PHP MySQL CRUD Application

What is CRUD

CRUD is an acronym for **C**reate, **R**ead, **U**pdate, and **D**elete. CRUD operations are basic data manipulation for database. We've already learned how to perform create (i.e. insert), read (i.e. select), update and delete operations in previous chapters. In this tutorial we'll create a simple PHP application to perform all these operations on a MySQL database table at one place.

Creating the Database Table

Execute the following SQL query to create a table named *employees* inside your MySQL database. We will use this table for all of our future operations.

Example
```sql
CREATE TABLE employees (
    id INT NOT NULL PRIMARY KEY AUTO_INCREMENT,
    name VARCHAR(100) NOT NULL,
    address VARCHAR(255) NOT NULL,
    salary INT(10) NOT NULL
);
```

Creating the Config File

After creating the table, we need create a PHP script in order to connect to the MySQL database server. Let's create a file named "config.php" and put the following code inside it.

We'll later include this config file in other pages using the PHP `require_once()` function.

Example
```php
<?php
/* Database credentials. Assuming you are running MySQL
server with default setting (user 'root' with no password) */
define('DB_SERVER', 'localhost');
define('DB_USERNAME', 'root');
define('DB_PASSWORD', '');
define('DB_NAME', 'demo');

/* Attempt to connect to MySQL database */
```

```php
$link = mysqli_connect(DB_SERVER, DB_USERNAME, DB_PASSWORD,
DB_NAME);

// Check connection
if($link === false){
    die("ERROR: Could not connect. " . mysqli_connect_error());
}
?>
```

Creating the Landing Page

First we will create a landing page for our CRUD application that contains a data grid showing the records from the *employees* database table. It also has action icons for each record displayed in the grid, that you may choose to view its details, update it, or delete it.

We'll also add a create button on the top of the data grid that can be used for creating new records in the *employees* table. Create a file named "index.php" and put the following code in it:

Example
```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Dashboard</title>
    <link rel="stylesheet" href="css/bootstrap.min.css">
    <link rel="stylesheet" href="css/font-awesome.min.css">
    <script src="js/jquery-3.5.1.min.js"></script>
    <script src="js/popper.min.js"></script>
    <script src="js/bootstrap.min.js"></script>
    <style>
        .wrapper{
            width: 600px;
            margin: 0 auto;
        }
        table tr td:last-child{
            width: 120px;
        }
    </style>
    <script>
        $(document).ready(function(){
            $('[data-toggle="tooltip"]').tooltip();
        });
    </script>
</head>
<body>
    <div class="wrapper">
```

```php
<div class="container-fluid">
    <div class="row">
        <div class="col-md-12">
            <div class="mt-5 mb-3 clearfix">
                <h2 class="pull-left">Employees Details</h2>
                <a href="create.php" class="btn btn-success pull-right"><i class="fa fa-plus"></i> Add New Employee</a>
            </div>
            <?php
            // Include config file
            require_once "config.php";

            // Attempt select query execution
            $sql = "SELECT * FROM employees";
            if($result = mysqli_query($link, $sql)){
                if(mysqli_num_rows($result) > 0){
                    echo '<table class="table table-bordered table-striped">';
                        echo "<thead>";
                            echo "<tr>";
                                echo "<th>#</th>";
                                echo "<th>Name</th>";
                                echo "<th>Address</th>";
                                echo "<th>Salary</th>";
                                echo "<th>Action</th>";
                            echo "</tr>";
                        echo "</thead>";
                        echo "<tbody>";
                        while($row = mysqli_fetch_array($result)){
                            echo "<tr>";
                                echo "<td>" . $row['id'] . "</td>";
                                echo "<td>" . $row['name'] . "</td>";
                                echo "<td>" . $row['address'] . "</td>";
                                echo "<td>" . $row['salary'] . "</td>";
                                echo "<td>";
                                    echo '<a href="read.php?id='. $row['id'] .'" class="mr-3" title="View Record" data-toggle="tooltip"><span class="fa fa-eye"></span></a>';
                                    echo '<a href="update.php?id='. $row['id'] .'" class="mr-3" title="Update Record" data-toggle="tooltip"><span class="fa fa-pencil"></span></a>';
                                    echo '<a href="delete.php?id='. $row['id'] .'" title="Delete Record" data-toggle="tooltip"><span class="fa fa-trash"></span></a>';
                                echo "</td>";
                            echo "</tr>";
```

```php
                }
                echo "</tbody>";
            echo "</table>";
            // Free result set
            mysqli_free_result($result);
        } else{
            echo '<div class="alert alert-
danger"><em>No records were found.</em></div>';
        }
    } else{
        echo "Oops! Something went wrong. Please try
again later.";
    }

    // Close connection
    mysqli_close($link);
    ?>
        </div>
      </div>
    </div>
  </div>
</body>
</html>
```

