

소프트웨어 테스트

실습 #2: Clover

CSE4061

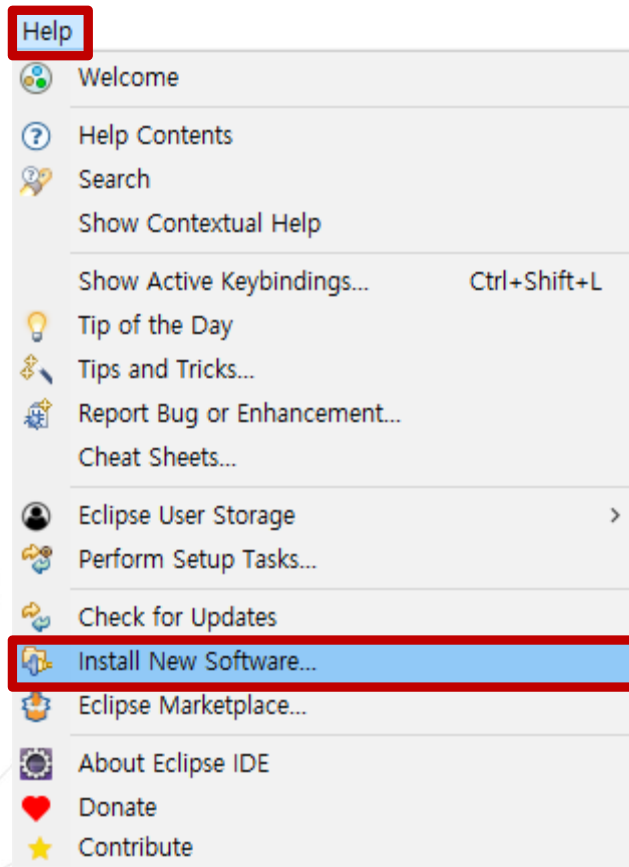
2023

설계 목표

- Clover 설치
- Clover 실행
- 설계 문제
 - Clover와 Junit을 이용한 커버리지 측정

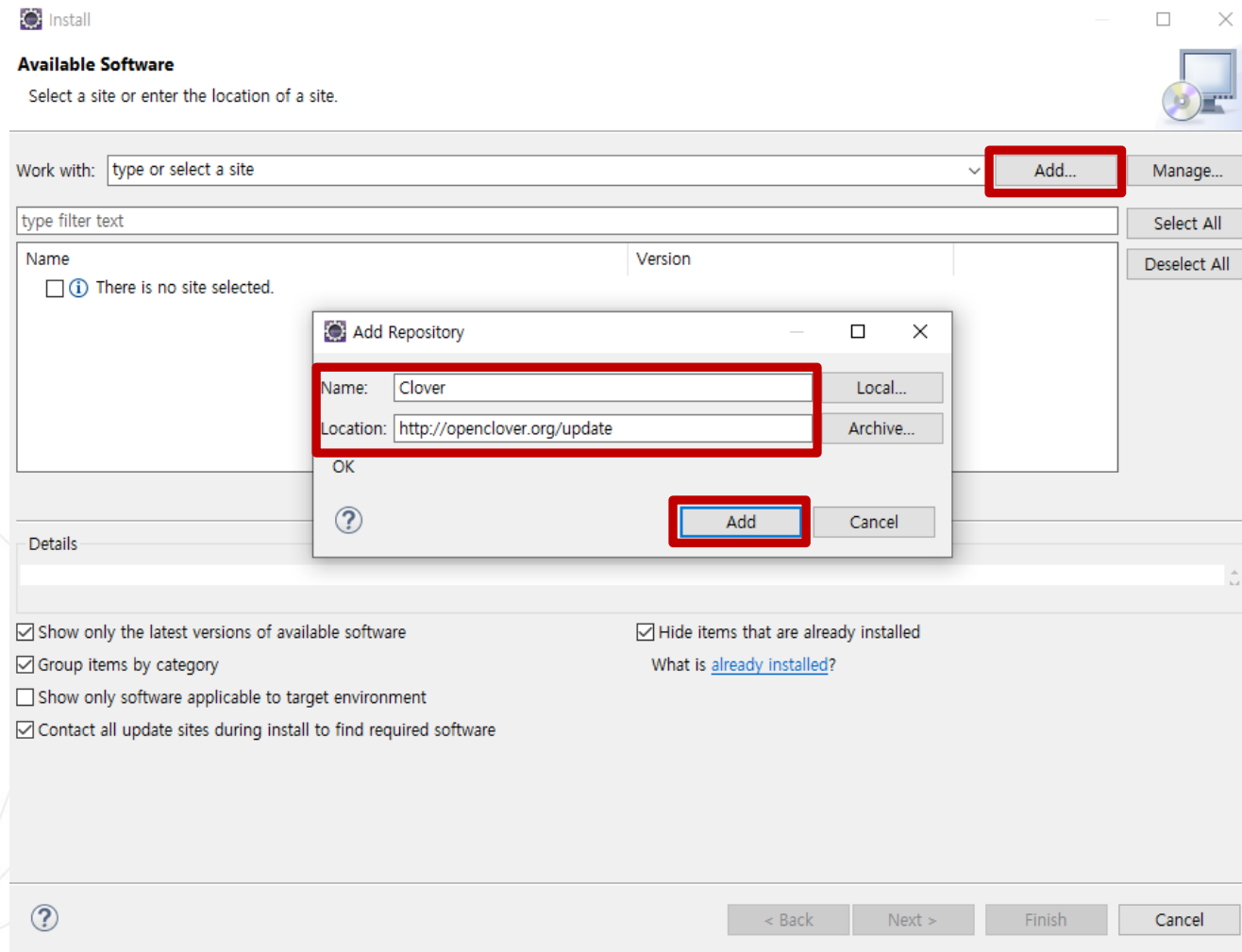


