

Project Report

Project 3 ECE 528

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### Acknowledgement

I acknowledge all works including figures, codes, and writings belong to me and/or persons who are referenced. I understand if any similarity in the code, comments, customized program behavior, report writings, and/or figures are found, both the helper (original work) and the requestor (duplicated/modified work) will be called for academic disciplinary action

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## Implemented Test Cases

### MqttCommandsTest.java:

testGetTopic(): Ensures MQTT topics are correctly formatted.  
testHandleMessage\_ValidActions(): Checks plug switching on, off, and toggling.  
testHandleMessage\_UnknownPlug(): Ensures no action is taken for unknown plugs.  
testHandleMessage\_ExceptionHandling(): Tests robustness against unexpected exceptions.

### MqttUpdatesTest.java:

testGetMessage(): Verifies correct MQTT message payload generation.  
testGetTopicWithSpecialCharacters(): Ensures MQTT topics are correctly formatted for different plug names.  
testGetMessageWithLargePayload(): Checks system behavior with large payloads.

### PlugSimTest.java

testMeasurePowerOffNameDotNumberParseError()– Ensures plug correctly parses numeric suffix for power measurement.  
testMeasurePowerWhilePlugsOff() – Verifies that power remains 0.000 when the plug is off.  
testMeasurePowerWithFluctuation ()– Checks that power fluctuates within a valid range when the plug is on.  
testSwitchOnAndCheckState() – Confirms that switchOn() updates the plug state to on.  
testSwitchOffAndCheckState ()– Ensures switchOff() correctly updates state to off and sets power to 0.000.  
testToggleSwitchState() – Validates that toggle() correctly switches the plug between on and off states.

How did you implement the features? What classes have you added/modified?

## Modified Classes

### 1. PlugSim.java

- Integrated MQTT updates to publish plug state changes.
- Ensured power measurements update MQTT topics correctly.

### 2. Main.java

- Initialized MQTT communication and attached it to the plug simulation.

### 3. MqttHandler.java (Modified to MqttCommands & MqttUpdates)

- Divided functionality into two classes for better modularity:
  - MqttCommands.java: Handles incoming MQTT action messages.
  - MqttUpdates.java: Handles publishing plug states and power readings.

## New Classes

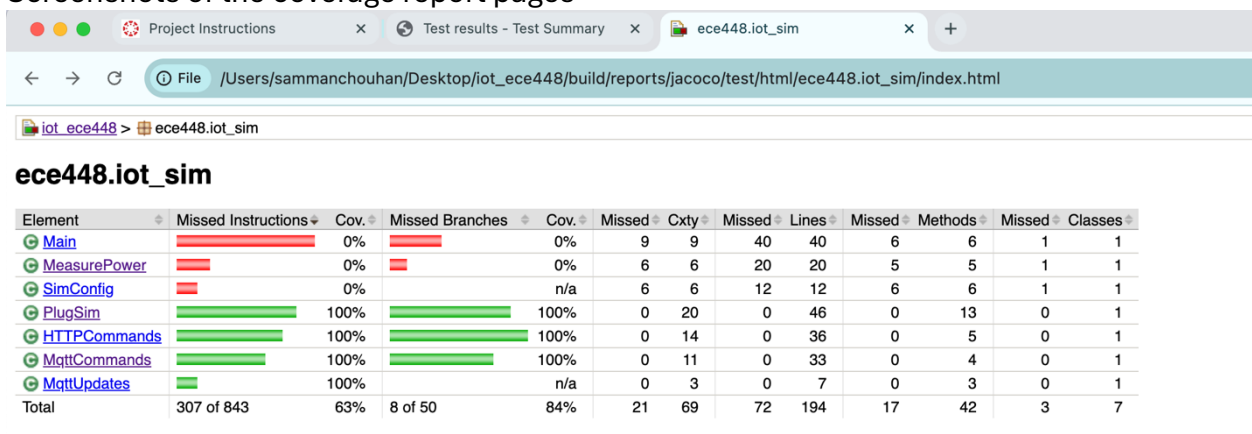
### 1. MqttCommands.java

- Listens to MQTT topics for plug action commands.
- Executes corresponding plug actions based on received messages.

### 2. MqttUpdates.java

- Handles publishing MQTT messages for plug states (on/off) and power values.

## Screenshots of the coverage report pages



Screenshot of Unit Test Report Page

Project Instructions

Test results - Class ece448...

ece448.iot\_sim

File

/Users/sammanchouhan/Desktop/iot\_ece448/build/reports/tests/test/classes/ece448.iot\_sim.MqttCommandsTest.html

Verify it's you

Class ece448.iot\_sim.MqttCommandsTest

all > ece448.iot\_sim > MqttCommandsTest

8

tests

0

failures

0

ignored

0.013s

duration

100%

successful

Tests

Standard output

| Test                                       | Duration | Result |
|--|----------|--------|
| testGetTopic                               | 0s       | passed |
| testHandleMessage_ExceptionHandling        | 0.010s   | passed |
| testHandleMessage_InvalidTopic             | 0s       | passed |
| testHandleMessage_InvalidTopic_ShortLength | 0.001s   | passed |
| testHandleMessage_InvalidTopic_WrongPrefix | 0.001s   | passed |
| testHandleMessage_UnknownAction            | 0s       | passed |
| testHandleMessage_UnknownPlug              | 0s       | passed |
| testHandleMessage_ValidActions             | 0.001s   | passed |

