



BHARATIYA VIDYA BHAVAN'S
SARDAR PATEL INSTITUTE OF TECHNOLOGY
(Empowered Autonomous Institute Affiliated to Mumbai University)
Department Of Computer Engineering

Name	Manish Shashikant Jadhav
UID	2023301005
Subject	Software Engineering
Experiment No.	9
Aim	Testing
Implementation	Unit testing was performed using the PHPUnit framework to validate the functionalities of adding, updating, and deleting room details in the `hostelmsphp` database. The `setUp()` method established a connection to the database and ensured the required `rooms` table was created with constraints like `UNIQUE` for `room_no`. It also inserted default test data to simulate real-world scenarios. Test cases were implemented to cover various outcomes, such as successful operations, handling invalid data, and managing edge cases like duplicate entries or non-existent records. Assertions were used to verify expected outcomes, such as ensuring data consistency and detecting failures caused by invalid inputs or constraints. The `tearDown()` method closed the database connection, ensuring that each test ran in isolation. This systematic approach ensured that the database interactions performed as expected under different conditions.

1. Units to Test:

Unit 1: addUser Function

This unit tests the functionality to add a user to the database.

Unit 2: updateUser Function

This unit tests the functionality to update a user's details in the database.

Unit 3: deleteUser Function

This unit tests the functionality to delete a user from the database.



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2. Exhaustive Test Case for Unit 1:

Test Case ID	Description	Expected Output
TC1	Add a valid room with correct data (valid seater, room_no, and fees).	Room added successfully
TC2	Add a room with a duplicate room_no (i.e., already exists in the database).	Error message or failure: "Room number already exists."
TC3	Add a room with invalid data (e.g., negative seater, zero fees, or zero room_no).	Error message or failure: "Invalid room data."
TC4	Add a room with missing required fields (e.g., missing seater, room_no, or fees).	Error message or failure: "All fields are required."

3. Exhaustive Test Case for Unit 2:

Test Case ID	Description	Expected Output
TC1	Update an existing room's data with valid information (e.g., new fees).	Room updated successfully
TC2	Attempt to update a non-existent room (invalid room_no).	Error message or failure: "Room not found."
TC3	Attempt to update a room's data with invalid information (e.g., negative fees).	Error message or failure: "Invalid room data."

4. Exhaustive Test Case for Unit 3:

Test Case ID	Description	Expected Output
TC1	Delete an existing room by valid room_no.	Room deleted successfully.
TC2	Attempt to delete a non-existent room (invalid room_no).	Error message or failure: "Room not found."
TC3	Attempt to delete a room with invalid data (e.g., non-integer room_no).	Error or exception: "Invalid room number format."

Every File contains a header of PHPUnit:

```
You, 4 hours ago | 1 author (You)
1 <?php
2 use PHPUnit\Framework\TestCase;
3
```



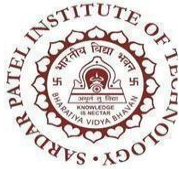
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```
UpdateRoomTest.php x  phpunit.xml x
HostelManagement > phpunit.xml
You, 3 hours ago | 1 author (You)
1 <?xml version="1.0" encoding="UTF-8"?>
2 <phpunit bootstrap="vendor/autoload.php" colors="true">
3     <testsuites>
4         <testsuite name="Hostel Management Tests">
5             <directory>./tests</directory>
6         </testsuite>
7     </testsuites>
8 </phpunit>
9 |
```

```
UpdateRoomTest.php  {} composer.json x
HostelManagement > {} composer.json > ...
You, 3 hours ago | 1 author (You)
1 {
2     "require-dev": {
3         "phpunit/phpunit": "^11.4"
4     }
5 }
6 |
```

- **Unit Test for Add room:**