Creating the Create Page

In this section we'll build the **C**reate functionality of our CRUD application.

Let's create a file named "create.php" and put the following code inside it. It will generate a web form that can be used to insert records in the *employees* table.

Example
```php
<?php
// Include config file
require_once "config.php";

// Define variables and initialize with empty values
$name = $address = $salary = "";
$name_err = $address_err = $salary_err = "";

// Processing form data when form is submitted
if($_SERVER["REQUEST_METHOD"] == "POST"){
    // Validate name
    $input_name = trim($_POST["name"]);
    if(empty($input_name)){
        $name_err = "Please enter a name.";
    } elseif(!filter_var($input_name, FILTER_VALIDATE_REGEXP,
array("options"=>array("regexp"=>"/^[a-zA-Z\s]+$/")))){
```

```php
            $name_err = "Please enter a valid name.";
        } else{
            $name = $input_name;
        }

        // Validate address
        $input_address = trim($_POST["address"]);
        if(empty($input_address)){
            $address_err = "Please enter an address.";
        } else{
            $address = $input_address;
        }

        // Validate salary
        $input_salary = trim($_POST["salary"]);
        if(empty($input_salary)){
            $salary_err = "Please enter the salary amount.";
        } elseif(!ctype_digit($input_salary)){
            $salary_err = "Please enter a positive integer value.";
        } else{
            $salary = $input_salary;
        }

        // Check input errors before inserting in database
        if(empty($name_err) && empty($address_err) &&
empty($salary_err)){
            // Prepare an insert statement
            $sql = "INSERT INTO employees (name, address, salary) VALUES
(?, ?, ?)";

            if($stmt = mysqli_prepare($link, $sql)){
                // Bind variables to the prepared statement as
parameters
                mysqli_stmt_bind_param($stmt, "sss", $param_name,
$param_address, $param_salary);

                // Set parameters
                $param_name = $name;
                $param_address = $address;
                $param_salary = $salary;

                // Attempt to execute the prepared statement
                if(mysqli_stmt_execute($stmt)){
                    // Records created successfully. Redirect to landing
page
                    header("location: index.php");
                    exit();
                } else{
                    echo "Oops! Something went wrong. Please try again
later.";
                }
            }
```

```php
        // Close statement
        mysqli_stmt_close($stmt);
    }

    // Close connection
    mysqli_close($link);
}
?>
```

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Create Record</title>
    <link rel="stylesheet" href="css/bootstrap.min.css">
    <style>
        .wrapper{
            width: 600px;
            margin: 0 auto;
        }
    </style>
</head>
<body>
    <div class="wrapper">
        <div class="container-fluid">
            <div class="row">
                <div class="col-md-12">
                    <h2 class="mt-5">Create Record</h2>
                    <p>Please fill this form and submit to add
employee record to the database.</p>
                    <form action="<?php echo
htmlspecialchars($_SERVER["PHP_SELF"]); ?>" method="post">
                        <div class="form-group">
                            <label>Name</label>
                            <input type="text" name="name"
class="form-control <?php echo (!empty($name_err)) ? 'is-invalid' :
''; ?>" value="<?php echo $name; ?>">
                            <span class="invalid-feedback"><?php
echo $name_err;?></span>
                        </div>
                        <div class="form-group">
                            <label>Address</label>
                            <textarea name="address" class="form-
control <?php echo (!empty($address_err)) ? 'is-invalid' : '';
?>"><?php echo $address; ?></textarea>
                            <span class="invalid-feedback"><?php
echo $address_err;?></span>
                        </div>
                        <div class="form-group">
                            <label>Salary</label>
```

