PHP and MySQL in i5/OS – New Stacks and New Solutions

Erwin Earley (erwin.earley@us.ibm.com)
System i Technology Center
Open Community Technologies

i want stress-free IT.
i want control.
i want an i.
Agenda

• Introduction

• The iAMP Stack

• The iADP Stack
Web Development Stacks

L A M P
i p y H
n a S P
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x h L
w e

W I M P
i l y H
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i A M P
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Introduction

• The LAMP stack (Linux, Apache, MySQL, PHP) is being used by a growing number of developers to provide a low-cost, reliable platform for web-based applications.

• The iAMP stack (i5/OS, Apache, MySQL, PHP) is the i5/OS native variant of the LAMP stack – it allows for development of web-based applications integrated with the MySQL open source database.
  – iAMP is well suited for those customers/environments that wish to leverage existing open source applications based on PHP and MySQL.

• The iADP stack (i5/OS, Apache, DB/2, PHP) is another i5/OS native variant of the LAMP stack – it allows for development of web-based applications integrated with the DB/2 database and other native i5/OS resources
  – iADP is well suited for those customers/environments that wish to develop customized web applications that provide the ability to access and manipulate i5/OS resources
The LAMP Stack

• LAMP refers to a set of tools (Linux, Apache, MySQL, and PHP) that facilitates rapid development and deployment of software applications

• LAMP is often defined as the open source web platform.
Evolution of web applications

- Every 7 seconds a new wiki or blog is created...
- Next wave of programmers: folks who create content are now empowered to create applications
- New platforms being established – providing simple, feature rich environments for editing and contributing content.
- Content is handled with a simple WYSIWYG editor that makes editing accessible to anyone
- Main content accompanied with discussion tabs, history tabs, version tabs, mailing list tabs
The LAMP Stack

- Open Source Software Components – used as a "toolkit" by web developers for deploying robust web-content complete with data access and manipulation

- Has become a major development platform for the enterprise
  - Used by such enterprises as Amazon, Friendster, Google, and Yahoo
What is LAMP?

- Open-source software stack with a strong focus on:
  - Affordability – Perceived zero to low cost
  - Ease of development, ease-of-use
  - Community
  - The functionality in LAMP is probably the same function that about 80% of J2EE/WebSphere applications use

- L = Linux
- A = Apache web server
- M = MySQL
- P = PHP | Perl | Python
The LAMP components

**Linux**
- Free UNIX-type operating system
- Has become firmly established as an enterprise-class alternative to proprietary UNIX and Microsoft products
- Commercial entities, such as IBM, have extended the free Linux kernel and created the support and services infrastructure essential to enterprise customers

**Apache**
- Traces its roots to the public domain HTTP daemon developed at the National Center for Supercomputing Applications
- Apache has been the most popular web server every year since 1996

**MySQL**
- World's most popular open source database
- Many large corporations – including Sabre Holdings, Cox Communications, The Associate Press, and NASA are using MySQL to power web-sites, business-critical enterprise applications and packaged software

**PHP**
- Widely used general-purpose scripting language
- Especially suited for web development
- Can be embedded in HTML
- It has become one of the most popular languages on the web
What's driving LAMP (and open-source related development stacks)

- Constant pressure on developers to do more, faster, and with less as firms strive to reduce costs, improve returns on IT investments, and accelerate time-to-value
- Growing adoption of SOA environments for enterprise integration
  - Allows wider choice of application development & implementation technologies by allowing heterogeneous systems to interact freely at the service level
- Faster pace of open source software improvement relative to proprietary products
  - Facilitated by active participation of global user communities
- Availability of polished developer tools for the LAMP environment
  - Example: Zend's integrated development and production environments for PHP applications
Speed and Simplicity

• The language component (PHP) of the LAMP stack (as well as iADP and iAMP) has been created specifically to simplify, streamline, and accelerate programming tasks typical of Web development.

• PHP is particularly well suited for text handling as well as database access for dynamic content generation.

• PHP features a simple, clear syntax that makes it easy to learn.
What can be done with LAMP – an Example

• Wikipedia:
  – >8,000 HTTP requests per second
  – >25,000 SQL requests per second
  – 12 database servers
  – 15 application servers in 'external storage' role
  – 20 application servers in 'object cache' role

3000 pageviews per second
The iAMP Stack

- Application
- PHP
- Apache
- MySQL
- IBM i5/OS Web Server
- i5/OS
Comparing iAMP

Application

PHP
Apache
MySQL
IBM i5/OS Web Server

i5/OS

Application

ASP/.NET
IIS
MS-SQL

MS/Windows
Apache

- Flexible, Easy to configure
- Serves over 50% of all websites
- Secure, efficient, extensible server
- Many extensions available
MySQL

• Very easy to setup and use

• Most popular open source database

• Has gained popularity in the web application world and is used in most of the leading PHP applications.

