Graph Processing Project

Overview

This project implements a directed graph using JGraphT and Graphviz. It supports:

- Parsing a DOT file to create a graph.
- Adding nodes and edges dynamically.
- Outputting the graph to a DOT file and a PNG image.
- Unit tests for all features.

Installation & Dependencies

Required Libraries:

- JGraphT
- Graphviz-Java
- JUnit 5
- Apache Maven

Ensure you have **Maven** installed. If not, install it using:

```
sudo apt install maven  # Linux
brew install maven      # macOS
choco install maven     # Windows
```

Running the Program

1. Compile the Project

```
mvn clean package
```

2. Run the Program

```
mvn exec:java -Dexec.mainClass="com.graph.GraphHandler" -Dexec.args='
```

This will:

- Parse `test.dot`
- Generate `output.dot`
- Generate `graph.png`

Running Unit Tests

To run unit tests:

```
mvn test
```

Ensure all tests **pass successfully**.

Example Input (`test.dot`)

```
digraph G {
    A -> B;
    B -> C;
    C -> A;
}
```

Expected Output (`expected.txt`)

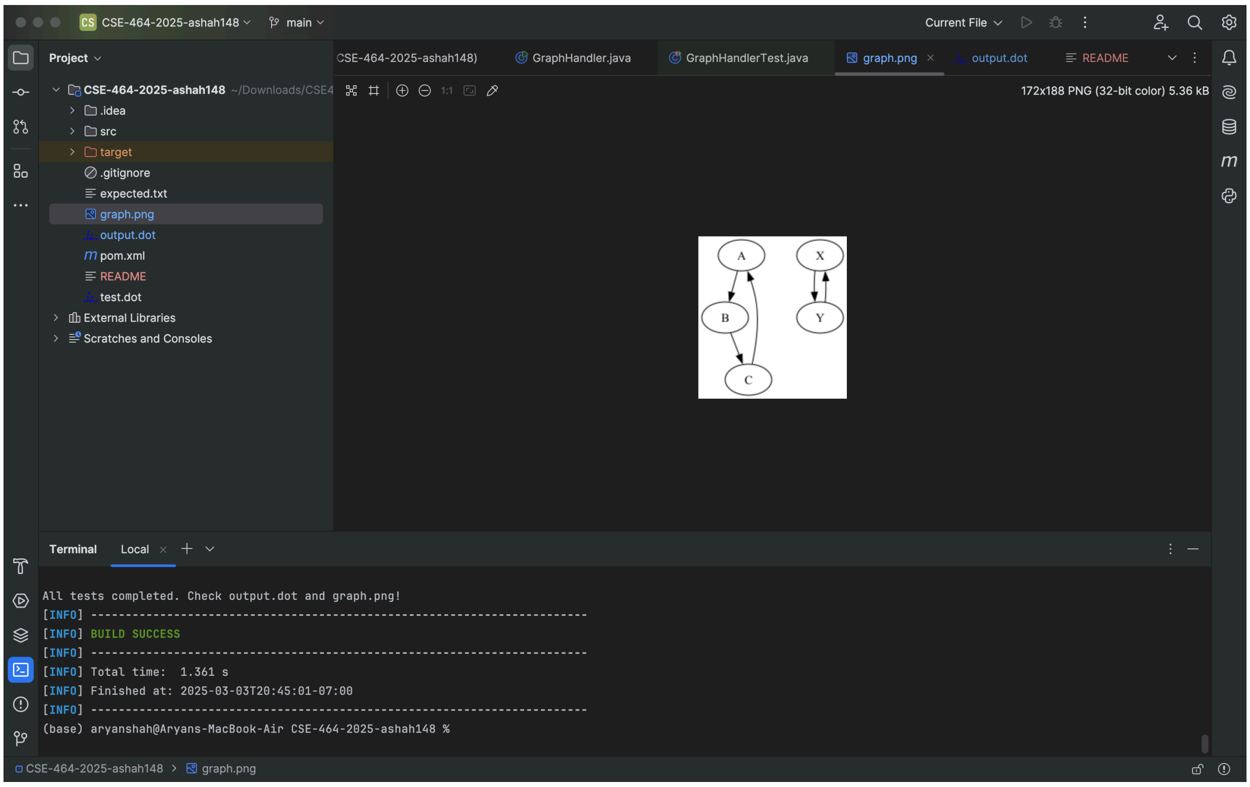
```
digraph G {
    A;
    B;
    C;
    A -> B;
    B -> C;
    C -> A;
}
```

