# Connecting to a Database Using PHP

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CMPS 183, Spring 2006

May 15, 2006

## Rationale

- Most Web applications:
  - Retrieve information from a database to alter their on-screen display
  - Store user data such as orders, tracking, address, credit card, etc. in a database
- Permits them to adapt to individual users, and provide fresh, changing content
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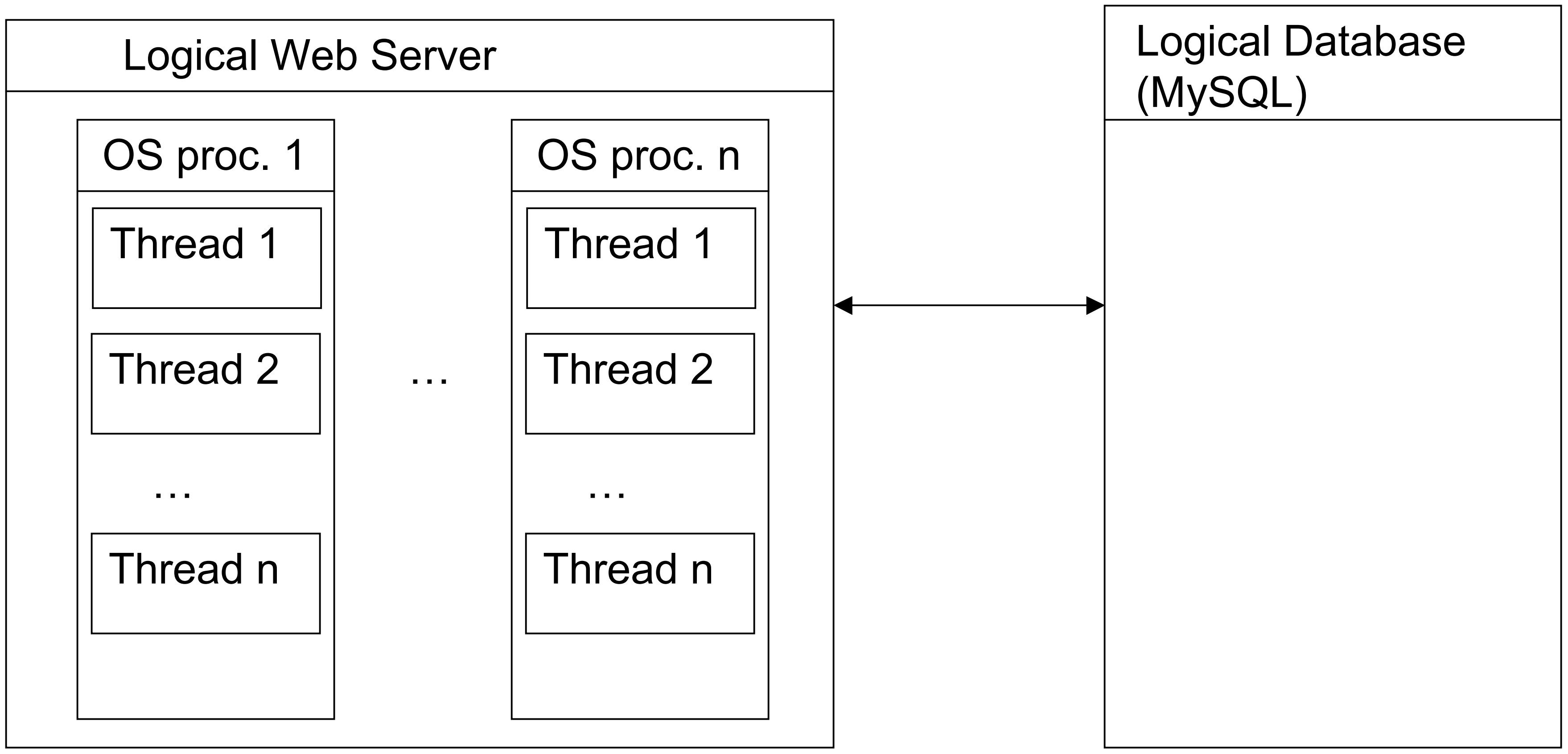
## PHP: Built-in Database Access