• Open Source, but also commercially backed

• Used in more than 11 million installations

• Cross-platform (over 20 including i5/OS, Windows, Linux, OS/X, HP-UX, AIX, Netware)
MySQL – Dual License

• MySQL has both a free and non-free license

• When using the free licensed MySQL – the GNU public license comes into play:
  – Any application that you develop (and plan on selling) that uses MySQL would require you to make the source code of your application freely available.
  – If you use the free-version of MySQL, that software that depends on it must also be free (as in speech).

• When using the non-free licensed MySQL you are not bound by the GNU public license:
  – Now the source-code for any application that you develop that uses MySQL can remain proprietary
  – If you plan to profit from using MySQL in your application then you will want to pay for a licensed version.

• In the MySQL world, this dual-license approach is often referred to as "What goes around comes around"
IBM and MySQL Announce Plans for i5/OS and DB2

- MySQL is the leading open source database with over 11 million installations
- MySQL is the most popular database to use with PHP applications

- Step 1: MySQL database to be supported on i5/OS
  - Enables customers to deploy MySQL-based applications on i5/OS

- Step 2: Plan to integrate MySQL with DB2 on i5/OS
  - Enables MySQL-based applications to store data in DB2 on i5/OS

System i customers get the benefit of being able to use thousands of new open source applications while continuing to have one easy to use data store with DB2.
PHP

- Web Scripting language by design
- Easy to learn
- Flexible and powerful
- Cross-platform
- Easily extended
Zend Products for i5/OS – July 11, 2006 Announcement

- Customers can order Zend Core for i5/OS and Zend Studio Professional for i5/OS from IBM
  - Orders will be passed to Zend for fulfillment with a GA of July 28th

- Zend Core for i5/OS
  - PHP runtime environment in i5/OS providing connections to DB2 UDB for i5/OS and RPG and COBOL applications
    - With 3 years Standard support
    - Gold and Platinum support levels available for a fee

- Zend Studio Professional for i5/OS
  - Integrated Development Environment on Windows or Linux
    - With 3 years Standard support
    - Gold and Platinum support levels available for a fee

* Zend retail price for Core and Studio Professional on Intel for 5 developers with 3 years standard support – zend/com 7-6-06

= $5000 Value*
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Support for Zend Products

• Zend provides support for i5/OS based products through the Zend Network

• Zend Core for i5/OS and Zend Studio Professional for i5/OS are provided with 3 years of Standard Support
  – Product downloads including current and previous versions
  – Software updates and information
  – Knowledge Base access
  – Web-based support including unlimited support tickets

• Gold and Platinum Support options are available
  – Gold: phone support, Monday through Friday, eight hours a day
  – Platinum: phone support, seven days a week, twenty-four hours a day

• http://www.zend.com/core/network/
# Zend Support Offerings for i5/OS

<table>
<thead>
<tr>
<th>Zend Support Subscription Period</th>
<th>Standard</th>
<th>Gold</th>
<th>Platinum</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 years</td>
<td>1 year</td>
<td>1 year</td>
<td>1 year</td>
</tr>
</tbody>
</table>

| Zend Network                     | ✓       | ✓    | ✓        |
| Web-based Support                | ✓       | ✓    | ✓        |

| Web Response Time/SLA            | 3 days  | 1 business day | 1 business day |

| North American Phone Support     | ✓       | ✓    | ✓        |
| M-F 6am-6pm PST                  |         |      |          |

| Global Phone Support             | ✓       | ✓    | ✓        |
| M-F 6am-6pm GMT                  |         |      |          |

| Phone Response Time/SLA          | ✓       | 4 business hours | 4 business hours |
| (English)                        |         |                  |                  |

| 7x24 P1 Issues Phone Support     | ✓       | ✓    | ✓        |
| (English)                        |         |      |          |

| 7x24 P1 Issues Response          | ✓       | ✓    | 2 hours  |
| Time/SLA                          |         |      |          |

| Price                             | No Charge | $    | $        |
What are System i Customer's Doing with iAMP?