```html
                        <input type="text" name="salary"
class="form-control <?php echo (!empty($salary_err)) ? 'is-invalid'
: ''; ?>" value="<?php echo $salary; ?>">
                        <span class="invalid-feedback"><?php
echo $salary_err;?></span>
                    </div>
                    <input type="submit" class="btn btn-primary"
value="Submit">
                    <a href="index.php" class="btn btn-secondary
ml-2">Cancel</a>
                </form>
            </div>
        </div>
    </div>
</body>
</html>
```

Creating the Read Page

Now it's time to build the **R**ead functionality of our CRUD application.

Let's create a file named "read.php" and put the following code inside it. It will simply retrieve the records from the *employees* table based the id attribute of the employee.

Example

```php
<?php
// Check existence of id parameter before processing further
if(isset($_GET["id"]) && !empty(trim($_GET["id"]))){
    // Include config file
    require_once "config.php";

    // Prepare a select statement
    $sql = "SELECT * FROM employees WHERE id = ?";

    if($stmt = mysqli_prepare($link, $sql)){
        // Bind variables to the prepared statement as parameters
        mysqli_stmt_bind_param($stmt, "i", $param_id);

        // Set parameters
        $param_id = trim($_GET["id"]);

        // Attempt to execute the prepared statement
        if(mysqli_stmt_execute($stmt)){
            $result = mysqli_stmt_get_result($stmt);

            if(mysqli_num_rows($result) == 1){
                /* Fetch result row as an associative array. Since
the result set
```

```php
                contains only one row, we don't need to use while
loop */
                $row = mysqli_fetch_array($result, MYSQLI_ASSOC);

                // Retrieve individual field value
                $name = $row["name"];
                $address = $row["address"];
                $salary = $row["salary"];
            } else{
                // URL doesn't contain valid id parameter. Redirect
to error page
                header("location: error.php");
                exit();
            }

        } else{
            echo "Oops! Something went wrong. Please try again
later.";
        }
    }

    // Close statement
    mysqli_stmt_close($stmt);

    // Close connection
    mysqli_close($link);
} else{
    // URL doesn't contain id parameter. Redirect to error page
    header("location: error.php");
    exit();
}
?>

<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>View Record</title>
    <link rel="stylesheet" href="css/bootstrap.min.css">
    <style>
        .wrapper{
            width: 600px;
            margin: 0 auto;
        }
    </style>
</head>
<body>
    <div class="wrapper">
        <div class="container-fluid">
            <div class="row">
                <div class="col-md-12">
                    <h1 class="mt-5 mb-3">View Record</h1>
```

```html
                        <div class="form-group">
                            <label>Name</label>
                            <p><b><?php echo $row["name"]; ?></b></p>
                        </div>
                        <div class="form-group">
                            <label>Address</label>
                            <p><b><?php echo $row["address"]; ?></b></p>
                        </div>
                        <div class="form-group">
                            <label>Salary</label>
                            <p><b><?php echo $row["salary"]; ?></b></p>
                        </div>
                        <p><a href="index.php" class="btn btn-primary">Back</a></p>
                    </div>
                </div>
            </div>
</body>
</html>
```

Creating the Update Page

Similarly, we can build the **U**pdate functionality of our CRUD application.

Let's create a file named "update.php" and put the following code inside it. It will update the existing records in the *employees* table based the id attribute of the employee.

Example

```php
<?php
// Include config file
require_once "config.php";

// Define variables and initialize with empty values
$name = $address = $salary = "";
$name_err = $address_err = $salary_err = "";

// Processing form data when form is submitted
if(isset($_POST["id"]) && !empty($_POST["id"])){
    // Get hidden input value
    $id = $_POST["id"];

    // Validate name
    $input_name = trim($_POST["Name"]);
    if(empty($input_name)){
```

