Advanced MySQL topics

Presented by:

John A Mahady

AndrewInfoServices.com

Topics

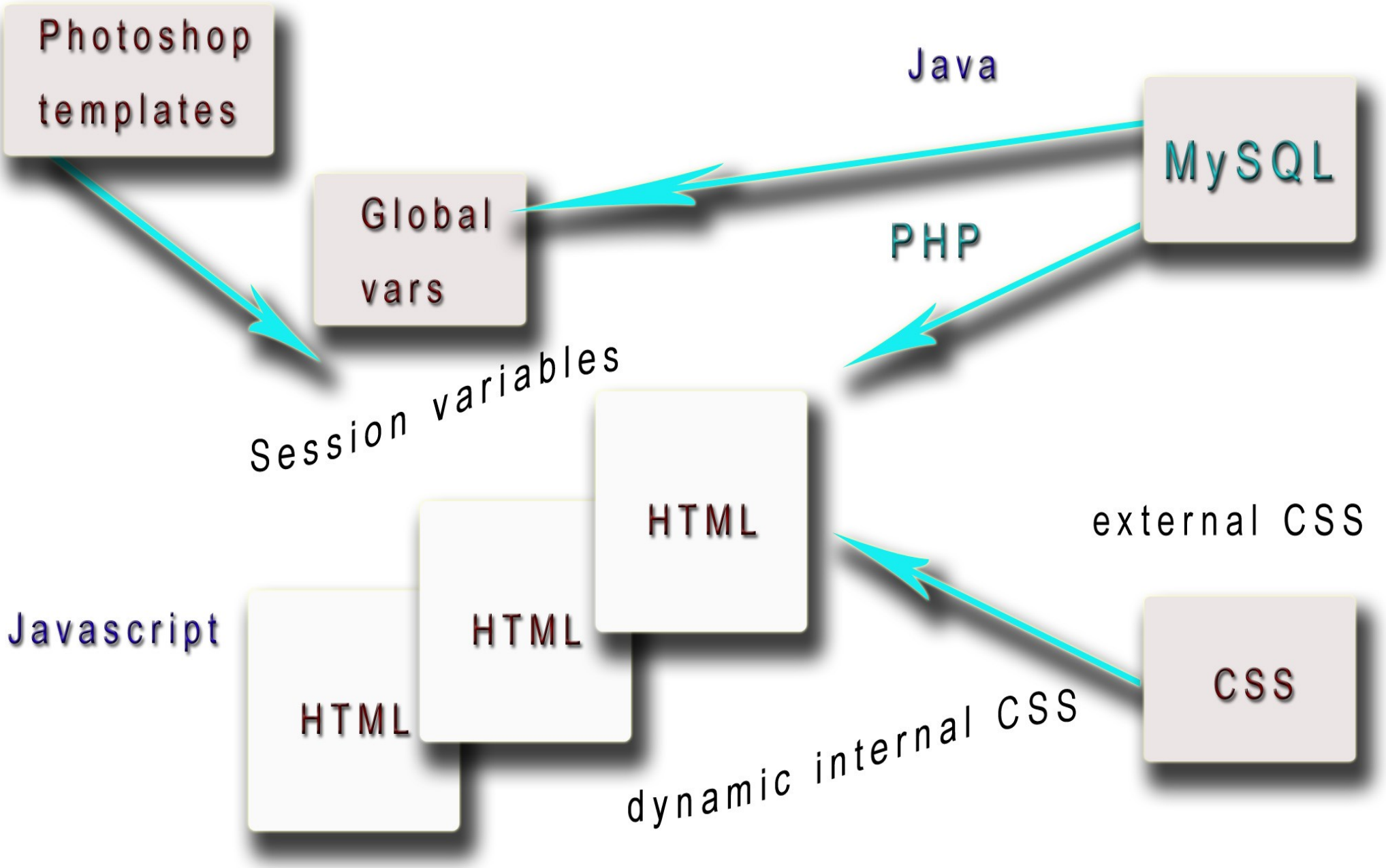
- Introduction
- Stored Procedures
- Views
- Triggers
- Cursors
- ODBC & OO Base