• Leveraging PHP portfolio: Run commercial or opensource PHP applications on i5/OS
System i Requirements for Zend Core for i5/OS

- **i5/OS V5R4**
- **i5/OS V5R3**
  - Zend Core for i5/OS Version 1.6 or later required
  - i5/OS V5R3 database PTF SI25802 is required
  - Zend Core for i5/OS does not support remote debugging from a Zend Studio client
- **Plus**
  - Portable App Solutions Environment 33 5722ss1
  - IBM Portable Utilities For i5/OS *base 5733sc1
  - OpenSSH,OpenSST,Zlib 1 5733sc1
  - Crypto Access Provider 128 bit *base 5722ac3
  - Qshell 30 5722ss1
  - System Openness Includes 13 5722ss1
  - Digital Certificate Manager 34 5722ss1
- System i servers that run i5/OS V5R4 or V5R3
Obtaining Zend Core & Zend Studio for i5/OS

- Zend.com Registration
- Download (to your PC) Zend Core for i5/OS & Zend Studio for i5/OS
Unzip Zend Core for i5/OS

- Unzip ZendCoreFori5_OS-v1.4.1GA.zip
  - README
  - RELEASE_NOTES
  - zcoreprod.savf
  - Zend_Core_User_Guide_i5OS.pdf
ZCOREPROD SAVF Creation

- CRTSAVF FILE(QGPL/ZCOREPROD) TEXT('Zend Core for i5/OS Product SAVF')

All previous commands and messages:

Job 102073/SANDBERG/QPADEV0007 started on 08:02:06 at 15:06:57 in subsystem QINTER in QSYS. Job entered system on 08/02/06 at 15:06:57.

> CRTSAVF FILE(QGPL/ZCOREPROD) TEXT('ZEND Core for i5/OS Product SAVF')
FILE ZCOREPROD created in library QGPL.
FTP of SAVF to System i

- Open a Command Prompt on the PC
- Change the directory to the location of zcoreprod.savf (cd c:\ in this example)
- Start a ftp session with the System i (ftp <System i host name>)
- Log in using your System i User & Password
- Change the transfer type to binary (bin)
- Transfer zcoreprod.savf (put zcoreprod.savf QGPL/ZCOREPROD)
- When the transfer is complete exit (quit)

C:\Documents and Settings\Administrator>cd c:\
c:\>ftp phpsystem.ibmdemo.com
Connected to phpsystem.ibmdemo.com
220-QTCP at phpsystem.ibmdemo.com
220 Connection will close if idle more than 5 minutes.
User (phpsystem.ibmdemo.com:(none))=phpuser
331 Enter password.
Password:
230 PHPUSER logged on.
ftp> bin
200 Representation type is binary IMAGE.
ftp> put zcoreprod.savf QGPL/QCOREPROD.
200 PORT subcommand request successful.
150 Sending file to member ZCOREPROD to file ZCOREPROD in library QGPL.
226 File transfer completed successfully.
ftp: 309133440 bytes entin 40.72Seconds 7591.87Kbytes/sec.
ftp> _
Install Zend Core for i5/OS

- Open a 5250 session with the System i
- Issue the restore license program command RSTLICPGM LICPGM(1ZCORE5) DEV(*SAVF) SAVF(QGPL/ZCOREPROD) This will launch the install process to install and start the environment. NOTE: The user profile must be of *SECOFR user class, and the QGPL and QTEMP libraries must be in the library list. You will be prompted through several screens.
Install Zend Core for i5/OS

- This is the password that will be used when you use the browser based administration for Zend Core.
Install Zend Core for i5/OS

• On this screen you will need to enter the User ID and Password you registered on zend.com
Install Zend Core for i5/OS

- Once installation is complete the environment is installed and running ready for use.
Install Zend Core

Select one of the following:

1. User tasks
2. Office tasks
3. General system tasks
4. Files, libraries, and folders
5. Programming
6. Communications
7. Define or change the system
8. Problem handling
9. Display a menu
10. Information Assistant options
11. iSeries Access tasks
90. Sign off

Selection or command

===> go zendcore/zcmenu

F3=Exit  F4=Prompt  F9=Retrieve  F12=cancel  F13=Information Assistant
F23=Set initial menu
*PGM objects for product 1ZCORE5 option *BASE release *FIRST restored.
Open source Applications: PHP and MySQL

- Customer Relationship Management
- Help Desk
- Portal
- Portal
- Portal
- Course Management System
- e-Commerce
- Bulletin Board
- Content Management System
- Wiki
MySQL + PHP on i5/OS Applications

- Examples on i5/OS www.zend.com/forums
Joomla! (Open Source Content Management System)

MySQL + PHP on i5/OS

- Application Website: [http://joomla.org/](http://joomla.org/)
SugarCRM (Open Source Customer Relationship Management (CRM))

Application Website: www.sugarcrm.com
Description: http://en.wikipedia.org/wiki/SugarCRM
How To: www.zend.com/forums/index.php?t=msg&th=3111
Running on i5/OS: http://sei5a2.rchland.ibm.com:89/sugarcrm/
SugarCRM Announces Support for i5/OS