- PHP provides built-in database connectivity for a wide range of databases
  - MySQL, PostgreSQL, Oracle, Berkeley DB, Informix, mSQL, Lotus Notes, and more
  - Starting support for a specific database may involve PHP configuration steps
- Another advantage of using a programming language that has been designed for the creation of web apps.
- Support for each database is described in the PHP manual at:
  - http://www.php.net/manual/en/

# MySQL and PHP

- Architecture diagram



## Connecting to MySQL

- To connect to a database, need to create a connection
  - At lowest level, this is a network connection
  - Involves a login sequence (username/password)
- Since this is a relatively expensive step, web application environments:
  - Share connections
  - Have multiple connections
- Whether, and how many, are typical configuration items. In MySQL:
  - Allow_persistent: whether to allow persistent connections
  - Max_persistent: the maximum number of persistent connections
  - Max_links: max number of connections, persistent and not
  - Connection_timeout: how long the persistent connection is left open
- Can also use SSL to encrypt connection

## High-Level Process of Using MySQL from PHP

- Create a database connection
- Select database you wish to use
- Perform a SQL query
- Do some processing on query results
- Close database connection

## Creating Database Connection

- Use either mysql_connect or mysql_pconnect to create database connection
  - mysql_connect: connection is closed at end of script (end of page)
  - mysql_pconnect: creates persistent connection
    - connection remains even after end of the page
- Parameters
  - Server – hostname of server
  - Username – username on the database
  - Password – password on the database
  - New Link (mysql_connect only) – reuse database connection created by previous call to mysql_connect
  - Client Flags
    - MYSQL_CLIENT_SSL :: Use SSL
    - MYSQL_CLIENT_COMPRESS :: Compress data sent to MySQL

## Security Note

- Username and password fields imply that database password is sitting there in the source code
  - If someone gains access to source code, can compromise the database
  - Servers are sometimes configured to view PHP source code when a resource is requested with ".phps" instead of ".php"
  - One approach to avoid this: put this information in Web server config. File
    - Then ensure the Web server config. file is not externally accessible

## Selecting a Database

- mysql_select_db()
  - Pass it the database name
- Related:
  - mysql_list_dbs()
    - List databases available
  - Mysql_list_tables()
    - List database tables available

# Perform SQL Query

- Create query string
  - $query = ‘*SQL formatted string*’
  - $query = ‘SELECT * FROM *table*’
- Submit query to database for processing
  - $result = mysql_query($query);
  - For UPDATE, DELETE, DROP, etc, returns TRUE or FALSE
  - For SELECT, SHOW, DESCRIBE or EXPLAIN, $result is an identifier for the results, and does not contain the results themselves
    - $result is called a “resource” in this case
    - A result of FALSE indicates an error
- If there is an error
  - mysql_error() returns error string from last MySQL call

# Process Results

- Many functions exist to work with database results
- mysql_num_rows()
  - Number of rows in the result set
  - Useful for iterating over result set
- mysql_fetch_array()
  - Returns a result row as an array
  - Can be associative or numeric or both (default)
  - $row = mysql_fetch_array($result);
  - $row['*column name*'] :: value comes from database row with specified column name
  - $row[0] :: value comes from first field in result set

## Process Results Loop

- Easy loop for processing results:

```
$result = mysql_query($qstring);
$num_rows = mysql_num_rows($result);
for ($i=0; $i<$num_rows; $i++) {
   $row = mysql_fetch_array($result);
   // take action on database results here
}
```

## Closing Database Connection

- mysql_close()
  - Closes database connection
  - Only works for connections opened with mysql_connect()
  - Connections opened with mysql_pconnect() ignore this call
  - Often not necessary to call this, as connections created by mysql_connect are closed at the end of the script anyway