Generated Output Files

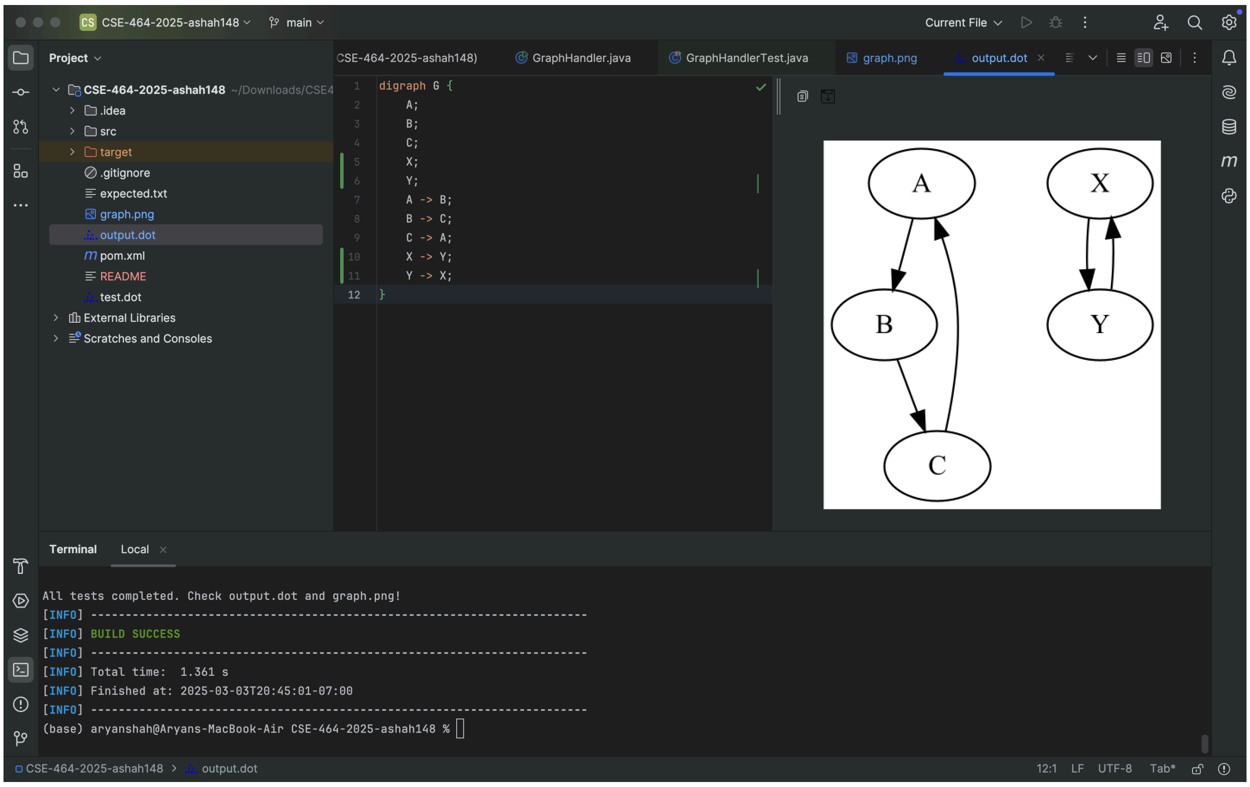
- `output.dot` (Graph representation in DOT format)
- `graph.png` (Graph visualization as an image)

Screenshots:

- **Graph and output**



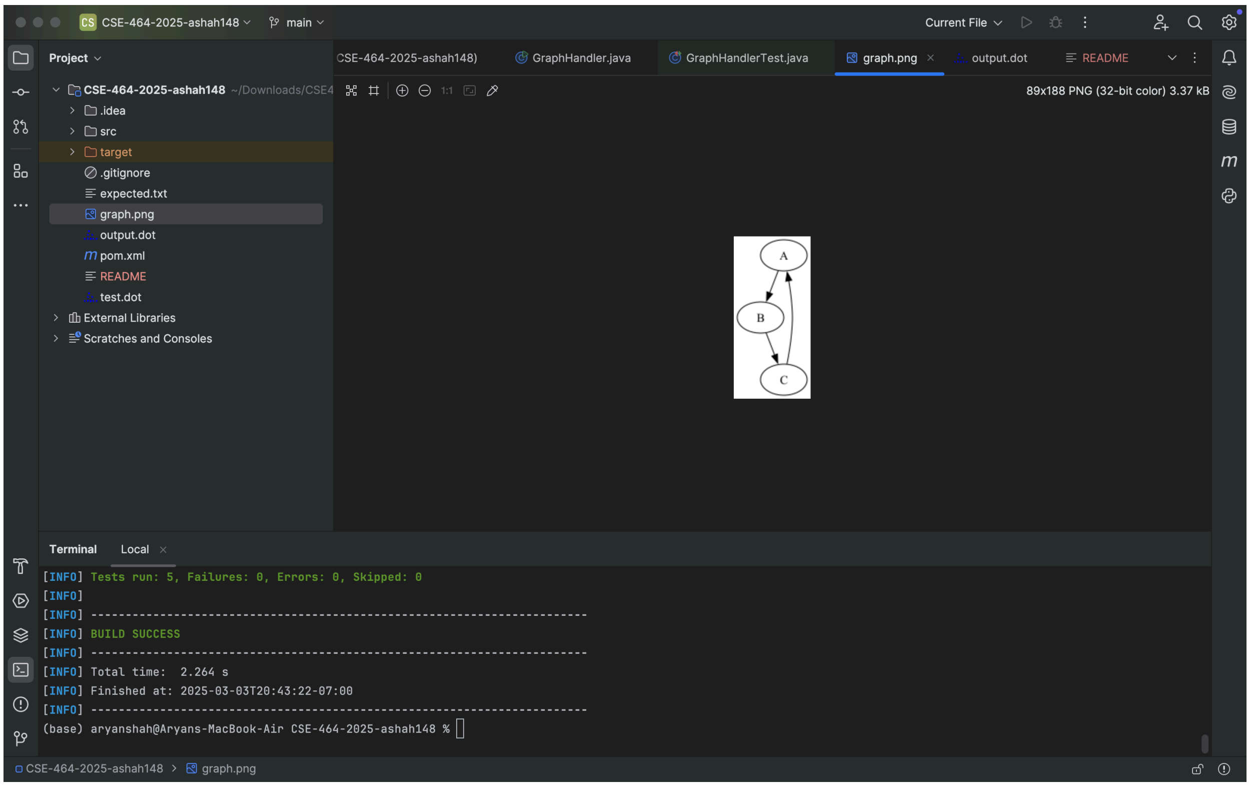
```
All tests completed. Check output.dot and graph.png!
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  1.361 s
[INFO] Finished at: 2025-03-03T20:45:01-07:00
[INFO] ------------------------------------------------------------------------
(base) aryanshah@Aryans-MacBook-Air CSE-464-2025-ashah148 %
```