- Eclipse 실행 - Help – Install New Software

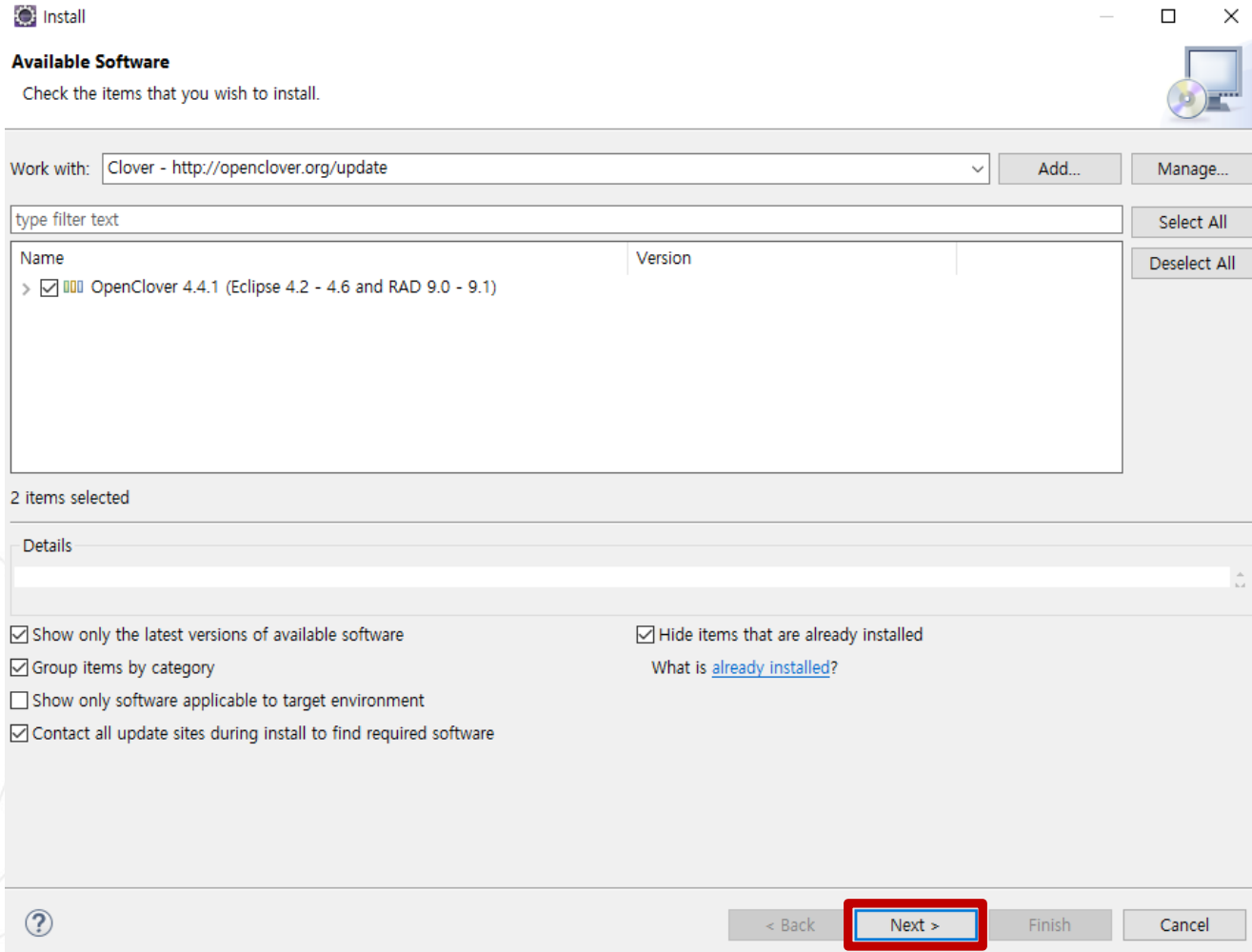


Clover 설치

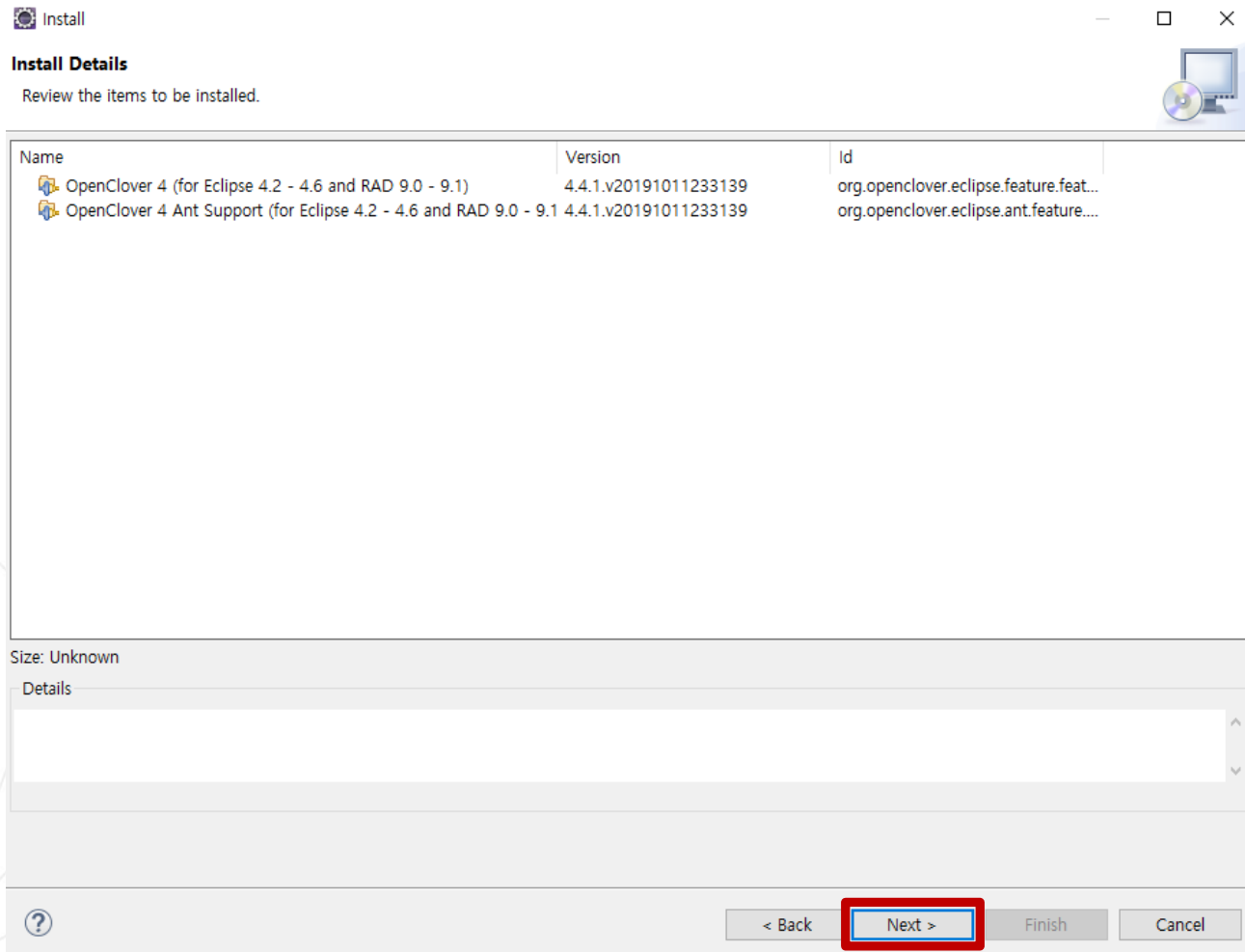
- Add – Location : <http://openclover.org/update>



