

## Project Overview

This project implements a Binary Calculator Web Application and API using Spring Boot. It provides:

- A web based calculator to perform binary arithmetic operations (`+`, `\*`, `&`, `|`).
- A REST API that supports binary operations (`add`, `multiply`, `and`, `or`) and returns results in JSON format.
- Unit tests to validate the correctness of the web application and API.

## Summary of Test Cases

This section describes the test cases, their target classes/functions, and purpose .

### *Web Application Tests (`BinaryControllerTest.java`)*

Test Name	Target Class/Function	Purpose
getDefault()	BinaryController.calculatorPage()	Tests if the calculator page loads correctly with an empty operand.
getParameter()	BinaryController.calculatorPage()	Tests if the calculator page pre fills `operand1` correctly when passed as a parameter.
postParameter()	BinaryController.calculate()	Tests if addition works correctly (`111 + 111 = 1110`).
testMultiplication()	BinaryController.calculate()	Tests multiplication (`101 11 = 1111`).
testAndOperation()	BinaryController.calculate()	Tests bitwise AND (`1101 & 1011 = 1001`)
testOrOperation	BinaryController.calculate()	Tests bitwise OR (`1101 1011 = 1111`).

### *API Tests (`BinaryAPIControllerTest.java`)*

Test Name	Target Class/Function	Purpose
add()	BinaryAPIController.add()	Tests addition API (`111 + 1010 = 10001`)
add2()	BinaryAPIController.addJson()	Tests addition API in JSON format.
testMultiplicationAPI()	BinaryAPIController.multiply()	Tests multiplication API (`10111 = 1111`).
testAndAPI()	BinaryAPIController.and()	Tests bitwise AND API (`1101 & 1011 = 1001`).
testOrAPI()	BinaryAPIController.or()	Tests bitwise OR API (`1101 1011 = 1111`).

### *Hello Controller Tests (`HelloControllerTest.java` & `HelloAPIControllerTest.java`)*

Test Name	Target Class/Function	Purpose
getDefault()	HelloController.home()	Tests if `/hello` loads correctly with default name "World".
helloWithName()	HelloController.home()	Tests if `/hello?name=Doe` correctly displays `"Hello Doe"`.
helloAPINoParameter()	HelloController.hello()	Tests if `/helloAPI` returns `"Hello World"`.
helloAPIWithName	HelloController.hello()	Tests if `/helloAPI?name=John` returns "Hello John".

## Maven Test Summary

The tests were executed using Maven.

All tests passed successfully!

The application correctly performs:

- Binary arithmetic (+, -, \*, /, %).
- API responses in both plain text and JSON formats.
- Web UI interaction validation.

## Snapshots of Maven Test Summary

Below is the Maven test output, confirming all tests passed.

```
torService 'applicationTaskExecutor'
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 19, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 7.466 s
[INFO] Finished at: 2025-02-04T23:31:24-05:00
[INFO]
PS C:\Users\eroms\projects\BinaryCalculatorWebapp>
```

## Conclusion

This report confirms that the Binary Calculator Web Application and API function as expected.

- All operations (+, -, \*, /, %) work correctly.
- The API returns expected JSON responses.
- The web application correctly processes binary inputs.