Press Release - April 15, 2009

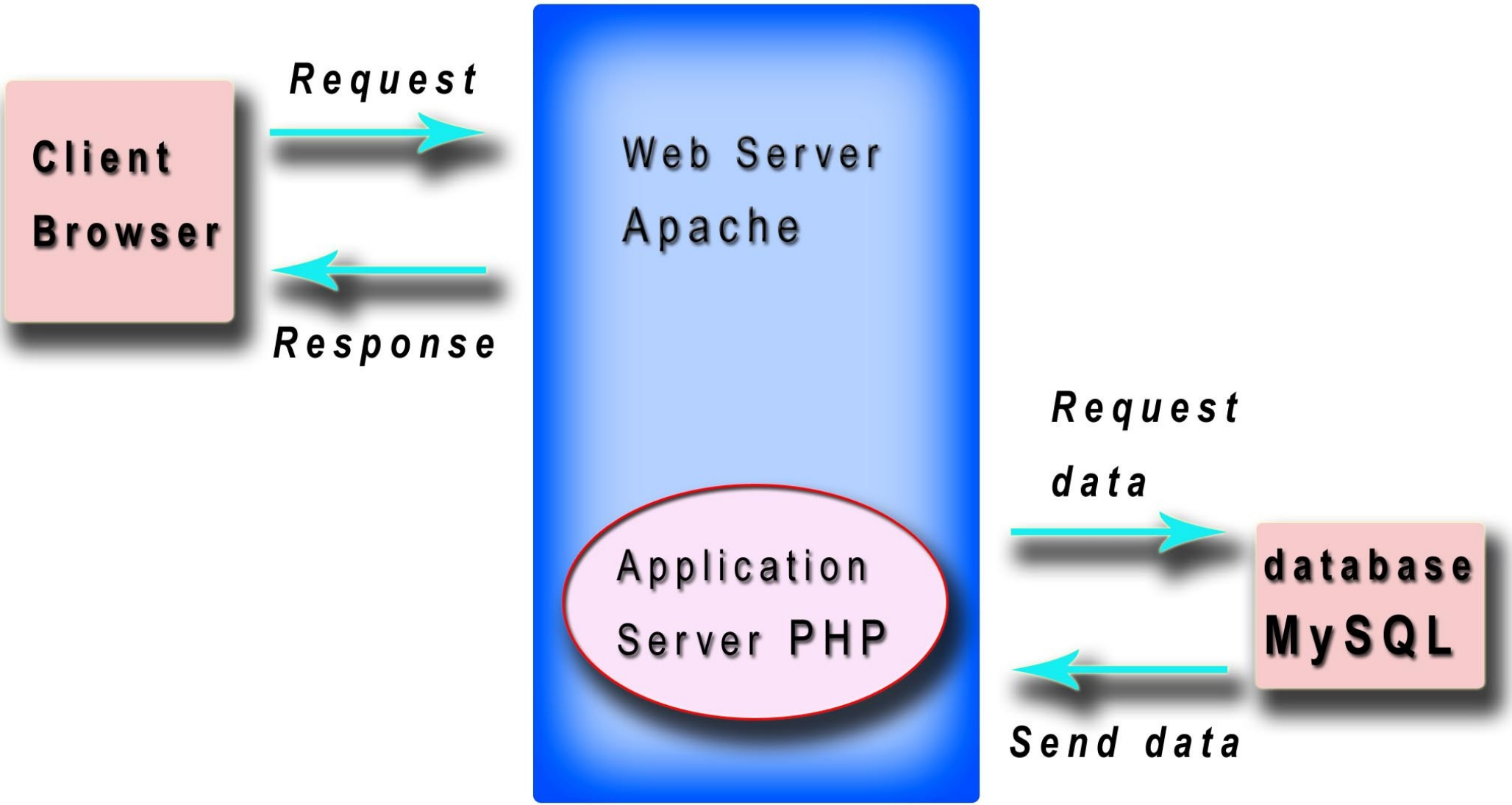
”Next Week's MySQL Conference & Expo Spotlights Obama Campaign's Web Team; Open Source's Contribution to Presidential Campaign Explored”

http://press.oreilly.com/pub/pr/2271

Structure


Photoshop templates
Java
MySQL
Global vars
PHP
Session variables
HTML
external CSS
Javascript
HTML
HTML
CSS
dynamic internal CSS