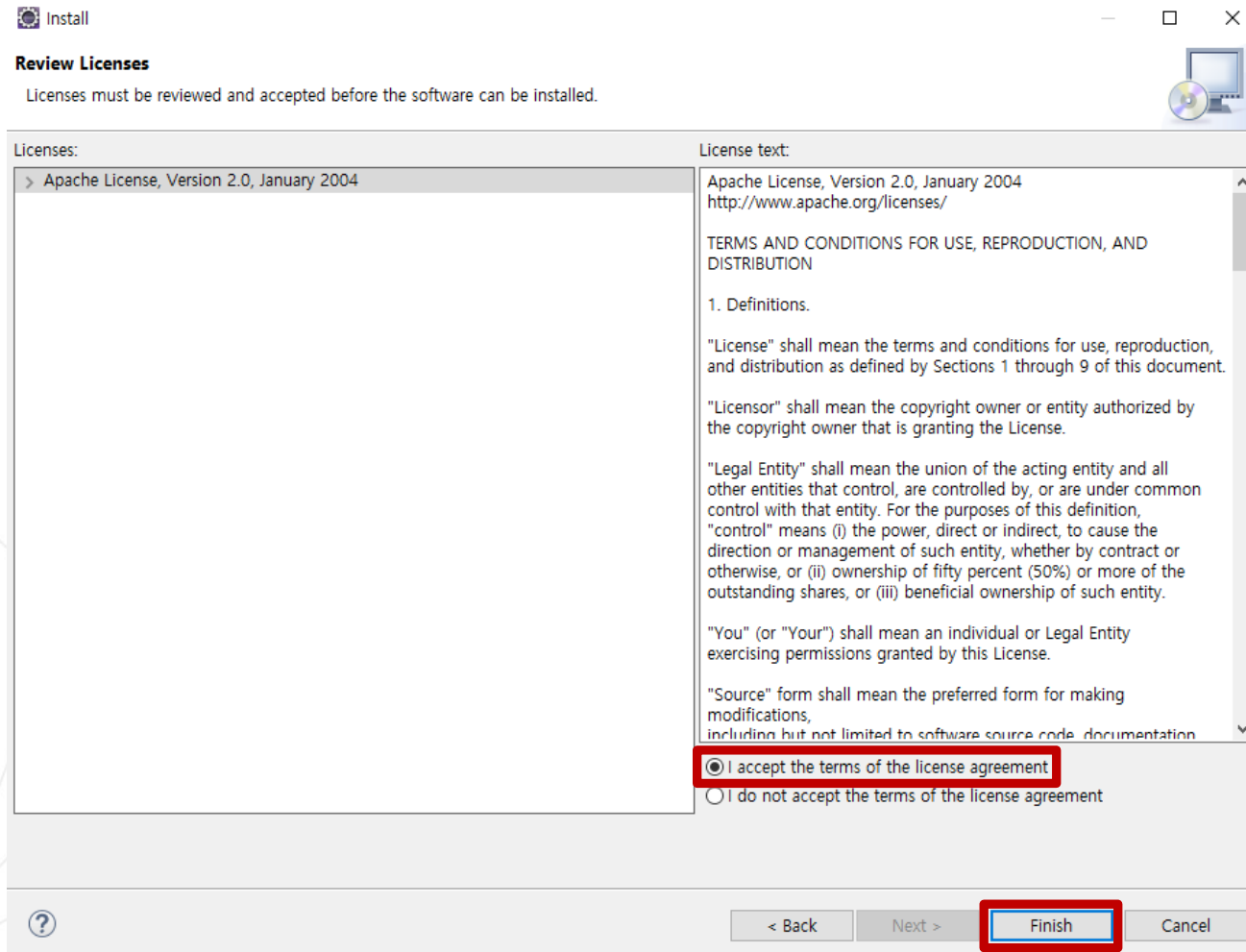
● Next Click



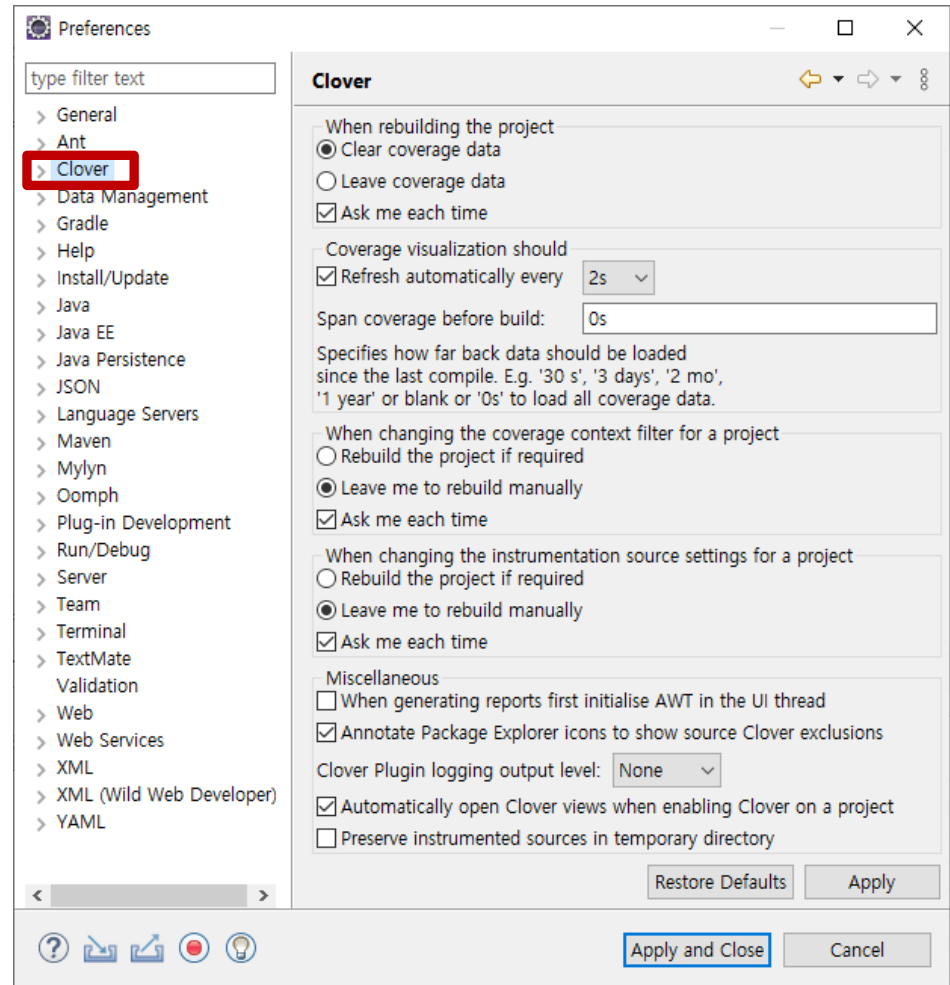
● Next Click



- I accept license agreement - Finish



- windows – preferences
- Clover 설치 확인



Project 생성

- File – New – Java Project - Next

New Java Project

Create a Java Project

Create a Java project in the workspace or in an external location.

Project name: Lab 2

☒ Use default location

Location: C:\Users\SW_lab\workspace\Lab 2 [Browse...](#)

JRE

☒ Use an execution environment JRE: JavaSE-1.8 [Configure JREs...](#)

☐ Use a project specific JRE: jre

☐ Use default JRE 'jre' and workspace compiler preferences

Project layout

☐ Use project folder as root for sources and class files

☒ Create separate folders for sources and class files [Configure default...](#)

Working sets

☐ Add project to working sets [New...](#)

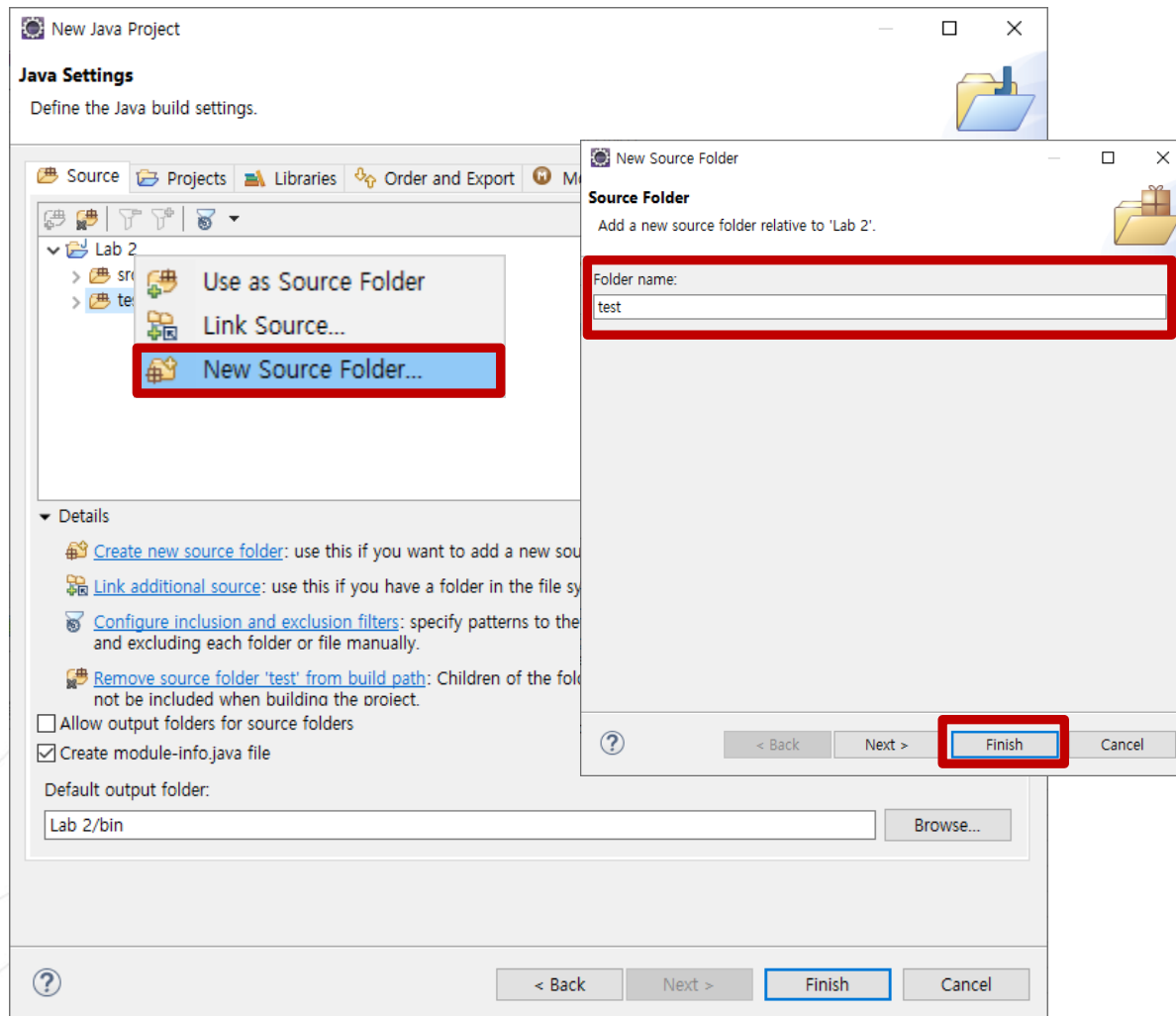
Working sets: [Select...](#)