```
28 public function testAddNewRoom()
29 {
30     $seater = 2;
31     $roomno = 101; // New room number
32     $fees = 5000;
33
34     // Prepare the insert statement
35     $query = "INSERT INTO rooms (seater, room_no, fees) VALUES (?, ?, ?)";
36     $stmt = $this->mysqli->prepare($query);
37     $stmt->bind_param('iii', $seater, $roomno, $fees);
38
39     // Execute the statement and assert success
40     $this->assertTrue($stmt->execute(), "Room should be added successfully.");
41 }
42
43 public function testAddExistingRoom()
44 {
45     // Insert a room first for testing the 'existing room' case
46     $this->mysqli->query("INSERT INTO rooms (seater, room_no, fees) VALUES (2, 101, 5000)");
47
48     // Attempt to add the same room again
49     $seater = 3;
50     $roomno = 101; // Existing room number
51     $fees = 6000;
```



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```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS GITLENS SEARCH ERROR COMMENTS
PS C:\xampp\htdocs\HostelManagement> vendor/bin/phpunit --bootstrap vendor/autoload.php tests/AddRoomsTest.php
PHPUnit 11.4.3 by Sebastian Bergmann and contributors.

Runtime:       PHP 8.2.12
Configuration: C:\xampp\htdocs\HostelManagement\phpunit.xml

.FF                                                    3 / 3 (100%)

Time: 00:00.068, Memory: 8.00 MB

There were 2 failures:

1) AddRoomsTest::testAddExistingRoom
Room with the same room number should not be added.
Failed asserting that true is false.

C:\xampp\htdocs\HostelManagement\tests\AddRoomsTest.php:59

2) AddRoomsTest::testInvalidRoomData
Room data should not be accepted.
Failed asserting that true is false.
```

✓ Showing rows 0 - 2 (3 total, Query took 0.0005 seconds.)

SELECT * FROM `rooms`

Profiling

[Edit inline]

[Edit]

[Explain SQL]

[Create PHP code]

[Refresh]

Show all

Number of rows: 25

Filter rows: Search this table

Sort by key: None

Extra options

←↑→

id

seater

room_no

fees

posting_date

Edit

Copy

Delete

1

2

101

5000

2024-11-19 20:04:11

↶

Check all

With selected:

Edit

Copy

Delete

Export

Show all

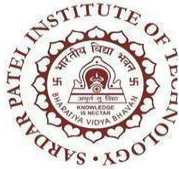
Number of rows: 25

Filter rows: Search this table

Sort by key: None

- **Unit Test for update room:**

```
38 public function testUpdateRoom()
39 {
40     $roomno = 504; // Room to be updated
41     $newFees = 15000;
42
43     // Update room details
44     $updateQuery = "UPDATE rooms SET fees = ? WHERE room_no = ?";
45     $updateStmt = $this->mysqli->prepare($updateQuery);
46     $updateStmt->bind_param('ii', $newFees, $roomno);
47
48     // Assert that the room is updated successfully
49     $this->assertTrue($updateStmt->execute(), "Room fees should be updated successfully.");
50
51     // Verify the update was successful
52     $result = $this->mysqli->query("SELECT fees FROM rooms WHERE room_no = $roomno");
53     $row = $result->fetch_assoc();
54     $this->assertEquals($newFees, $row['fees'], "Room fees should be updated in the database.");
55 }
56
57 // Test: Attempting to update a non-existent room
58 public function testUpdateNonExistentRoom()
59 {
60     $roomNo = 999; // Non-existent room number
61     $newFees = 7000;
62
63     $updateQuery = "UPDATE rooms SET fees = ? WHERE room_no = ?";
64     $updateStmt = $this->mysqli->prepare($updateQuery);
65     $updateStmt->bind_param('ii', $newFees, $roomNo);
66
67     // Assert that the update fails for non-existent room
68     $this->assertFalse($updateStmt->execute(), "The room update should fail for non-existent room.");
69 }
70
71 // Test: Updating with invalid data (e.g., negative fees)
72 public function testUpdateRoomWithInvalidData()
```



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```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS GITLENS SEARCH ERROR COMMENTS
PS C:\xampp\htdocs\HostelManagement> vendor/bin/phpunit --bootstrap vendor/autoload.php tests/UpdateRoomTest.php
PHPUnit 11.4.3 by Sebastian Bergmann and contributors.

Runtime:    PHP 8.2.12
Configuration: C:\xampp\htdocs\HostelManagement\phpunit.xml

.FF.                                               4 / 4 (100%)

Time: 00:00.081, Memory: 8.00 MB

There were 2 failures:

1) UpdateRoomTest::testUpdateNonExistentRoom
The room update should fail for non-existent room.
Failed asserting that true is false.