Move processing and logic to the DBMS



LAMP Installation in Ubuntu
Linux, Apache, MySQL and PHP

1. Optionally, install SSH Client and Server (for remote access to this server)
   sudo apt-get install ssh

2. Install Database Server
   sudo apt-get install mysql-server

3. Install Apache2 web server
   sudo apt-get install apache2

4. Install PHP5
   sudo apt-get install php5 libapache2-mod-php5

5. Install PHP5-MySQL support
   sudo apt-get install php5-mysql

6. Restart Apache
   sudo /etc/init.d/apache2 restart

7. Optionally, install phpMyAdmin
   sudo apt-get install phpmyadmin

Where do you put your web pages?

In your browser type

'LOCALHOST' or 127.0.0.1

In Ubuntu/Linux this is equal to directory

/var/www

Download sample database 'world'

This database is used in MySQL certifications and training!

Download and unzip from http://dev.mysql.com/doc/

```
shell> mysql -u root -p
mysql> CREATE DATABASE world;
mysql> USE world;
mysql> SOURCE world.sql;

mysql> SHOW TABLES;
mysql> DESCRIBE Country;
mysql> DESCRIBE City;
mysql> DESCRIBE CountryLanguage;
```

Topics

- Introduction
- Stored Procedures
- Views
- Triggers
- Cursors
- ODBC & OO Base

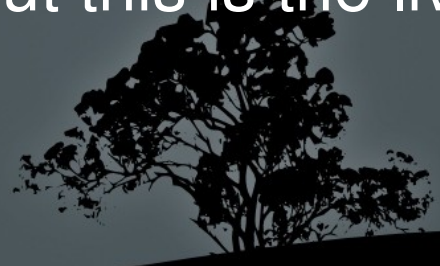
Where are the Stored procedure descriptions?

SELECT * FROM INFORMATION_SCHEMA.ROUTINES;

The INFORMATION_SCHEMA database is available to all MySQL users so they can know the environment and objects. The tables in this database are read-only views based on the tables in the mysql database which is only accessible to those with the privileges since the tables are modifiable.

SELECT * FROM mysql.proc;

This is equivalent to the above statement but this is the live table the view is selecting data from.



Information on Stored Procedures

SHOW PROCEDURE STATUS;

database, name, type, creator, creation and modification dates, and character set information.

SHOW CREATE PROCEDURE *procname*\G

returns the exact string that can be used to re-create the named stored procedure.

SELECT * FROM INFORMATION_SCHEMA.ROUTINES\G

Passing back values

Stored procedures pass values back to the calling program by:

- OUT or INOUT parameters
- Global session variables that persistent after the procedure ends
- The result set from one or more SELECT statements
- Stored Functions use the RETURNS statement.

Stored Procedures - variables

- Data types exception: can use all the scalar types a.k.a. single values but NO arrays, records, or structures.

- Scope of User variables is global to the session. But its recommended you reduce scope through:
  - DECLARE private variables inside the Procedure or
  - pass session/user variables as parameters with IN, OUT, INOUT settings so you can obtain its value when the procedure returns.

Stored Proc – passing a literal value

Example:

- CREATE PROCEDURE sp_mealtip(IN tip float)
  - SELECT .15 * tip;
-

- mysql> CALL `demo`.`sp_mealtip`(300);
- Query OK, 0 rows affected (0.00 sec)

- +-----------+
- | .15 * tip |
- +-----------+
- | 45 |
- +-----------+
- 1 row in set (0.00 sec)

Stored Proc – scope of session values

Example:

```
CREATE PROCEDURE sp_mealtip( INOUT tip float )
 SET tip = .15 * tip;
```

```
mysql> set @tip = 200;
```

```
mysql> call  demo.sp_mealtip(@tip);
```

```
mysql> select @tip;
```

```
+-----------+
|    @tip    |
+-----------+
|     30      |
+-----------+
1 row in set (0.00 sec)
```

Backuping up databases

mysqldump will backup by default all the triggers but NOT the stored procedures/functions. There are 2 mysqldump parameters that control this behavior:

--routines - FALSE by default
--triggers - TRUE by default

This means that if you want to include triggers and stored procedures in an existing backup script you only need to add the *routines* command line parameter

```
mysqldump -pdemodba1 -udemodba  srcdb > demo2.sql

mysqldump --routines -p -udemodba  srcdb > demo2.sql
```

Stored Proc Security Feature

Use MySQL Administrator or commands

REVOKE ALL PRIVILEGES .....