i The default compiler compliance level for the current workspace is 14. The new project will use a project specific compiler compliance level of 1.8.

[?](#) < Back Next > Finish Cancel

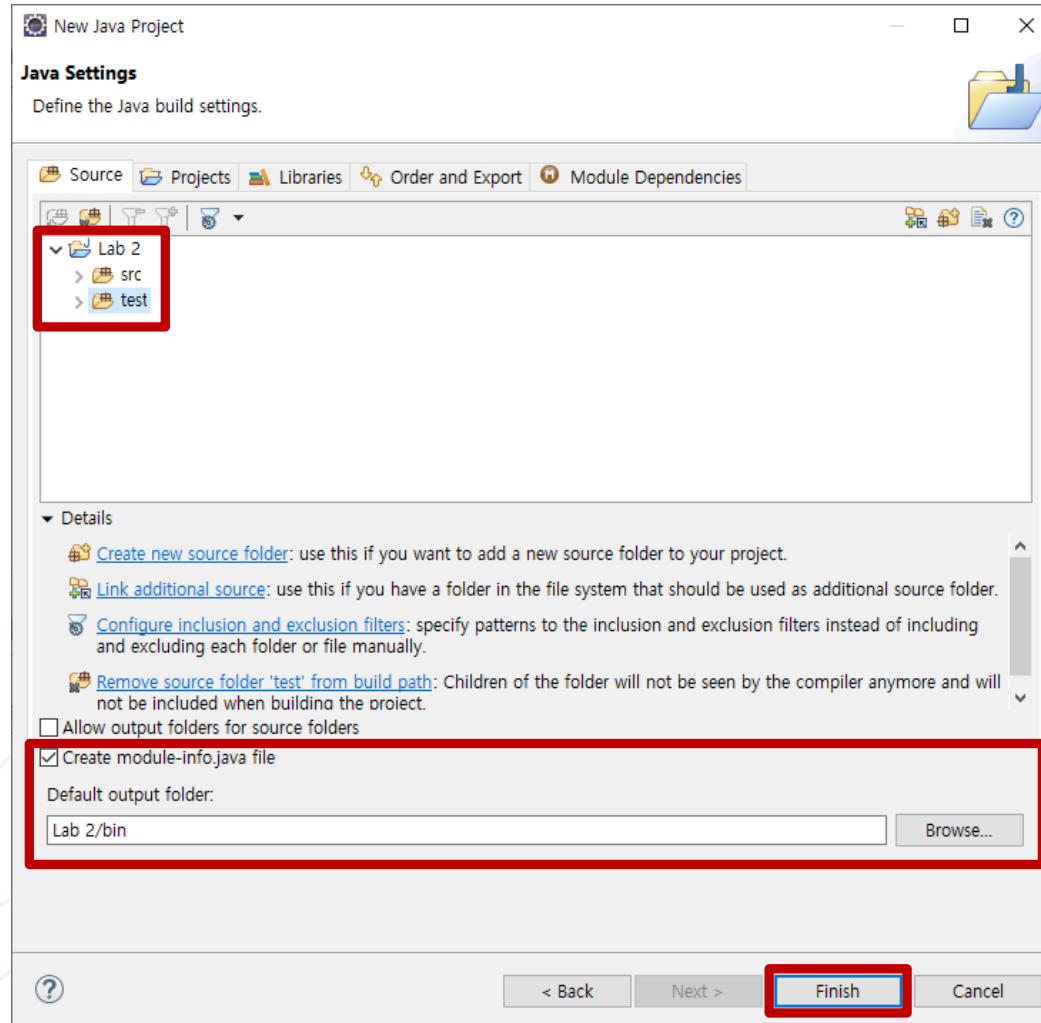
Project 생성

- Lab 2 마우스 오른쪽 클릭 – New Source Folder... Click



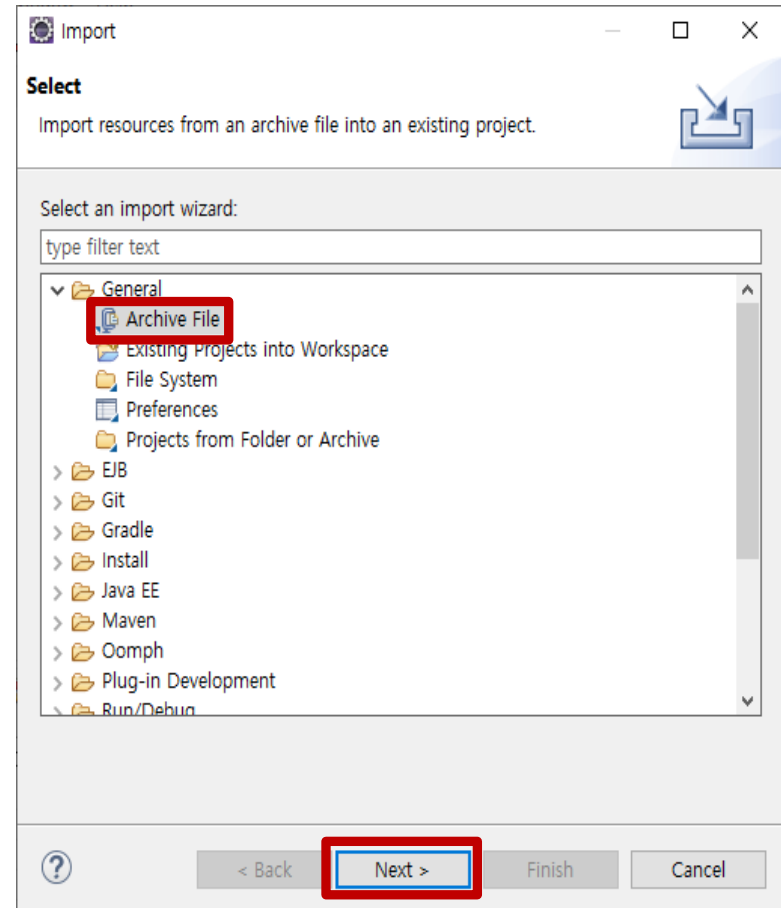
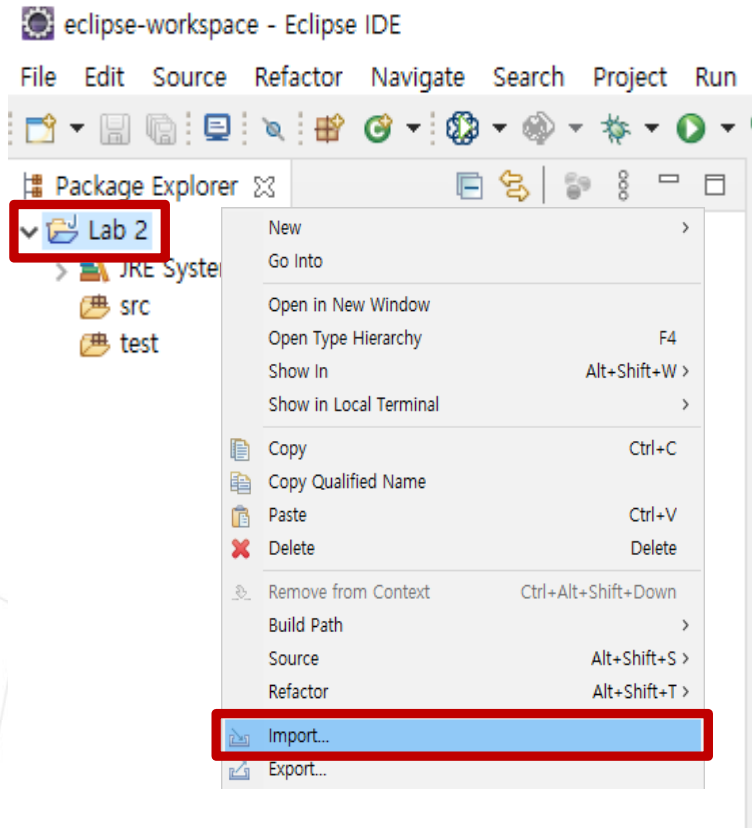
Project 생성