Wrap lines

Generated by Gradle 6.9.3 at Mar 16, 2025, 12:20:41 AM

Project Instructions

Test results - Class ece448...

ece448.iot\_sim

File

/Users/sammanchouhan/Desktop/iot\_ece448/build/reports/tests/test/classes/ece448.iot\_sim.MqttUpdatesTest.html

Verify it's you

Class ece448.iot\_sim.MqttUpdatesTest

all > ece448.iot\_sim > MqttUpdatesTest

7

tests

0

failures

0

ignored

0.047s

duration

100%

successful

Tests

| Test                                | Duration | Result |
|-------------------------------------|----------|--------|
| testGetMessage                      | 0s       | passed |
| testGetMessageWithEmptyString       | 0s       | passed |
| testGetMessageWithLargePayload      | 0.047s   | passed |
| testGetMessageWithSpecialCharacters | 0s       | passed |
| testGetTopic                        | 0s       | passed |
| testGetTopicWithEmptyStrings        | 0s       | passed |
| testGetTopicWithSpecialCharacters   | 0s       | passed |

Generated by Gradle 6.9.3 at Mar 16, 2025, 12:20:41 AM

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OUTPUT    DEBUG CONSOLE    TERMINAL    TEST RESULTS    PORTS    COMMENTS
> Task :grade_p3
2025-03-16 21:08:10,814 INFO MqttCtl grader/iot_sim: tcp://127.0.0.1 connected
2025-03-16 21:08:10,892 INFO JHTTP: accepting connections on port 8080
2025-03-16 21:08:11,224 INFO MQTT subscribe to 1742177290263/grade_p3/iot_ece448/action/#
2025-03-16 21:08:11,226 INFO MQTT connected to broker: tcp://127.0.0.1
***** testCase00 of GradeP3: pass
2025-03-16 21:08:11,230 INFO testCase00 of GradeP3: success
*****
2025-03-16 21:08:11,231 INFO MqttCmd 1742177290263/grade_p3/iot_ece448/action/xx/on:
***** testCase01 of GradeP3: pass
2025-03-16 21:08:12,237 INFO testCase01 of GradeP3: success
*****
2025-03-16 21:08:12,238 INFO MqttCmd 1742177290263/grade_p3/iot_ece448/action/xx/off:
***** testCase02 of GradeP3: pass
2025-03-16 21:08:13,241 INFO testCase02 of GradeP3: success
*****
2025-03-16 21:08:13,243 INFO MqttCmd 1742177290263/grade_p3/iot_ece448/action/xx/toggle:
***** testCase03 of GradeP3: pass
2025-03-16 21:08:14,244 INFO testCase03 of GradeP3: success
*****
2025-03-16 21:08:15,746 INFO MqttCmd 1742177290263/grade_p3/iot_ece448/action/zz.666/on:
***** testCase04 of GradeP3: pass
2025-03-16 21:08:17,246 INFO testCase04 of GradeP3: success
*****
***** testCase05 of GradeP3: pass
2025-03-16 21:08:17,247 INFO testCase05 of GradeP3: success
*****
2025-03-16 21:08:17,413 INFO JHTTP: /127.0.0.1:59599 GET /yy?action=on HTTP/1.1
2025-03-16 21:08:17,414 INFO HTTPCmd /yy: {action=on}
***** testCase06 of GradeP3: pass
2025-03-16 21:08:18,428 INFO testCase06 of GradeP3: success
*****
2025-03-16 21:08:18,432 INFO JHTTP: /127.0.0.1:59600 GET /yy?action=off HTTP/1.1
2025-03-16 21:08:18,433 INFO HTTPCmd /yy: {action=off}
***** testCase07 of GradeP3: pass
2025-03-16 21:08:19,438 INFO testCase07 of GradeP3: success
*****
2025-03-16 21:08:19,470 INFO MqttCmd 1742177290263/grade_p3/iot_ece448/action/zz.666/toggle:
2025-03-16 21:08:19,482 INFO JHTTP: /127.0.0.1:59602 GET /zz.666 HTTP/1.1
2025-03-16 21:08:19,482 INFO HTTPCmd /zz.666: {}
***** testCase08 of GradeP3: pass
2025-03-16 21:08:20,489 INFO testCase08 of GradeP3: success
*****
2025-03-16 21:08:20,491 INFO MqttCmd 1742177290263/grade_p3/iot_ece448/action/zz.666/toggle:
2025-03-16 21:08:20,492 INFO JHTTP: /127.0.0.1:59603 GET /zz.666 HTTP/1.1
2025-03-16 21:08:20,493 INFO HTTPCmd /zz.666: {}
***** testCase09 of GradeP3: pass
2025-03-16 21:08:21,498 INFO testCase09 of GradeP3: success
*****

Local Grading Test Result: 10/10 cases passed
*****
* Make sure you "git add ." and "git commit -am "your comments" and "git push" *
* to fully upload all of your codes to the Endeavour Git Repo. *
* Otherwise, your grading result may differ from your local result vs. server *
*****

```