SHOW GRANTS FOR CURRENT_USER;

Restrict user to EXECUTE privilege.

Login into MySQL Query Browser with user
Spuser
Only objects available are stored procs

Brief example of a function

```
CREATE  FUNCTION `f_mealtip`(in_meal decimal)
    RETURNS decimal(10,0)  DETERMINISTIC
RETURN in_meal * .15;
```

```
SELECT *, f_mealtip(cost) AS tip FROM demo.meals;
```

Examples in MySQL Query Browser

```
CALL world.1_sp_sel_na_ppsf()

CALL 2_sp_in_sel( IN v_continent varchar(20) )

CALL 3_sp_out_continentavglifeexpectancy(
                IN v_continent varchar(20),
                OUT avglife float)

CALL world.spRtn2selects( IN cntrycod CHAR(3) )

CALL demo.sp_tfer_funds(
                from_account int,
                to_account int,
                tfer_amount numeric(10,2),
                OUT status int, OUT message VARCHAR(30))

CALL john1.sp_get_topics;
```

Topics

- Introduction
- Stored Procedures
- Views – two issues
- Triggers
- Cursors
- ODBC & OO Base

Views – significant issue

- Two ways a View is processed: MERGE vs TEMPTABLE
- MySQL tries to use MERGE algorithm first.
- Temp table is used if sql command includes GROUP BY, DISTINCT, aggregate functions, UNION, or other inputs that break the one-to-one relationship of view to base table.
- TEMPTABLE views are not updatable because of the above point.
- Temporary tables have no indexes so table scan run slower.
- Views can be updatable even if they have a JOIN but updates must be in one table not both.
- Views can be used instead of column privileges which impact performance and prevent usage of the query cache.
- A View can not have a trigger associated with it.

Views – example

- Original View

```
CREATE VIEW vw_oceania AS
        SELECT * FROM country WHERE Continent = 'Oceania'
        WITH CHECK OPTION;
```

- Command that uses view

```
SELECT Code, Name FROM vw_oceania WHERE Name='Australia';
```

- If the processor chooses TEMPTABLE solution (not updatable):

```
>CREATE TEMPORARY TABLE tmp_oceania AS
      SELECT * FROM country WHERE Continent = 'Oceania';
>SELECT Code, Name FROM tmp_oceania WHERE Name='Australia';
```

- If the processor chooses MERGE table solution:

```
>SELECT Code, Name FROM country
WHERE Continent = 'Oceania' AND Name='Australia';
```

Views – diagnostic code

- Example in Query Browser:

  Run SELECT in world.sp_mergeview then menu 'Explain Query' = SIMPLE

  Run SELECT in world.sp_temptbl then menu 'Explain Query' = DERIVED

- See result in mysql program within Terminal.

  Mysql> See how MySQL rewrites the query with EXPLAIN EXTENDED
  followed by SHOW WARNINGS.

  Mysql> EXPLAIN SELECT * FROM <view_name>
  If response says DERIVED = temp table.

Views – frozen schema

The view definition is “frozen” at creation time, so changes to the underlying tables afterward do not affect the view definition.

CREATE VIEW v_test AS SELECT * FROM table;

Becomes

CREATE VIEW v_test AS SELECT fld1,fld2,fld3 FROM table;

Views - example

```
CREATE
        ALGORITHM = MERGE
        VIEW `john1`.`v_merge` AS
                SELECT * FROM ex_tbl_trgr;


CREATE
        ALGORITHM = TEMPTABLE
        VIEW `john1`.`v_temptbl` AS
                SELECT * FROM ex_tbl_trgr;
```

```
INSERT INTO v_merge VALUES(null,'lois','lane');
INSERT INTO v_temptbl VALUES(null,'clark','kent');
```

ERROR!

