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WEB APPLICATION ENGINEERING II

Lecture #10

Umar Ibrahim Enesi

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Objectives

- Gain understanding on using PDO

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What is PDO

- PDO- **P**HP **D**ata **O**bjects
- PDO is a PHP extension (not PHP's core)
- Formalizes access to databases
- Not a database abstraction layer – provides a data-access abstraction layer
- Ships with PHP
- Supports various databases (MySQL, Oracle database, SQLite…)

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Checking for & Enabling PDO

- There is a database-specific PDO driver for every database that supports PDO
- Use `phpinfo()` to check the status of PDO and availability of database-specific PDO driver.
- Or programmatically, `PDO::getAvailableDrivers()`
- To enable PDO simply configure the appropriate extension in `php.ini`
- On windows just uncomment

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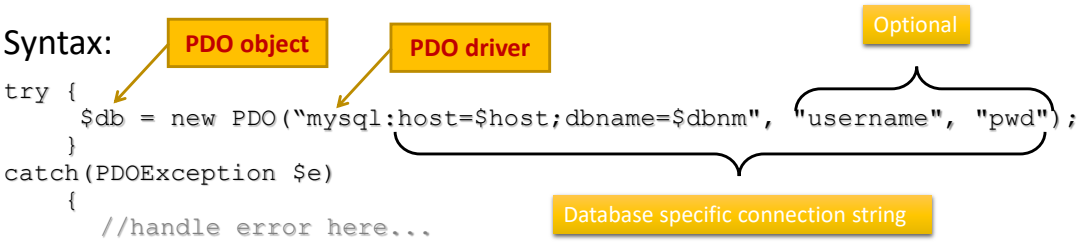
Connecting to Database (MySQL)

Syntax:



- Instead of using `try{}catch(){}`, you might want to handle the exception in an application global exception handler

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Connecting to Database (Persistence)

Syntax:

```
try {
      $db = new PDO(
                  "mysql:host=$host;dbname=$dbnm",
                  "username",
                  "pwd",
                  array( PDO::ATTR_PERSISTENT => true )
                  );
    }
catch(PDOException $e)
    {
      //handle error here...
    }
```

***Note**: Using `PDO::setAttribute()` instead of array format after connection has been made will not have any effect*

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Closing Connection

- By default, non-persistent connections are implicitly closed after a script finish executing.
- Explicitly,

```
$db = null;
```

- Avoid this,

```
$db_copy = $db;
$db = null;
```

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Querying Databases: SELECT

- Simplistically:

```
$result = $db->query($select_sql);
```

- On success, returns a `PDOStatement` object that can be iterated using foreach...loop.
- On failure, false is returned
- `$select_sql` should be properly escaped
- Call `$result->closeCursor()` before issuing another SELECT query.
- Use `fetch()` or `fetchAll()` to get result of the query

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Querying Databases: FETCH Modes

- `query()` returns `PDOStatement` object on success.
- By default `PDOStatement` object uses the `PDO::FETCH_BOTH` mode
- Use `setFetchMode()` to change the default fetch mode
- Most common modes:
  - `PDO::FETCH_ASSOC`: Table column name as keys
  - `PDO::FETCH_NUM`: Integer index as keys in table column order
  - `PDO::FETCH_BOTH`: A combination of column names and integer index (always double the size of `FETCH_ASSOC` or `FETCH_NUM`)

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Querying Databases: INSERT, UPDATE & DELETE

Syntax:

```
$count = $db->exec($sql);
```

- On success returns the number of rows affected (integer)
- On failure returns false
- Use (===) to make sure 0 is converted to false
- `$sql` should be properly escaped

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Querying Databases: Prepared Statements

- Prepared statement is like an SQL template
- Can be used with different variable parameters.
- It improves performance
- Optimize resources
- Prevent SQL injection (automatic escaping)
- It is more convenient when issuing the same query multiple times
- Can be used for SELECT, INSERT, UPDATE and DELETE

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Querying Databases: Prepared Statements

Syntax 1 (binding with named parameter):

```
$stmt = $dbh->prepare("INSERT INTO tbluser(username, pwd)
      VALUES (:usn, :pwd)");
$stmt->bindParam(':usn', $usn, PDO::PARAM_STR);
$stmt->bindParam(':pwd', $pwd, PDO::PARAM_STR, 10);
$usn= 'umar';
$pwd= 'enesi_pass';
$stmt->execute();
```

- Recall that `PDOStatement` has methods for fetching result set and to enquire how many rows are affect by its last execution.