- SugarCRM is a leading provider of commercial open source customer relationship management (CRM) software for companies of all sizes

- Sugar Enterprise available for i5/OS
  - Runs with Zend Core and MySQL

http://www.sugarcrm.com/crm/
ZenCart (Open Source Shopping Application)

MySQL + PHP on i5/OS

- Application Website: http://www.zen-cart.com/
- Description: http://en.wikipedia.org/wiki/Zen_Cart
- Running on i5/OS: http://sei5a2.rchland.ibm.com:89/zen-cart-v1.3.7/
Deploy Opensource Applications on i5/OS

• Solution
  – System i offers an integrated and open web application deployment environment based on Apache, MySQL, and PHP on i5/OS

• Value
  – **Deploy applications faster, maintain systems easier**
    • i5/OS provides a leading *integrated and complete environment* for LAMP-based applications.
    • Delivers enterprise *scalability* from one to 64-way POWER5 processors.
    • The integrated i5/OS architecture is *secure and virus resistant* by design
    • i5/OS delivers industry leading *availability and reliability*.
    • i5/OS provides ability to easily integrate web apps with business apps on the same server
    • i5/OS has a proven track record of delivering the *lowest TCO and highest customer satisfaction*

  – **Access i5/OS applications and data easier and faster**
    • PHP applications have *direct and easy access* to business apps and data running on i5/OS

  – **Run MySQL applications**
Objections for Opensource Applications

• Why should we deploy a LAMP application on i5/OS?
  – i5/OS provides leading reliability, security, and scalability for web applications.
  – The Zend toolkit for i5/OS provides easy and fast access to i5/OS applications and data.
  – Support of MySQL in i5/OS provides the ability to run PHP/MySQL applications unchanged in i5/OS.

• Is the System i community embracing PHP?
  – Yes, the System i community is an active participant in the PHP community. The Zend forum for i5/OS is 3x more active than the Zend forum for Oracle.

• Who provides support for the open-source (PHP, MySQL) components of the web development stack?
  – Zend offers a range of support options for their PHP development and deployment products. 3 years of standard support is included with Zend Core and Studio for i5/OS at no charge.
  – MySQL AB provides support for the enterprise deployment of MySQL
Announcing MySQL for i5/OS

- MySQL database available and supported on i5/OS V5R4
  - MySQL Community Server for i5/OS
    - Free download from mysql.com
    - No Support
  - MySQL Enterprise for i5/OS
    - Download from mysql.com
    - Annual Subscription
    - 3 support levels
  - Available directly from MySQL on 7/24
    - Can also be ordered from IBM

MySQL

<table>
<thead>
<tr>
<th>MySQL Enterprise</th>
<th>MySQL Enterprise</th>
<th>MySQL Enterprise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silver</td>
<td>Gold</td>
<td>Platinum</td>
</tr>
<tr>
<td>$1995.00/Server/Year</td>
<td>$2995.00/Server/Year</td>
<td>$4995.00/Server/Year</td>
</tr>
<tr>
<td>Business Hours</td>
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</tr>
<tr>
<td>4 Hours*</td>
<td>2 Hours*</td>
<td>1 Hour*</td>
</tr>
</tbody>
</table>

Advisory Services and Consultant Support Options

http://www.ibm.com/systems/i/software/mysql/

* Max Initial Response Time
MySQL US List Prices
https://shop.mysql.com/enterprise/
IBM Announcements for MySQL

• MySQL Enterprise for i5/OS can be ordered from IBM
  – Same product, license, support and price as direct from MySQL
  – 5639-MYS with 3 support levels
  – IBM passes order to MySQL for fulfillment

• Added Zend Core and MySQL to 550, 570, and 595 Enterprise Edition
  – Zend Core with standard support (5639-ZC1)
  – MySQL Enterprise with silver support (5639-MYS)

• Added Zend and MySQL Implementation service to voucher program for Enterprise and i5/OS Editions
MySQL in i5/OS High Level Architecture

- Integrated File System
- MySQL Database
- PASE Environment
  - mysqld
  - MySQL Server Process
  - TCP/IP
  - Socket
  - (localhost)
  - mysql
  - Client Process
  - PHP
  - Client Process
- TCP/IP
- ODBC
- PHP