```php
        $name_err = "Please enter a name.";
    } elseif(!filter_var($input_name, FILTER_VALIDATE_REGEXP,
array("options"=>array("regexp"=>"/^[a-zA-Z\s]+$/")))){
        $name_err = "Please enter a valid name.";
    } else{
        $name = $input_name;
    }

    // Validate address address
    $input_address = trim($_POST["address"]);
    if(empty($input_address)){
        $address_err = "Please enter an address.";
    } else{
        $address = $input_address;
    }

    // Validate salary
    $input_salary = trim($_POST["salary"]);
    if(empty($input_salary)){
        $salary_err = "Please enter the salary amount.";
    } elseif(!ctype_digit($input_salary)){
        $salary_err = "Please enter a positive integer value.";
    } else{
        $salary = $input_salary;
    }

    // Check input errors before inserting in database
    if(empty($name_err) && empty($address_err) &&
empty($salary_err)){
        // Prepare an update statement
        $sql = "UPDATE employees SET name=?, address=?, salary=?
WHERE id=?";

        if($stmt = mysqli_prepare($link, $sql)){
            // Bind variables to the prepared statement as
parameters
            mysqli_stmt_bind_param($stmt, "sssi", $param_name,
$param_address, $param_salary, $param_id);

            // Set parameters
            $param_name = $name;
            $param_address = $address;
            $param_salary = $salary;
            $param_id = $id;

            // Attempt to execute the prepared statement
            if(mysqli_stmt_execute($stmt)){
                // Records updated successfully. Redirect to landing
page
                header("location: index.php");
                exit();
            } else{
```

```php
                    echo "Oops! Something went wrong. Please try again
later.";
                }
            }

            // Close statement
            mysqli_stmt_close($stmt);
        }

        // Close connection
        mysqli_close($link);
} else{
        // Check existence of id parameter before processing further
        if(isset($_GET["id"]) && !empty(trim($_GET["id"]))){
            // Get URL parameter
            $id =  trim($_GET["id"]);

            // Prepare a select statement
            $sql = "SELECT * FROM employees WHERE id = ?";
            if($stmt = mysqli_prepare($link, $sql)){
                // Bind variables to the prepared statement as
parameters
                mysqli_stmt_bind_param($stmt, "i", $param_id);

                // Set parameters
                $param_id = $id;

                // Attempt to execute the prepared statement
                if(mysqli_stmt_execute($stmt)){
                    $result = mysqli_stmt_get_result($stmt);

                    if(mysqli_num_rows($result) == 1){
                        /* Fetch result row as an associative array.
Since the result set
                        contains only one row, we don't need to use
while loop */
                        $row = mysqli_fetch_array($result,
MYSQLI_ASSOC);

                        // Retrieve individual field value
                        $name = $row["name"];
                        $address = $row["address"];
                        $salary = $row["salary"];
                    } else{
                        // URL doesn't contain valid id. Redirect to
error page
                        header("location: error.php");
                        exit();
                    }

                } else{
```

```php
                echo "Oops! Something went wrong. Please try again
later.";
            }
        }

        // Close statement
        mysqli_stmt_close($stmt);

        // Close connection
        mysqli_close($link);
    } else{
        // URL doesn't contain id parameter. Redirect to error page
        header("location: error.php");
        exit();
    }
}
?>

<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Update Record</title>
    <link rel="stylesheet" href="css/bootstrap.min.css">
    <style>
        .wrapper{
            width: 600px;
            margin: 0 auto;
        }
    </style>
</head>
<body>
    <div class="wrapper">
        <div class="container-fluid">
            <div class="row">
                <div class="col-md-12">
                    <h2 class="mt-5">Update Record</h2>
                    <p>Please edit the input values and submit to
update the employee record.</p>
                    <form action="<?php echo
htmlspecialchars(basename($_SERVER['REQUEST_URI'])); ?>"
method="post">
                        <div class="form-group">
                            <label>Name</label>
                            <input type="text" name="name"
class="form-control <?php echo (!empty($name_err)) ? 'is-invalid' :
''; ?>" value="<?php echo $name; ?>">
                            <span class="invalid-feedback"><?php
echo $name_err;?></span>
                        </div>
                        <div class="form-group">
                            <label>Address</label>
```