Topics

- Introduction
- Stored Procedures
- Views
- Triggers
- Cursors
- ODBC & OO Base

Triggers -1

- Can be helpful for automatically updating denormalized and summary tables.
- Also can be used to enforce constraints or business logic.
- One trigger per table per each event.
- MySQL supports only row-level triggers -FOR EACH ROW. No triggers on datasets currently.
- Data is consistent at all times versus periodic bulk update routines.
- Server as foreign key functionality in non-transactional tables, e.g. MYISAM.

Triggers -2

- In transactional tables (Innodb) triggers will be atomic with the statement that fired them. ROLLBACK and COMMIT.
- They can obscure what the server is doing.
- Can be hard to debug.
- Triggers can cause nonobvious deadlocks and lock waits.
- MySQL trigger implementation is not mature yet.
- Triggers for a table are currently stored in .TRG files.
- MySQL triggers are activated by SQL statements only.

Triggers – delete example

- GOAL: From within the Query Browser tool use a Before Delete trigger to copy a record to a backup table when it is deleted.

- CREATE TRIGGER trg_del BEFORE DELETE ON ex_tbl_trgr FOR EACH ROW
  INSERT INTO ex_tbl_trgr_bkp (id,name,company,whenadded,action) VALUES(OLD.id,OLD.name,OLD.company,null,'delete');

Triggers – ODBC delete example

- GOAL: From within OpenOffice Base (similar to MS Access) connect to the MySQL world database using ODBC and delete a record in the Country table and see if the ”backup” trigger works.

- CREATE TRIGGER world.trg_country_bkp

  BEFORE DELETE ON world.Country

  FOR EACH ROW

  INSERT INTO Country_bkp (Code, Name, Continent, Region)

  VALUES(OLD.Code,OLD.Name,OLD.Continent,OLD.Region)

Triggers – OO Base insert using a View example

- This example will insert a new record into a MySQL View from within OO Base. Will the trigger fire?

```
CREATE TRIGGER trg_ins BEFORE INSERT ON ex_tbl_trgr FOR
EACH ROW
INSERT INTO ex_tbl_trgr_bkp (id,name,company,whenadded)
VALUES(NEW.id,NEW.name,NEW.company,null);
```

```
INSERT INTO v_merge VALUES(null,'bozo','the clown');

SELECT * FROM ex_tbl_trgr;
SELECT * FROM ex_tbl_trgr_bkp
```

Topics

- Introduction
- Stored Procedures
- Triggers
- Views
- Cursors
- ODBC & OO Base

Cursors

- MySQL provides read-only, forward-only, server-side cursors.
- Currently, cursors are not updatable because they create and iterate through a temporary table not the base table.
- Can only be used within a stored procedure. A stored proc can have more than one open at once.

Cursors

- A cursor executes the entire query when it is opened. So closing a cursor early doesn't save your server any effort.
  - So even if you just need to touch the first 100 records on a million record table a query of all the records is done first wth the cursor OPEN command.
- If a cursor involves a table with BLOB or TEXT field an on-disk temporary table will be created since in-memory temporary tables do not support these field types.