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Checking licensed programs

<table>
<thead>
<tr>
<th>Licensed program</th>
<th>Option</th>
<th>Description test</th>
</tr>
</thead>
<tbody>
<tr>
<td>5722SS1</td>
<td>*BASE</td>
<td>I5/OS Version 5 Release 4 (V5R4)</td>
</tr>
<tr>
<td>5722SS1</td>
<td>13</td>
<td>System Openness Includes¹</td>
</tr>
<tr>
<td>5722SS1</td>
<td>30</td>
<td>Qshell</td>
</tr>
<tr>
<td>5722SS1</td>
<td>33</td>
<td>Portable Application Solutions Environment (PASE)</td>
</tr>
<tr>
<td>5722SC1</td>
<td>*BASE</td>
<td>IBM Portable Utilities for i5/OS²</td>
</tr>
</tbody>
</table>

1. System Openness Includes is not completely necessary but may be useful. This licensed program provides all source includes for APIs shipped with i5/OS
2. IBM Portable Utilities for i5/OS is not completely necessary but may be useful.
Other pre-installation tasks

• Checking i5/OS fixes
  – Make sure you have the latest individual and group fixes for your system
  – i5/OS fixes (including database)
  – I5/OS PASE fixes

• Checking user profile authorities
  – For installation process – a user profile with *SECOFR user class (with all special authorities) is required.

• Verify TCP/IP configuration
Installing MySQL

• Download MySQL from the following web site:
  – http://dev.mysql.com/downloads/mysql/5.0.html#downloads

• Click on the IBM i5/OS (SAVF packages) link

• Click on the i5/OS (POWER, 64 bit) package (Pick a mirror)
Installing MySQL

• Save the file to a folder on your PC

• In i5/OS
  – Logon to the i5/OS system with a user profile of *SECOFR user class with all special authorities
  
  – Create a save file:
    
    CRTSAVF FILE(QGPL/MYSQLINST) TEXT(‘MySQL 5.0 save file’)

• On your PC
  – Open a command prompt and change directory to the directory where the mysql file was downloaded to
  – Start an ftp session to your i5/OS system
    
    • Enter a valid user-name / password
    • Type ‘bin’ to enter binary transfer mode
    • Transfer the save file:
      
      put mysql-5.0.45b-i5os-power-64bit.savf mysqlinst.savf
    • When the transfer is complete type ‘quit’ to terminate the ftp session
Installing MySQL

- Back In i5/OS
  - Verify the contents of the save file:
    DSPSAVF FILE(MYSQLINST)
  - Restore the library included in the save file:
    RSTLIB SAVLIB(MYSQLINST) DEV(*SAVF) SAVF(MYSQLINST)
    MBROPT(*ALL) ALLWOBJDEF(*ALL)
Installing MySQL

- Verify that all objects required for installation are in the restored library:

```
DSPLIB LIB(MYSQLINST)
```

<table>
<thead>
<tr>
<th>Opt</th>
<th>Object</th>
<th>Type</th>
<th>Attribute</th>
<th>Size</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>INSMYSQL</td>
<td>*PGM</td>
<td>CLP</td>
<td>69632</td>
<td>Install MySQL</td>
</tr>
<tr>
<td></td>
<td>TARF</td>
<td>*FILE</td>
<td>SAVF</td>
<td>60841984</td>
<td></td>
</tr>
<tr>
<td></td>
<td>INSMYSQL</td>
<td>*CMD</td>
<td>SAVF</td>
<td>8192</td>
<td>Install MySQL</td>
</tr>
</tbody>
</table>

F3=Exit  F12=Cancel  F17=Top  F18=Bottom
Installing MySQL

• Start the actual MySQL Installation:
  MYSQLINST/INSMYSQL
  – NOTE: Press <F4> to show the installation settings

  – Installation directory will be created if it does not exist
  – Data Directory is the location where MySQL database files and binary logs will be located
  – Owning User Profile is the user profile that will own the files that are installed
Installation Completed

• When the installation is completed you should see messages similar to the following:

```
PLEASE REMEMBER TO SET A PASSWORD FOR THE MySQL root USER.
To do so, start the server, then issue the following commands.
./bin/mysqladmin -u root password 'new-password'
./bin/mysqladmin -u root -h RCHASM27.RCHLAND.IBM.COM password 'new-password'
See the manual for more instructions.
You can start the MySQL daemon with:
cd .; ./bin/mysqld_safe &

You can test the MySQL daemon with mysql-test-run.pl
cd mysql-test; perl mysql-test-run.pl

Please report any problems with the ./bin/mysqlbug script.

The latest information about MySQL is available on the web at http://www.mysql.com
Support MySQL but buying support/licenses at http://shop.mysql.com
Press ENTER to end terminal session

==> 
```

F3=Exit  F4=End of File  F6=Print  F9=Retrieve  F17=Top
F18=Bottom  F19=Left  F20=Right  F21=User Window
Verifying the Installation

- Display the job log:

  DSPJOBLOG

  Display All Messages
  System: RCHASM27
  Job . . : QPADEV0001  User . . : JAVIER  Number . . . : 013126

  Special authorities granted *NONE.
  User profile MYSQL created.
  Command ended normally with exit status 0.
  Command ended normally with exit status 0.
  Owner changed for object /tmp/mysql_i5os_install.tar.
  Security changes occurred for 1 objects.
  1 object restored.  0 objects not restored.
  Current directory changed.
  Command ended normally with exit status 0.
  Object not found. Object is mysql.
  Command ended normally with exit status 0.
  Command ended normally with exit status 0.
  Command ended normally with exit status 0.
  Link Removed.