- Finish click



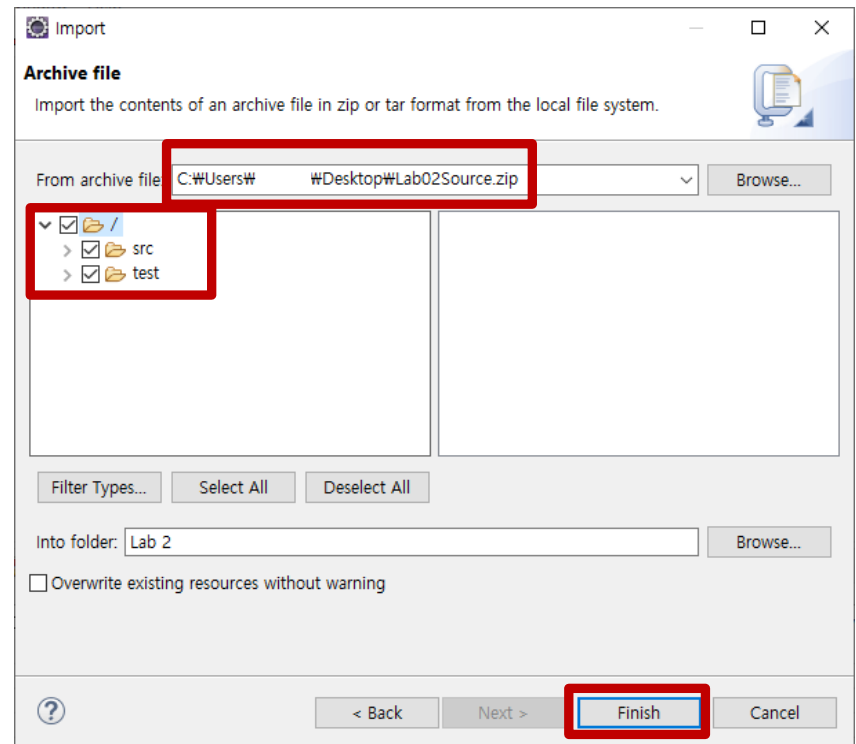
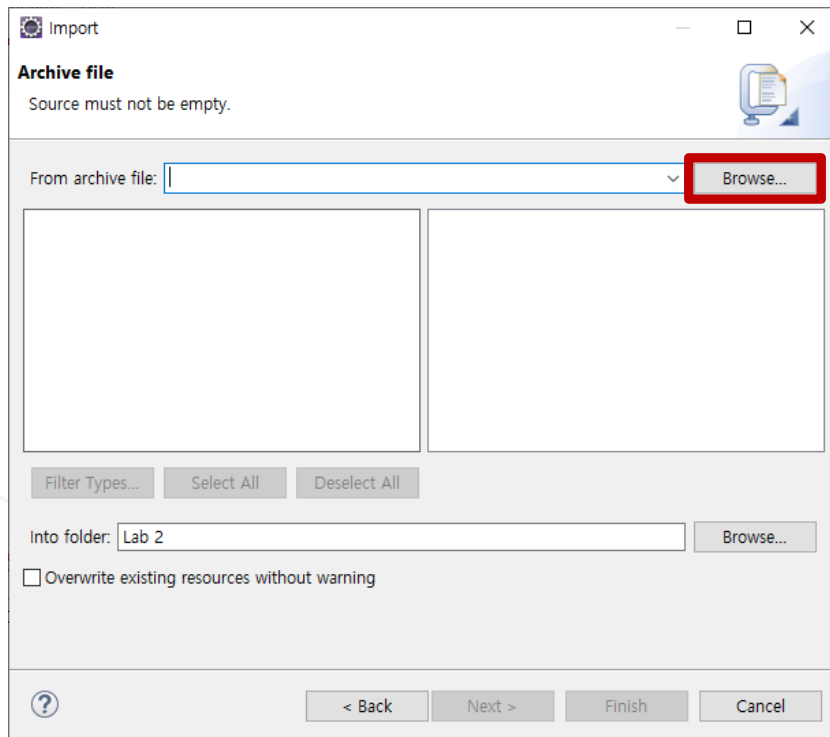
소스 코드 가져오기