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Querying Databases: Prepared Statements

Syntax 2 (binding with positional parameter):

```
$stmt = $dbh->prepare("INSERT INTO tbluser(username, pwd)
      VALUES (?, ?)");
$stmt->bindParam(1, $usn, PDO::PARAM_STR);
$stmt->bindParam(2, $pwd, PDO::PARAM_STR, 10);
$usn= 'umar';
$pwd= 'enesi_pass';
$stmt->execute();
```

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Querying Databases: Prepared Statements

Syntax 3 (using array of parameter values):

```
$stmt = $dbh->prepare("INSERT INTO tbluser(username, pwd)
      VALUES (:usn, :pwd)");
$usn= 'umar';
$pwd= 'enesi_pass';
$vals = array(":usn"=>$usn, ":pwd"=>$pwd);
$stmt->execute($vals);
```

- All array values will be mapped as `PDO::PARAM_STR`

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Querying Databases: Prepared Statements

Syntax 4 (using array of positional values):

```
$stmt = $dbh->prepare("INSERT INTO tbluser(username, pwd)
      VALUES (?, ?)");
$usn= 'umar';
$pwd= 'enesi_pass';
$vals = array($usn, $pwd);
$stmt->execute($vals);
```

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Querying Databases: Prepared Statements

Syntax 5 (Special case with IN clause):

```
$params= array('umar', 'ibrahim', 'enesi');
$place_holders = implode(',', array_fill(0, count($params), '?'));
$stmt = $dbh->prepare("SELECT * FROM tbluser WHERE username
      IN ($place_holders)");
$stmt->execute($params);
```

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Transactions

- By default auto-commit mode is on
- PDO transactions turns auto-commit mode off
- Thus one has to explicitly commit queries
- This allows for one to query the database multiple times before committing

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Transactions

General Syntax:

```
$db -> beginTransaction();
//perform multiple queries…
$db->commit();
```

To cancel a transaction call:

```
$db->rollback();
```

During a transaction, the id of the last INSERT can be retrieved:

```
$lasted = $db -> lastInsertId();
```

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Error Handling

- Exceptions may occur during database connection
- But errors can occur during query execution
  - Invalid SQL statement
  - Insufficient privileges
  - Error in PHP logic
- To catch and handle all errors from the point of connection to the point of disconnecting from the database;

```
$dbh->setAttribute(PDO::ATTR_ERRMODE, PDO::ERRMODE_EXCEPTION);
```

- This will cause Exception to be through in case of any error.

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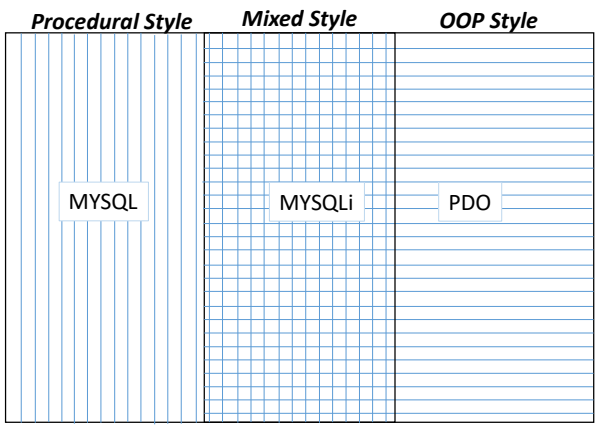
Summary on Database Access Libraries



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Reference

- http://www.phpro.org/tutorials/Introduction-to-PHP-PDO.html#4
- PHP Manual
- Wrox Professional PHP6