Press Enter to continue.

F3=Exit  F5=Refresh  F12=Cancel  F17=Top  F18=Bottom
Starting the MySQL Server

- Enter the PASE Environment:
  CALL QP2TERM (or qsh)

- Change directory to the MySQL binary directory:
  cd /usr/local/mysql/bin

- Start the MySQL Server:
  ./mysqld_safe –u root &

- Verify that the MySQL server is running:
  ps -ef ./mysqld grep mysqld
Stopping the MySQL Server

• In the PASE environment enter the command:
  ./mysqladmin -u root shutdown

Common Installation Errors

• Your user profile does not have sufficient authority
• Structures from a previous installation are found by the installer
• Your library list does not contain the QGPL or QTEMP libraries
• Prerequisite software products or fixes are missing
Post installation Tasks

• Creating a MYSQL administrator user:
  – Enter the PASE environment
    CALL QP2TERM
  – Change directory to the mysql binary directory:
    cd /usr/local/mysql/bin
  – Verify that the MySQL server is running:
    mysqladmin –u root status
    mysqladmin –u root ping

> mysqladmin –u root status
Uptime: 80618  Threads: 1 Questions: 254  Slow queries: 0 Opens: 32  Flush tables: 2 Open tables: 19  Queries per second avg: 0.003
> mysqladmin –u root ping
mysql is alive
$
Post installation Tasks

- Create the administrative user profile
  
  mysql –u root mysql –e “insert into user (host, user, password) values(‘%’, ‘itso’, ‘itso’)”

- Grant administrative privileges and encrypt the password
  
  mysql –u root mysql –e “grant all privileges on *.* to ‘itso’@’%’ identified by ‘itso’ with grant option”
  mysql –u root mysql –e “flush privileges”

```bash
> mysql –u root mysql –e “insert into user (host, user, password) values(‘%’, ‘itso’, ‘itso’)”
$ > mysql –u root mysql –e “grant all privileges on *.* to ‘itso’@’%’ identified by ‘itso’ with grant option”
$ > mysql –u root mysql –e “flush privileges”
$ ```
Post Installation Tasks

- Check the administrative account
  - Run the interactive mysql client:
    ```
    mysql -u root
    ```
  - Select the mysql schema
    ```
    use mysql;
    ```
  - Execute a query over the table ‘user’
    ```
    select user, password from user
    ```

```
> Mysql -u root
Welcome to the MySQL monitor, Commands end with ; or \g.
Your MySQL connection id is 2
Server version: 5.0.45 MySQL Community Server (GPL)

Type ‘help;’ or ‘\n’ for help. Type ‘\c’ to clear the buffer.