- Lab 2 마우스 오른쪽 클릭 – Import – Archive File 선택 - Next



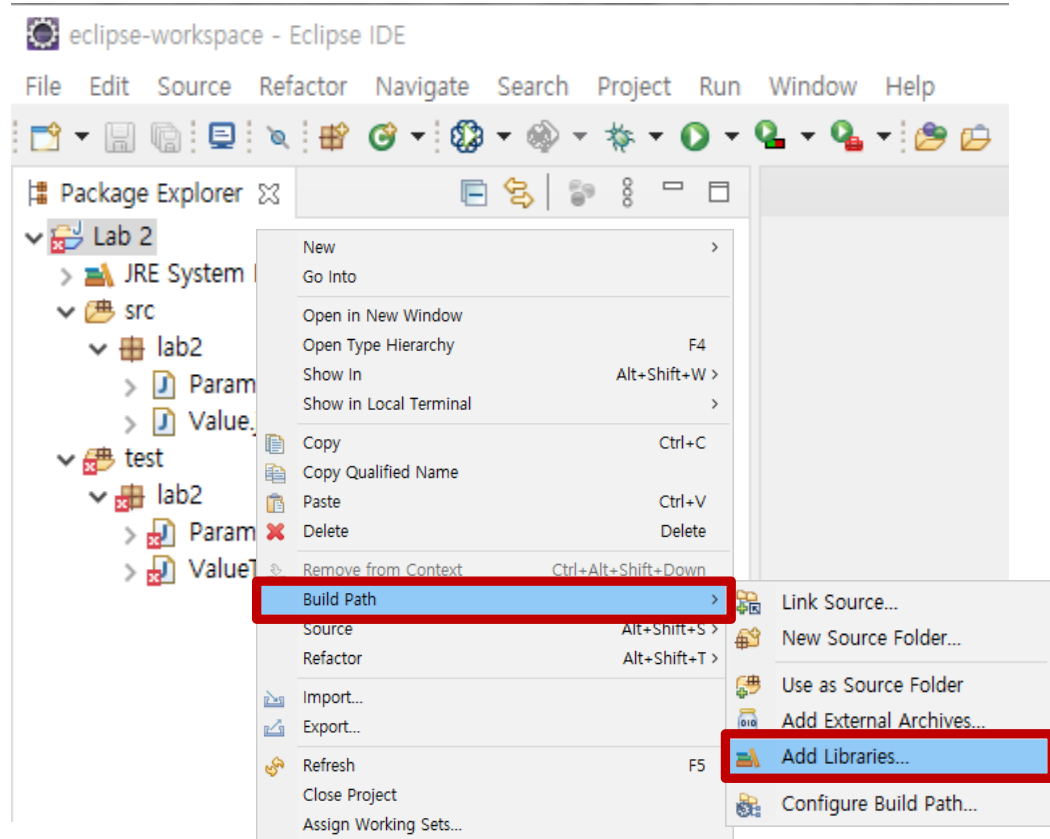
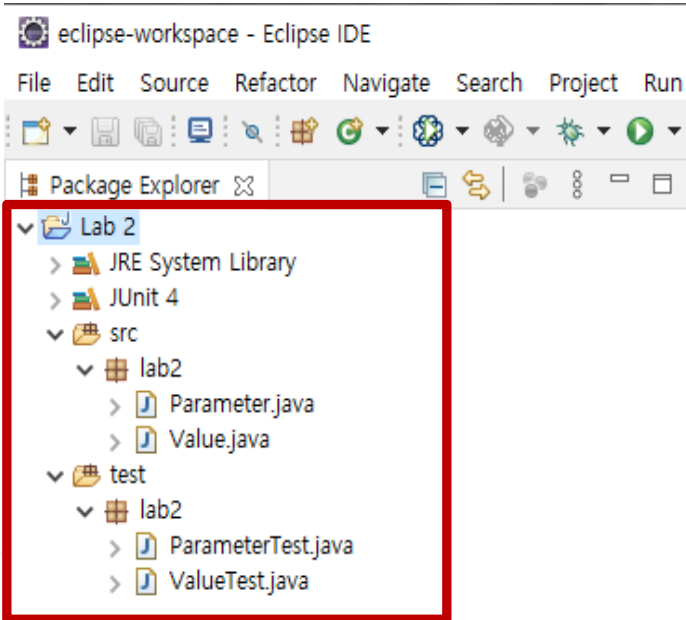
소스 코드 가져오기

- Browse – Lab02Source.zip 선택 (eclass에서 소스코드 내려받기)



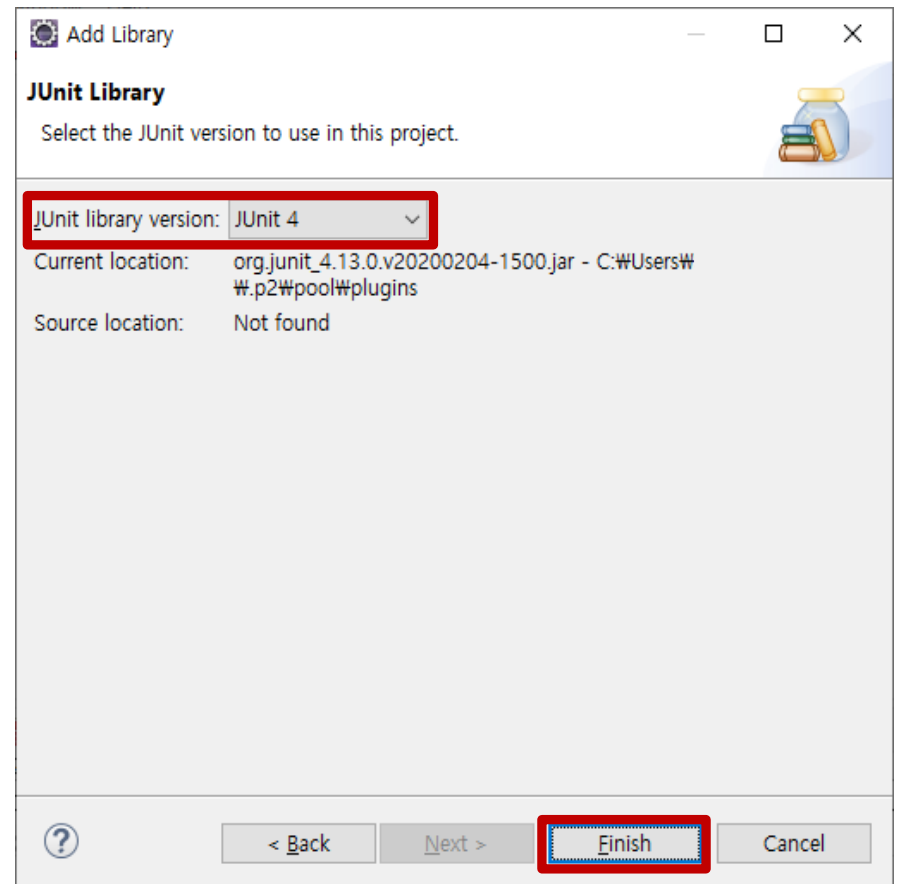
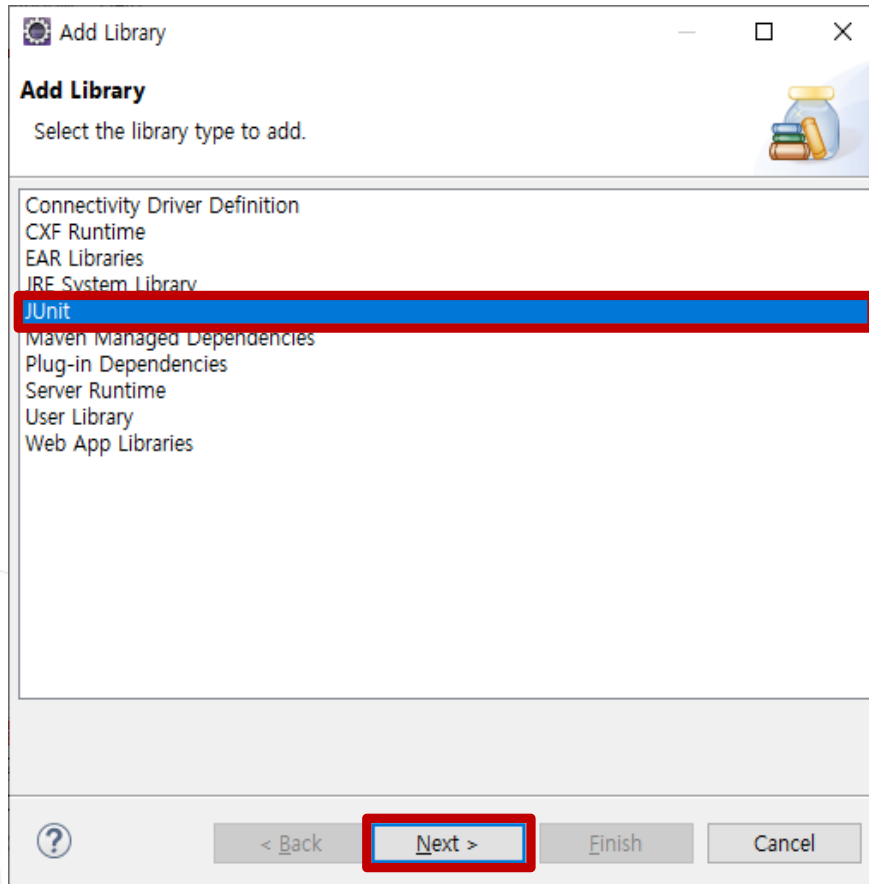
JUnit 4 라이브러리 추가