C:\xampp\htdocs\HostelManagement\tests\UpdateRoomTest.php:68

2) UpdateRoomTest::testUpdateRoomWithInvalidData
The room update should fail with invalid data.
Failed asserting that true is false.
```

☐ Show all | Number of rows: 25 | Filter rows: Search this table | Sort by key: None

Extra options

				id	seater	room_no	fees	posting_date
<input type="checkbox"/>	Edit	Copy	Delete	1	2	101	5000	2024-11-19 20:20:09
<input type="checkbox"/>	Edit	Copy	Delete	5	2	504	15000	2024-11-19 20:20:26

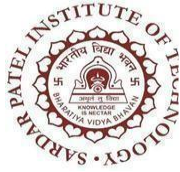
☐ Check all | With selected: Edit Copy Delete Export

☐ Show all | Number of rows: 25 | Filter rows: Search this table | Sort by key: None

Query results operations

- Unit Test for Delete Room:

```
38 public function testDeleteRoom()
39 {
40     $roomno = 101; // Room to be deleted
41
42     // Delete the room
43     $deleteQuery = "DELETE FROM rooms WHERE room_no = ?";
44     $deleteStmt = $this->mysqli->prepare($deleteQuery);
45     $deleteStmt->bind_param('i', $roomno);
46
47     // Assert that the room is deleted successfully
48     $this->assertTrue($deleteStmt->execute(), "Room should be deleted successfully.");
49
50     // Verify that the room was deleted
51     $result = $this->mysqli->query("SELECT * FROM rooms WHERE room_no = $roomno");
52     $this->assertNull($result->fetch_assoc(), "Room should no longer exist in the database.");
53 }
54
55 // Test: Deleting a non-existent room
56 public function testDeleteNonExistentRoom()
57 {
58     $roomNo = 999; // Non-existent room number
59
60     // Attempt to delete a non-existent room
61     $deleteQuery = "DELETE FROM rooms WHERE room_no = ?";
62     $deleteStmt = $this->mysqli->prepare($deleteQuery);
63     $deleteStmt->bind_param('i', $roomNo);
64
65     // Assert that the deletion fails for non-existent room
66     $this->assertFalse($deleteStmt->execute(), "The room deletion should fail for non-existent room.");
67 }
68
69 // Test: Deleting a room with invalid data (e.g., invalid room number format)
70 public function testDeleteRoomWithInvalidData()
71 {
72     $roomNo = 'invalid'; // Invalid room number format (string)
73
74     // Attempt to delete with invalid data
75     $deleteQuery = "DELETE FROM rooms WHERE room_no = ?";
76     $deleteStmt = $this->mysqli->prepare($deleteQuery);
```



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```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS GITLENS SEARCH ERROR COMMENTS

PS C:\xampp\htdocs\HostelManagement> vendor/bin/phpunit --bootstrap vendor/autoload.php tests/DeleteRoomTest.php
PHPUnit 11.4.3 by Sebastian Bergmann and contributors.

Runtime:    PHP 8.2.12
Configuration: C:\xampp\htdocs\HostelManagement\phpunit.xml

.FF                                                    3 / 3 (100%)

Time: 00:00.064, Memory: 8.00 MB

There were 2 failures:

1) DeleteRoomTest::testDeleteNonExistentRoom
The room deletion should fail for non-existent room.
Failed asserting that true is false.

C:\xampp\htdocs\HostelManagement\tests\DeleteRoomTest.php:66

2) DeleteRoomTest::testDeleteRoomWithInvalidData
Failed asserting that exception of type "mysqli_sql_exception" is thrown.
```

☐ Show all | Number of rows: 25 | Filter rows: Search this table

Extra options

← T →

	id	seater	room_no	fees	posting_date
<input type="checkbox"/> Edit Copy Delete	5	2	504	15000	2024-11-19 20:20:26

☐ Check all | With selected: Edit Copy Delete Export

☐ Show all | Number of rows: 25 | Filter rows: Search this table

Query results operations

Conclusion

Hence by completing this experiment I got to know how to perform unit testing on web application in PHP and MySQL using framework called PHPUnit.