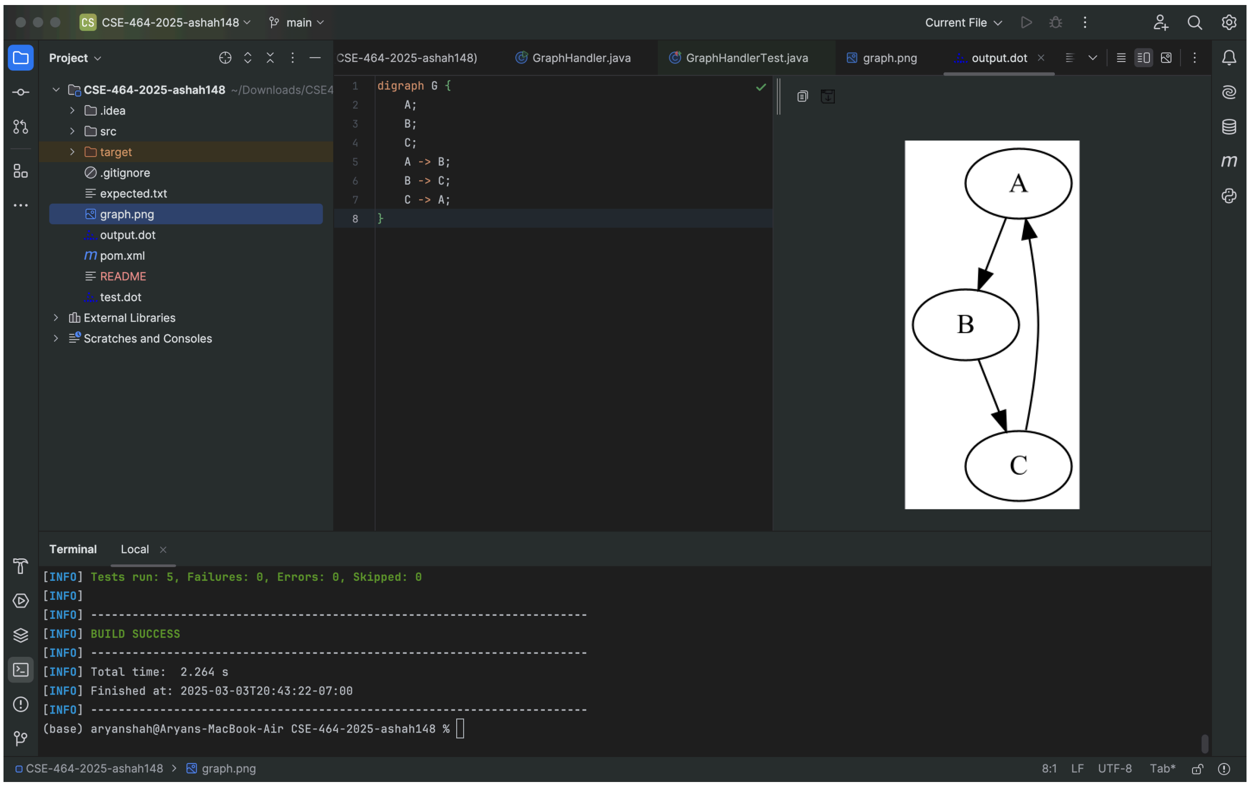
```
digraph G {
    A;
    B;
    C;
    X;
    Y;
    A -> B;
    B -> C;
    C -> A;
    X -> Y;
    Y -> X;
}
```

```
All tests completed. Check output.dot and graph.png!
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  1.361 s
[INFO] Finished at: 2025-03-03T20:45:01-07:00
[INFO] ------------------------------------------------------------------------
(base) aryanshah@Aryans-MacBook-Air CSE-464-2025-ashah148 %
```