- 왼쪽 그림과 같이 생성되었는지 확인 – Lab 2 마우스 오른쪽 클릭 – BuildPath – Add Libraries



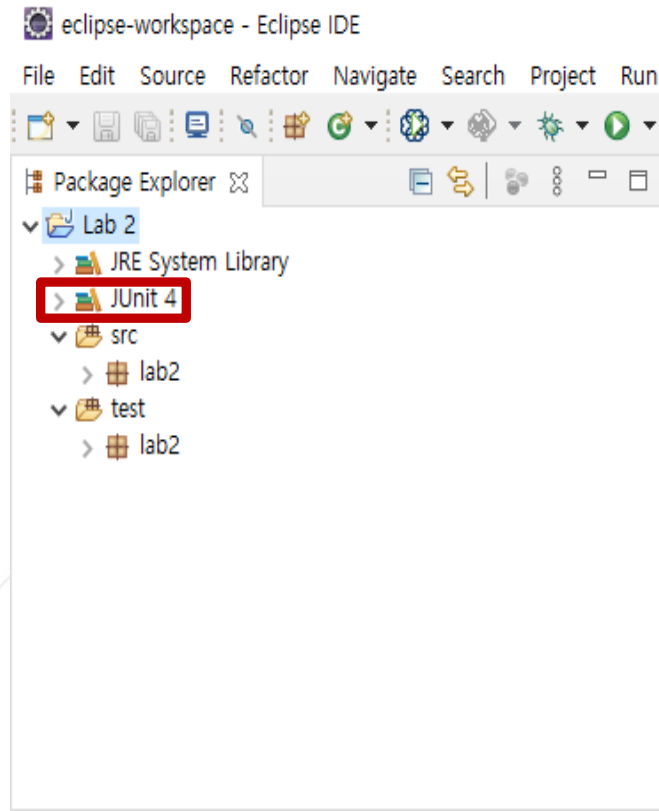
JUnit 4 라이브러리 추가

- JUnit 선택 – Next – JUnit 4 선택 - Finish

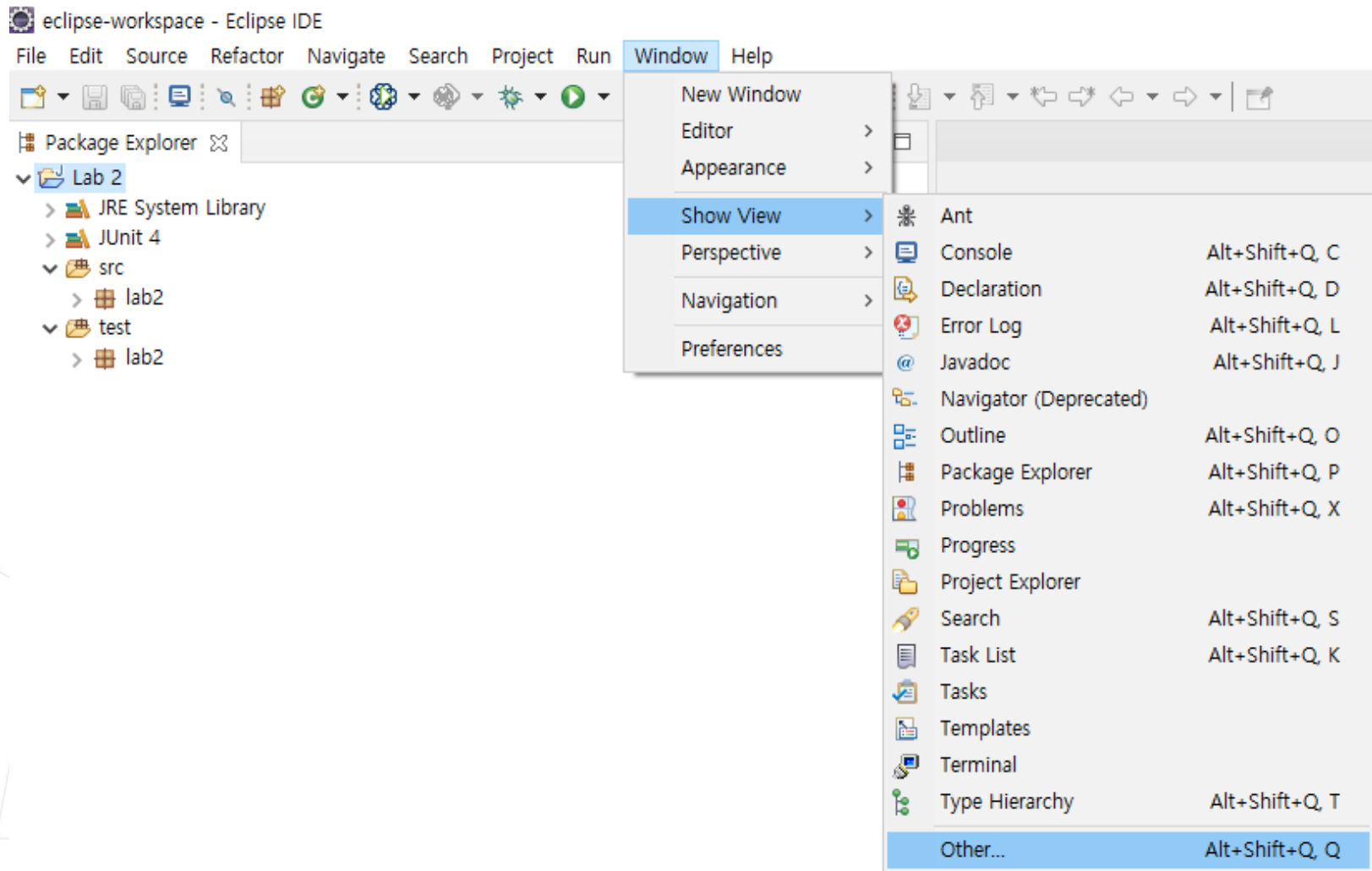


JUnit 4 라이브러리 추가

- JUnit 4 Library 생성 확인

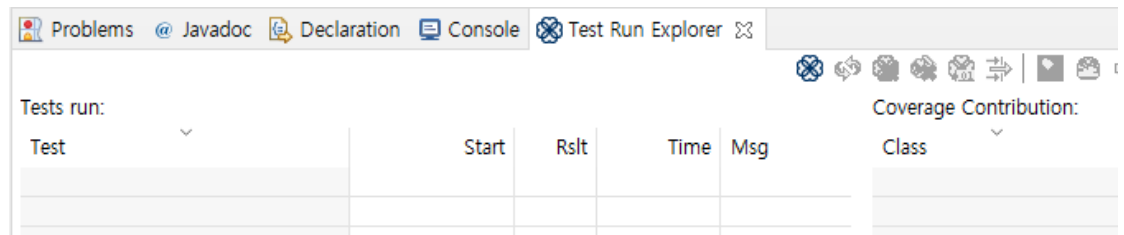
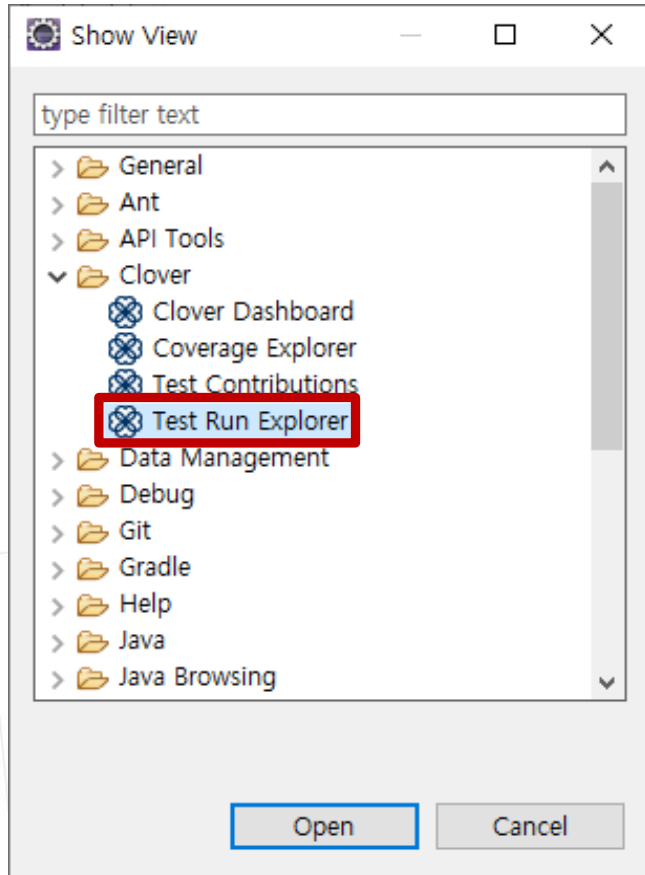