```html
                              <textarea name="address" class="form-
control <?php echo (!empty($address_err)) ? 'is-invalid' : '';
?>"><?php echo $address; ?></textarea>
                              <span class="invalid-feedback"><?php
echo $address_err;?></span>
                          </div>
                          <div class="form-group">
                              <label>Salary</label>
                              <input type="text" name="salary"
class="form-control <?php echo (!empty($salary_err)) ? 'is-invalid'
: ''; ?>" value="<?php echo $salary; ?>">
                              <span class="invalid-feedback"><?php
echo $salary_err;?></span>
                          </div>
                          <input type="hidden" name="id" value="<?php
echo $id; ?>"/>
                          <input type="submit" class="btn btn-primary"
value="Submit">
                          <a href="index.php" class="btn btn-secondary
ml-2">Cancel</a>
                      </form>
                  </div>
              </div>
          </div>
</body>
</html>
```

Creating the Delete Page

Finally, we will build the **D**elete functionality of our CRUD application.

Let's create a file named "delete.php" and put the following code inside it. It will delete the existing records from the *employees* table based the id attribute of the employee.

Example

```php
<?php
// Process delete operation after confirmation
if(isset($_POST["id"]) && !empty($_POST["id"])){
    // Include config file
    require_once "config.php";

    // Prepare a delete statement
    $sql = "DELETE FROM employees WHERE id = ?";
```

```php
    if($stmt = mysqli_prepare($link, $sql)){
        // Bind variables to the prepared statement as parameters
        mysqli_stmt_bind_param($stmt, "i", $param_id);

        // Set parameters
        $param_id = trim($_POST["id"]);

        // Attempt to execute the prepared statement
        if(mysqli_stmt_execute($stmt)){
            // Records deleted successfully. Redirect to landing
page
            header("location: index.php");
            exit();
        } else{
            echo "Oops! Something went wrong. Please try again
later.";
        }
    }

    // Close statement
    mysqli_stmt_close($stmt);

    // Close connection
    mysqli_close($link);
} else{
    // Check existence of id parameter
    if(empty(trim($_GET["id"]))){
        // URL doesn't contain id parameter. Redirect to error page
        header("location: error.php");
        exit();
    }
}
?>

<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Delete Record</title>
    <link rel="stylesheet" href="css/bootstrap.min.css">
    <style>
        .wrapper{
            width: 600px;
            margin: 0 auto;
        }
    </style>
</head>
<body>
    <div class="wrapper">
        <div class="container-fluid">
            <div class="row">
                <div class="col-md-12">
```

```
                    <h2 class="mt-5 mb-3">Delete Record</h2>
                    <form action="<?php echo
htmlspecialchars($_SERVER["PHP_SELF"]); ?>" method="post">
                        <div class="alert alert-danger">
                            <input type="hidden" name="id"
value="<?php echo trim($_GET["id"]); ?>"/>
                            <p>Are you sure you want to delete this
employee record?</p>
                            <p>
                                <input type="submit" value="Yes
class="btn btn-danger">
                                <a href="index.php" class="btn btn-
secondary">No</a>
                            </p>
                        </div>
                    </form>
                </div>
            </div>
        </div>
</body>
</html>
```

Creating the Error Page

At the end, let's create one more file "error.php". This page will be displayed if request is invalid i.e. if id parameter is missing from the URL query string or it is not valid.

Example
```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Error</title>
    <link rel="stylesheet" href="css/bootstrap.min.css">
    <style>
        .wrapper{
            width: 600px;
            margin: 0 auto;
        }
    </style>
</head>
<body>
    <div class="wrapper">
        <div class="container-fluid">
```

```html
        <div class="row">
            <div class="col-md-12">
                <h2 class="mt-5 mb-3">Invalid Request</h2>
                <div class="alert alert-danger">Sorry, you've
made an invalid request. Please <a href="index.php" class="alert-
link">go back</a> and try again.</div>
            </div>
        </div>
    </div>
</body>
</html>
```