- **Graph and output from unit tests**



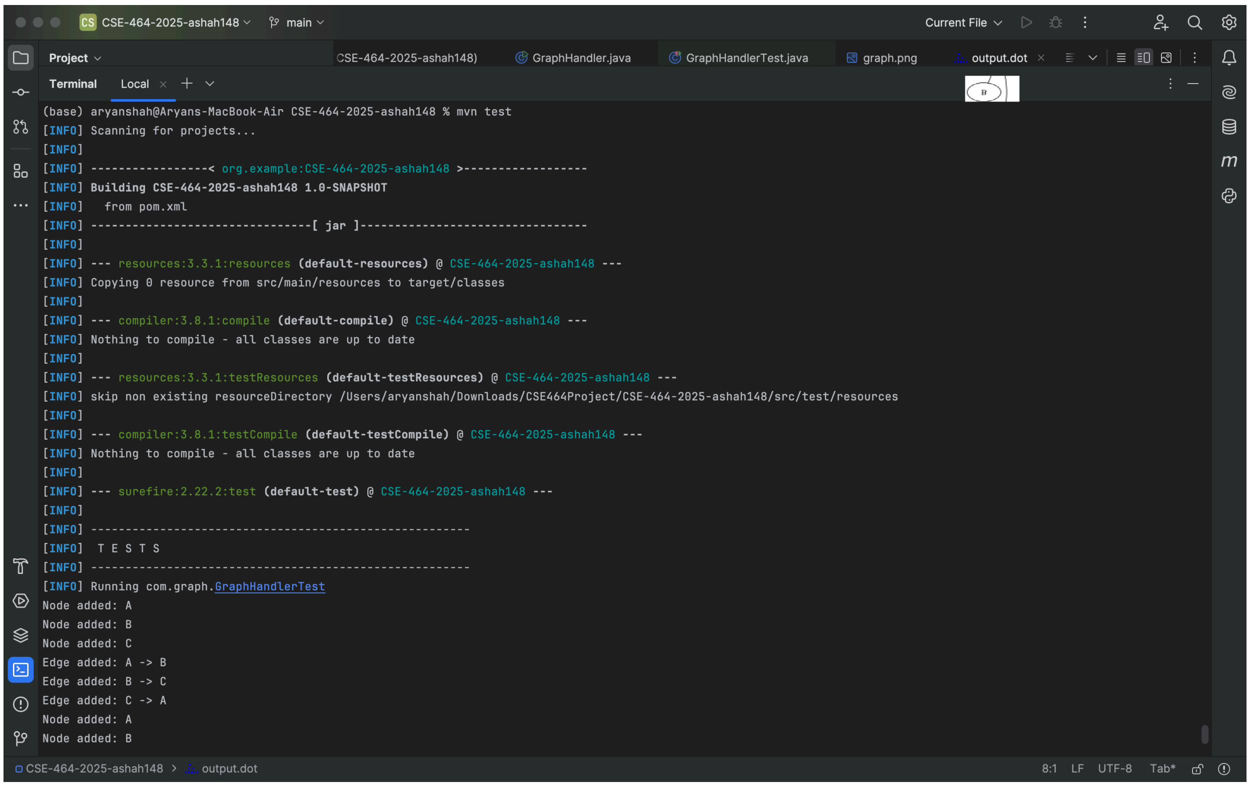
```
[INFO] Tests run: 5, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  2.264 s
[INFO] Finished at: 2025-03-03T20:43:22-07:00
[INFO] ------------------------------------------------------------------------
(base) aryanshah@Aryans-MacBook-Air CSE-464-2025-ashah148 %
```



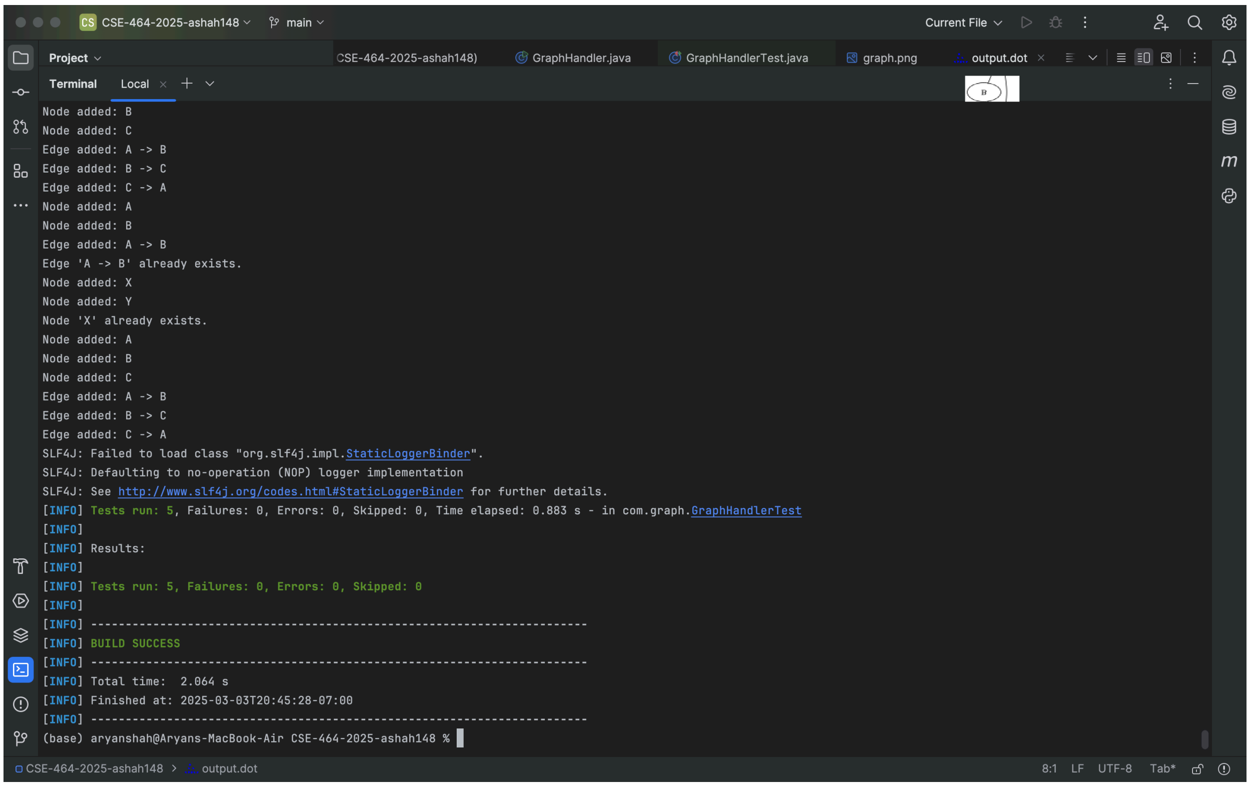
```
digraph G {
    A;
    B;
    C;
    A -> B;
    B -> C;
    C -> A;
}
```

```
[INFO] Tests run: 5, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  2.264 s
[INFO] Finished at: 2025-03-03T20:43:22-07:00
[INFO] ------------------------------------------------------------------------
(base) aryanshah@Aryans-MacBook-Air CSE-464-2025-ashah148 %
```