Topics

- Introduction
- Stored Procedures
- Views
- Triggers
- Cursors
- ODBC & OO Base

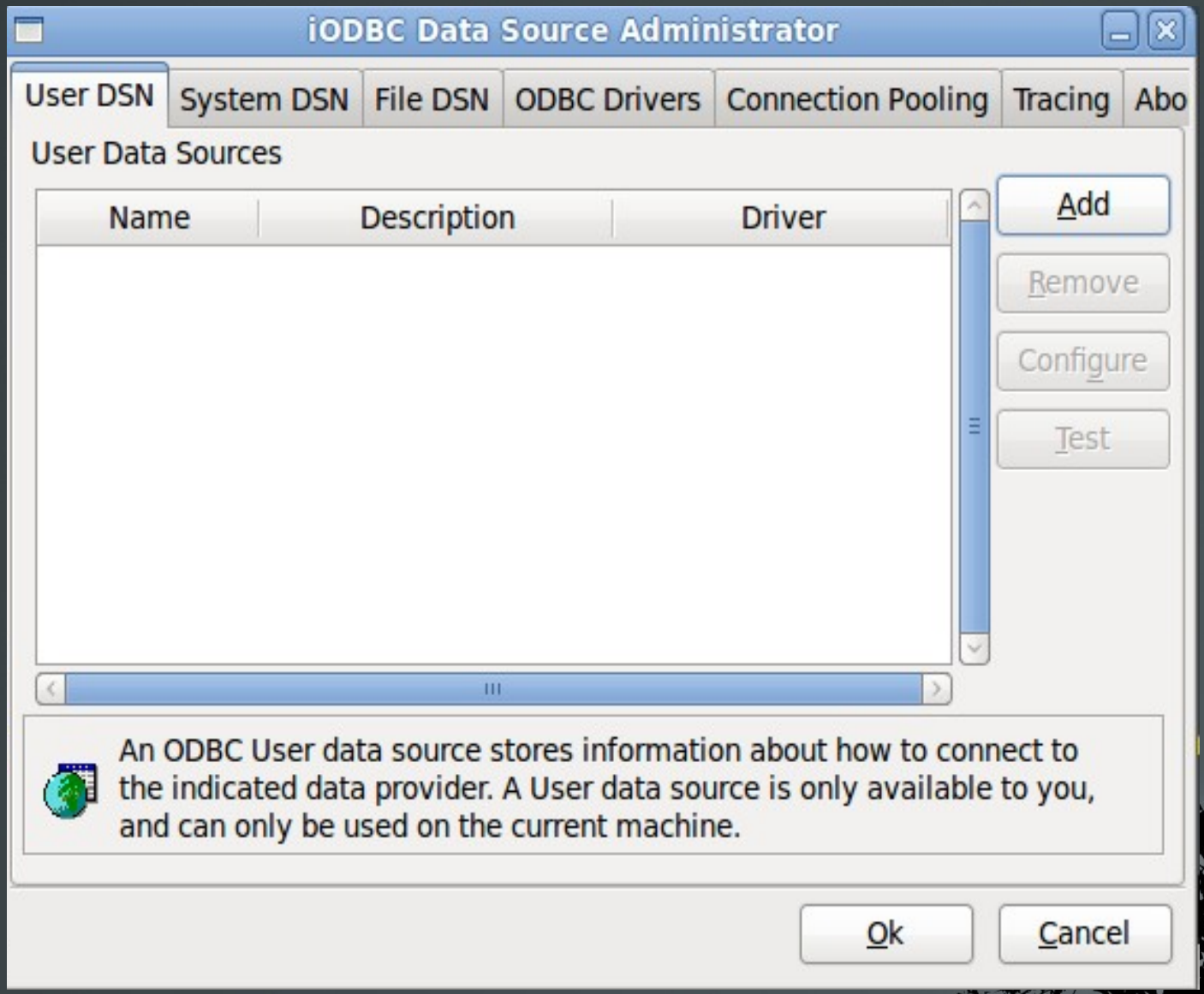
Connect OpenOffice Base to MySQL

- Base database engine internally is HSQLDB (OSS)
- ODBC can be loaded on a Linux as well as Windows platform
- Base can select, update, insert, or delete MySQL tables
- Local queries and reports can access MySQL data
- Base can see tables and views but not stored procedures
- Triggers will still fire from OO Base
- Demo example

Install ODBC for connections – pg 1

- Install iodbc - GTK+ config front end for the iODBC Driver Manager
  - to install: sudo apt-get install iodbc
- Install mysql connector for odbc
  - sudo apt-get install libmyodbc
- Start iodbc
  - /usr/bin/Iodbcadm-gtk
- Add the mysql driver to the list of ODBC drivers
  - Switch to the "ODBC Drivers" tab, click "Add a driver". Type in a description of the driver (i.e., "MySQL").
  - For "Driver file name" choose /usr/lib/odbc/libmyodbc.so.
  - For "Setup file name" choose /usr/lib/odbc/libodbcmyS.so.

IODBC Administrator



Install ODBC for connections - pg 2

- Create a new User DSN (the procedure is the same for System DSN)
  - Click "Add", select the already created MySQL ODBC driver.
  - Give a name to your datasource (i.e.,"bobs_mysqldb").
  - Add keywords based on your server configuration. Minimally have:
    - server
    - database
    - user
    - password
- That's it.
- http://dev.mysql.com/doc/refman/5.1/en/connector-odbc-configuration.html

John A Mahady

john@AndrewInfoServices.com

312.560.8072