mysql>
> select user, password from user;
+---------+-------------------------------------------+
| user    | password                                  |
+---------+-------------------------------------------+
| root    |                                           |
| root    |                                           |
| root    |                                           |
| javier  | *B174F2517BA8F7BD62D6AF171D91AB2F537BCB94 |
| itso    | *63C5A3E03987225C0620E974CD173F0A77FF888D |
+---------+-------------------------------------------+
5 rows in set (0.01 sec)
```
MySQL Useful commands

- Starting the MySQL server:
  `bin/mysqlld_safe --user=mysql &`

- Stopping the MySQL server:
  `bin/mysqladmin -u root_shutdown`

- Displaying the version number:
  `bin/mysqladmin version`

- Displaying MySQL environment variables:
  `bin/mysqladmin variables`

- Tests to verify the ability to retrieve information from the MySQL Server
  `bin/mysqlshow`
  `bin/mysqlshow mysql`

NOTE: These commands assume you are in the PASE environment and the current working directory is `/usr/local/mysql`
Enabling MySQL Extensions in Zend Core

- To utilize MySQL with PHP in Zend Core, the MySQL extensions must be enabled.
- The extensions can either be enabled through the Zend Core management interface.

The ini file is `\usr\local\Zend\core\etc\php.ini`
  - Uncomment the `mysql.so` & `mysqli.so` extensions
    - `extension=mysql.so`
    - `extension=mysqli.so`
MySQL Overview

- MySQL has attracted a strong developer base over the years

- Features of MySQL include:
  - Portability – supported on a wide variety of operating systems and hardware
  - Ease of Use
  - Multi-User support
  - Scalability
  - Standards Compliant
  - Replication
  - Full text searching
  - Support for transactions
  - Wide application support
MySQL Overview

• Portability
  – MySQL is portable – platforms include i5/OS, Mac OS/X, Linux, Windows, Solaris
  – MySQL can run on small embedded systems as well as mainframes handling massive data stores. Hardware platforms supported by MySQL include: Intel X86, SPARC, PowerPC, IA64
  – Moving data from one platform to another is a simple task

• Ease of Use
  – Good documentation is readily available
  – Many tutorials are available
  – The MySQL client program allows access to both local and remote servers
  – Structure Query Language (SQL) is standards based and easy to learn/implement
MySQL Overview

• Multi-User support
  – MySQL supports multiple users
  – Access control can be based on location and username/password
  – Access can also be restricted at the Database or Table level
  – Access can be restricted based on the type of query (ex: read access but not write)

• Scalability
  – MySQL can scale up to large and complex databases
  – Databases of 50 million records are in use at the MySQL website.
  – Hundreds of users can access MySQL simultaneously
  – Examples of large MySQL database installations include: SAP, Yahoo, NASA, US Census bureau, Google.
MySQL Overview

• Standards Compliant
  – MySQL strives to maintain compliance with the appropriate standards.
  – MYSQL supports most of the features of the ANSI/ISO SQL Standard standard.

• Replication
  – MySQL supports replication
  – It is possible to setup a master server and a series of slave servers that copy the content of the master
  – It is possible to stop the slave and run a backup utility without taking down the master
  – Load balancing can be implemented where reads are satisfied by the slave servers and writes are satisfied by the master server
  – Replication occurs over a TCP/IP network so the slave servers can be remote
  – Replication is incremental and can survive network disruptions
MySQL Overview

• Support for transactions
  – MySQL supports transactions on a table-by-table basis
  – This facilitates fine-grained optimization

• Wide application support
  – MySQL has APIs for many programming languages including C, C++, ODBC, Java, PHP, Perl, Python, and Tcl (tool Command Language)
Porting Open Source Application to IAMP Example
SugarCRM

• There are several changes that need to be made to the ini file for Zend Core (\usr\local\Zend\Core\etc\php.ini)
  – The path that php uses to save files needs to be uncommented (remove the leading semicolon:
    ;session.save_path = "/tmp"
  – The memory limit needs to be increased to 32 megabytes:
    memory_limit = 8M
    Becomes
    memory_limit = 32M

• Zend Core will need to be stopped and then restarted to activate the changes:
  go zendcore/zcmenu

• Download the SugarCRM Open Source Code from the SugarCRM web site:
  www.sugarCRM.com
Porting Open Source Application to IAMP Example

SugarCRM

- Unpack the SugarCRM zip file
- Copy the program folder (sugarcrm) to \www\zendcore\htdocs
- Launch a browser and go to http://<i5_host>:89/sugarcrm/install.php
- The first screen prompts for the language selection.

Select the desired language and then click the <Start> button to begin the installation.
Porting Open Source Application to IAMP Example

SugarCRM

Read and accept the License agreement
Click <Next>

At this point the installation will check the system configuration to ensure that all dependencies are properly met
Click <Next>
Porting Open Source Application to IAMP Example

SugarCRM

Configure the database definition for SugarCRM

Define the Site Configuration information.
The URL will be http://<system i>:89/sugarcrm
Porting Open Source Application to IAMP Example