- Successfully passing the test cases



```
(base) aryanshah@Aryans-MacBook-Air CSE-464-2025-ashah148 % mvn test
[INFO] Scanning for projects...
[INFO]
[INFO] ----------------< org.example:CSE-464-2025-ashah148 >-----------------
[INFO] Building CSE-464-2025-ashah148 1.0-SNAPSHOT
[INFO]   from pom.xml
[INFO] --------------------------------[ jar ]---------------------------------
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ CSE-464-2025-ashah148 ---
[INFO] Copying 0 resource from src/main/resources to target/classes
[INFO]
[INFO] --- compiler:3.8.1:compile (default-compile) @ CSE-464-2025-ashah148 ---
[INFO] Nothing to compile - all classes are up to date
[INFO]
[INFO] --- resources:3.3.1:testResources (default-testResources) @ CSE-464-2025-ashah148 ---
[INFO] skip non existing resourceDirectory /Users/aryanshah/Downloads/CSE464Project/CSE-464-2025-ashah148/src/test/resources
[INFO]
[INFO] --- compiler:3.8.1:testCompile (default-testCompile) @ CSE-464-2025-ashah148 ---
[INFO] Nothing to compile - all classes are up to date
[INFO]
[INFO] --- surefire:2.22.2:test (default-test) @ CSE-464-2025-ashah148 ---
[INFO]
[INFO] -------------------------------------------------------
[INFO]  T E S T S
[INFO] -------------------------------------------------------
[INFO] Running com.graph.GraphHandlerTest
Node added: A
Node added: B
Node added: C
Edge added: A -> B
Edge added: B -> C
Edge added: C -> A
Node added: A
Node added: B
```



```
Node added: B
Node added: C
Edge added: A -> B
Edge added: B -> C
Edge added: C -> A
Node added: A
Node added: B
Edge added: A -> B
Edge 'A -> B' already exists.
Node added: X
Node added: Y
Node 'X' already exists.
Node added: A
Node added: B
Node added: C
Edge added: A -> B
Edge added: B -> C
Edge added: C -> A
SLF4J: Failed to load class "org.slf4j.impl.StaticLoggerBinder".
SLF4J: Defaulting to no-operation (NOP) logger implementation
SLF4J: See http://www.slf4j.org/codes.html#StaticLoggerBinder for further details.
[INFO] Tests run: 5, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.883 s - in com.graph.GraphHandlerTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 5, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  2.064 s
[INFO] Finished at: 2025-03-03T20:45:28-07:00
[INFO] ------------------------------------------------------------------------
(base) aryanshah@Aryans-MacBook-Air CSE-464-2025-ashah148 %
```

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