45% of the time in the database

• 487.3% on bench.php implies faster PHP language processing time

• Built-in reverse proxy cache adds huge performance difference

• MediaWiki
  • 6.98 requests/sec without caching
  • 2666.67 requests/sec with caching
Security

- 100% Java avoids problems of buffer overruns
- Ability to plug into Java security
  - Servlet Filters for input/output verification
  - Can use Java form-based authentication/authorization
- Resin can use OpenSSL for better SSL performance
- Hide backend/utility PHP files in WEB-INF/
Scalability and Reliability

- Database connection pooling
- Transparent clustering features
  - Distributed sessions
  - Fail-safe load balancing
  - Cluster-wide proxy caching
Development features

• Full PHP-Java integration
  • Use Java objects from PHP
  • Execute PHP in Java via javax.script
  • E.g. Java backend, PHP frontend
• Java development tools available to PHP developers
  • Profilers
  • Memory Analysis
The Power and Scalability of Java for PHP

- Java integration: Java objects in PHP
  - "Java" PHP class
    - \$foo = new Java("example.Foo", "foo");
  - JNDI
    - \$foo = jndi_lookup("java:comp/env/foo/foo-a");
  - WebBeans
    - \$foo = java_bean("foo-a")
  - Spring
    - \$foo = spring_bean("foo-a")
The Power and Scalability of Java for PHP

- Extend Java classes in PHP
- Catch Java exceptions within PHP
- Use PHP “foreach” to iterate over Java collections
- Extended “import” syntax allows more natural use of Java classes in PHP
Case Study: LiveProcess

• Established in 2003

• Developed first standardized software solution designed to help healthcare-related organizations prepare for and respond to emergencies
Case Study: LiveProcess

Quercus provides the best of both worlds. We get to use PHP, one of the most popular website building languages, for the front-end of our application and Java Enterprise Edition for the backend of our application. We could not have taken our application to the next level without it.

David Berry,
LiveProcess CTO
Case Study: LiveProcess

- Existing PHP application
- 8 person years of code
- Rewriting completely in Java deemed unfeasible
- CTO familiar with Java and PHP
- Java-PHP bridge determined to be unusable for production
Case Study: LiveProcess

- Existing code ran almost immediately
- Beta release of Quercus
- Background tasks easier in Java
- Threads!
- Resin's Java authentication eliminated messy PHP idiom
  - isLoggedIn() at top of page
Finding static bugs with compilation

- In interpreted mode, no error is raised here, but compilation catches the bug:

```php
function foo($id) {
    if ($id === 1) {
        break;
    }
    return null;
}
```
Fun with Corner Cases!

• Functions can be defined conditionally (if, switch, etc.)
• How to compile this?

```php
if ($x) {
    function foo($arg) { }
}

var_dump(function_exists("foo"));
```
Fun with Corner Cases!

- PHP can instantiate objects using a String for the class name

```php
class Foo {...}
$ObjectType = 'Foo';
$$ObjectType = new $ObjectType();
$$ObjectType->foo();
```
Fun with Corner Cases!

- What should the following expressions return?
  - isset($a[0]) (when $a == "")
  - count ("foo") (hint: count() is an array length function, but "foo" isn't an array)
  - array('3' => 'x', 'y'))
  - FALSE == 0
  - FALSE > -1
Features of using PHP in a Java Server

- Cron
  - Run PHP scripts on a regular schedule without shell scripts, background processes, etc.
- Implementing “built-in” functions
  - e.g. user-defined functions for output buffering
- Profiling
Summary

- Quercus is 100% Java and can be used with your existing Java deployment
- Open Source PHP applications run either side-by-side or integrated with Java applications
- PHP can be used as a view technology or as an application framework for Java development
- PHP in your enterprise opens your staffing possibilities to the vast PHP community
- PHP runs faster, is more reliable, and easier to manage on Java
Installing and profiling a PHP application in Java
Quercus opens a world of possibilities to Java enterprises. The vast array of open source applications and the huge development community of PHP are now available for Java.
Q&A
Thanks for your attention!

http://quercus.caucho.com
http://blog.caucho.com

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Appendix: How is Quercus licensed?

• Quercus Open Source (GPL)
  • Interpreted mode only
  • Does not offer clustered features
  • Available as .war for any app server
• Quercus Professional (closed source)
  • Interpreted and compiled mode
  • Clustering
  • Requires and is included with Resin Professional