SugarCRM

Confirm the configuration settings

At this point the installation of sugarCRM will proceed
The iADP Stack

Application

PHP

Apache

IBM i5/OS Web Server

DB/2

i5/OS
How does iADP Work?

http://<server name>:2001/HTTPAdmin

http://<server name>:89/ZendCore
What are System i Customer's Doing with iADP?

• Consolidation: Moving PHP applications that are running on Windows or Linux that access data in DB2 to run in i5/OS to speed up or reduce complexity of the application

• Modernization: Using iADP to web-enable green-screen applications

• New application development: Creating new applications with iADP including applications for the intranet, reporting, websites, and extranets.
Parts Depot

• Background
  – Parts Depot is one of the largest distributors and resellers of automotive aftermarket parts and paints in the U.S.

• Objectives
  – Update its applications that enable business partners to conduct a variety of online transactions, ranging from price quotations to fulfillment to the reviewing of historical data.

• Solution
  – Three System i 520s support the business.
    • Production, Development and HA
  – Developed new web application with PHP integrating with backend RPG applications

“We’re about the speed of delivery to the market. When you have a new idea for an application, you have to build it quickly, implement it and get it into the market. If you’re going to keep a competitive advantage, you have to be nimble.”

Jonathan George, CIO
Cremer

• Background
  – Distributor and manufacture of disposable health products in Brazil

• Challenge
  – Improve customer satisfaction with a streamlined call center application – inventory, prices, credit, invoices
  – Reduce software costs

• Solution
  – Developed new PHP web-based call center application accessing DB2 on i5/OS V5R3

• Benefits
  – Reduction in software costs
  – Short development cycle – even though started with no PHP skills
  – Faster access to DB2 information
Icon Fitness

• Background
  – World’s large home fitness manufacturer...and includes brands such as NordicTrack, HealthRider, and Proform

• Challenge
  – Quickly develop fitness/nutrition web sites to meet January demand peak

• Solution
  – Developed new consumer web sites with PHP tying into existing WebSphere Commerce Server on i5/OS V5R4

www.ifit.com
www.iconfitness.com
iADP – it's all about the API toolkit

• Are shipped with Zend products
  – Zend core for i5/OS
  – Zend Platform for i5/OS

• Geared towards accessing i5 data and resources from PHP
  – Similar in purpose to the IBM Toolbox for Java

• Note: the I5_COMD job must be running in the ZEND subsystem
  – Use the Zend menu to start:
    • GO ZENDCORE/ZCMENU
    • Option 5 (Service Management menu)
    • Option 8 (Start I5_COMD service)
I5 Toolkit APIs – Zend Core Version 1.4.1

- **Connection management**
  - i5_connect
  - i5_close
  - i5_adopt_authority
  - i5_error
  - i5_errno
  - i5_errormsg

- **Command calls**
  - i5_command
  - i5_cmdget

- **Program calls**
  - i5_program_prepare
  - i5_program_call
  - i5_program_close

- **Data retrieval**
  - i5_fetch_array
  - i5_fetch_assoc
  - i5_fetch_object
  - i5_fetch_row
  - i5_info
  - i5_field_len
  - i5_field_name
  - i5_field_scale
  - i5_field_type
  - i5_list_fields
  - i5_num_fields
  - i5_result

- **Native file access**
  - i5_open
  - i5_addnew
  - i5_edit
  - i5_delete
  - i5_cancel_edit
  - i5_setvalue
  - i5_update
  - i5_range_from
  - i5_range_to
  - i5_range_clear
  - i5_data_seek
  - i5_seek
  - i5_bookmark
  - i5_free_file
  - i5_new_record
  - i5_update_record
  - i5_get_keys

- **System values**
  - i5_get_system_value

- **Data areas**
  - i5_data_area_create
  - i5_data_area_read
  - i5_data_area_write
  - i5_data_area_delete

More are coming
Record-level access

• i5_open
  – Pass in library/file and type of "open" mode
    • i5_open_read, i5_open_readwrite, i5_open_commit, i5_openshrrd, i5_open_shrupd
    • Etc

• i5_list_fields
  – Get an array of the names of the fields in the file

• i5_fetch_row
  – Get an array of the fields in a record, passing in which record to fetch
    • i5_read_seek (current)
    • i5_read_next (default)
    • i5_read_prev
    • i5_read_first
    • i5_read_last
Record-level access: HTML code

<form method="post" action=i5_fetch.php">

Library (schema): <input type="text" name="lib"><br>

File (table): <input type="text" name="tbl"><br>

<input type="reset"> <input type="submit" value="Display records">

</form>
Record-level access: PHP code

// Get input data
$dbfile = $_POST['tbl'];
$dblib = $_POST['lib'];

// Open the file
$file = i5_open("$dblib/$dbfile", i5_open_read);
if (!$file)
   die("Error while attempting to open file mode=READ");

// Print a table row of field names
$fields = i5_list_fields($file); // returns an array
print "<table border=1 cellpadding=3><tr bgcolor=#CCCCCC>
;

// Parse the array
foreach ($fields as $value) {
   print "<th>$value</th>
;
}
print "</tr>
";}
Record-level access: PHP code

// Print records
$rec = i5_fetch_row($file, i5_read_first); // get array
while ($rec) { // while there is a record...
    // Print each field in the array
    foreach ($rec as $value) {
        print "<td>\$value</td>";
    }
    print "</tr>\n";
    // Get next record
    $rec = i5_fetch_row($file, i5_read_next);
} // loop

print "</table>"; // finish off the table
Questions
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