- Window – Show View – Other...



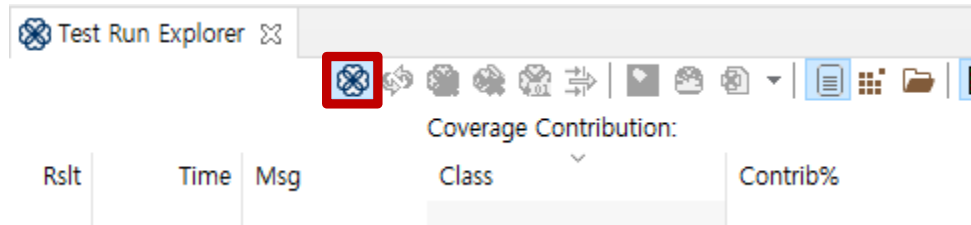
Clover 실행

- Test Run Explorer 선택
- 상태창에 Test Run Explorer 생성 확인

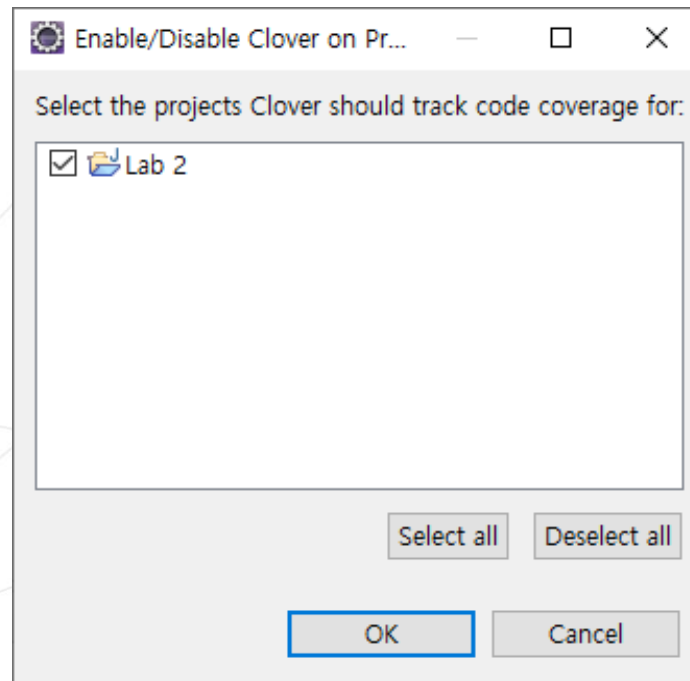


Clover 실행

- 아래 아이콘 클릭

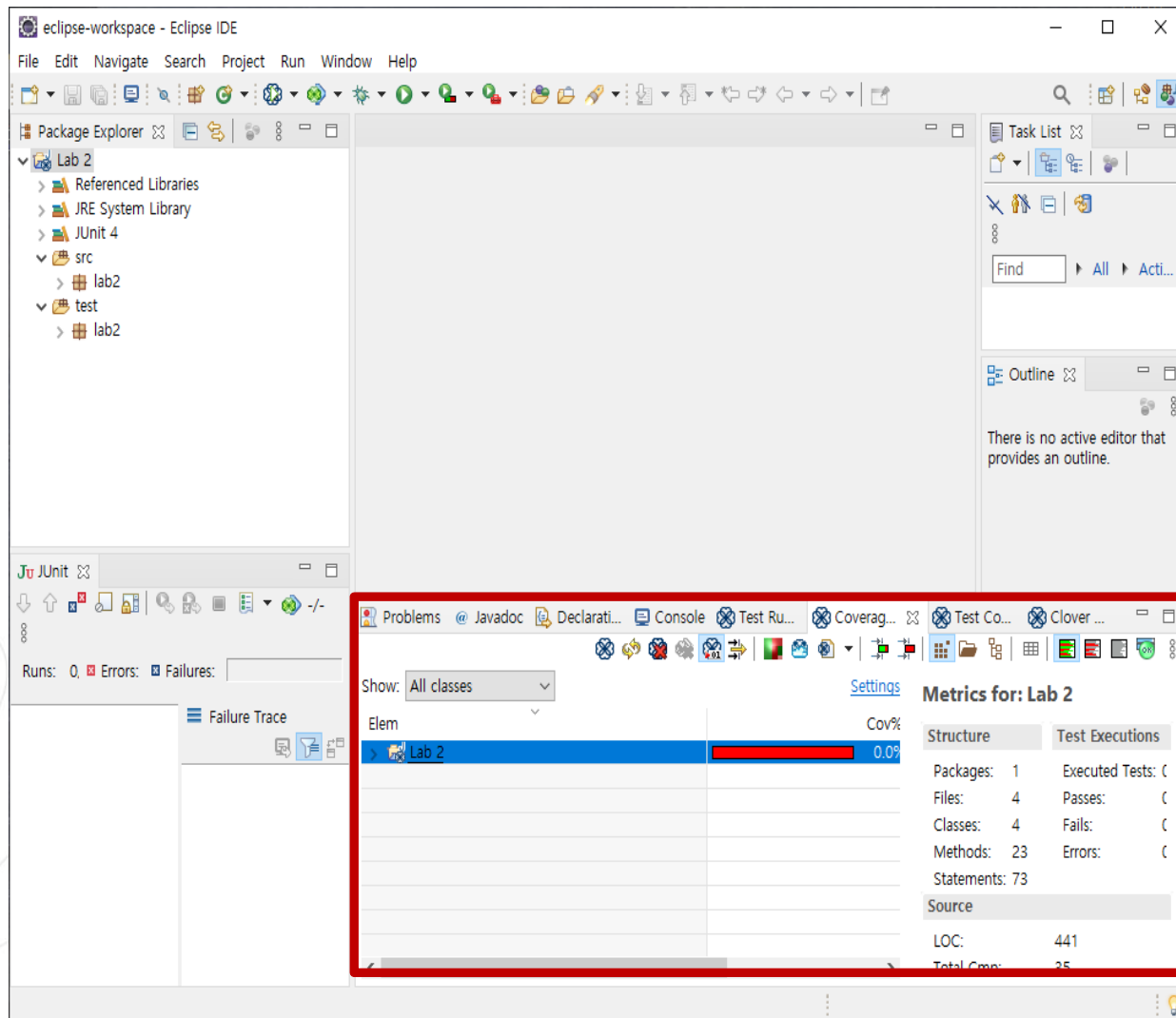


- Lab 2 체크



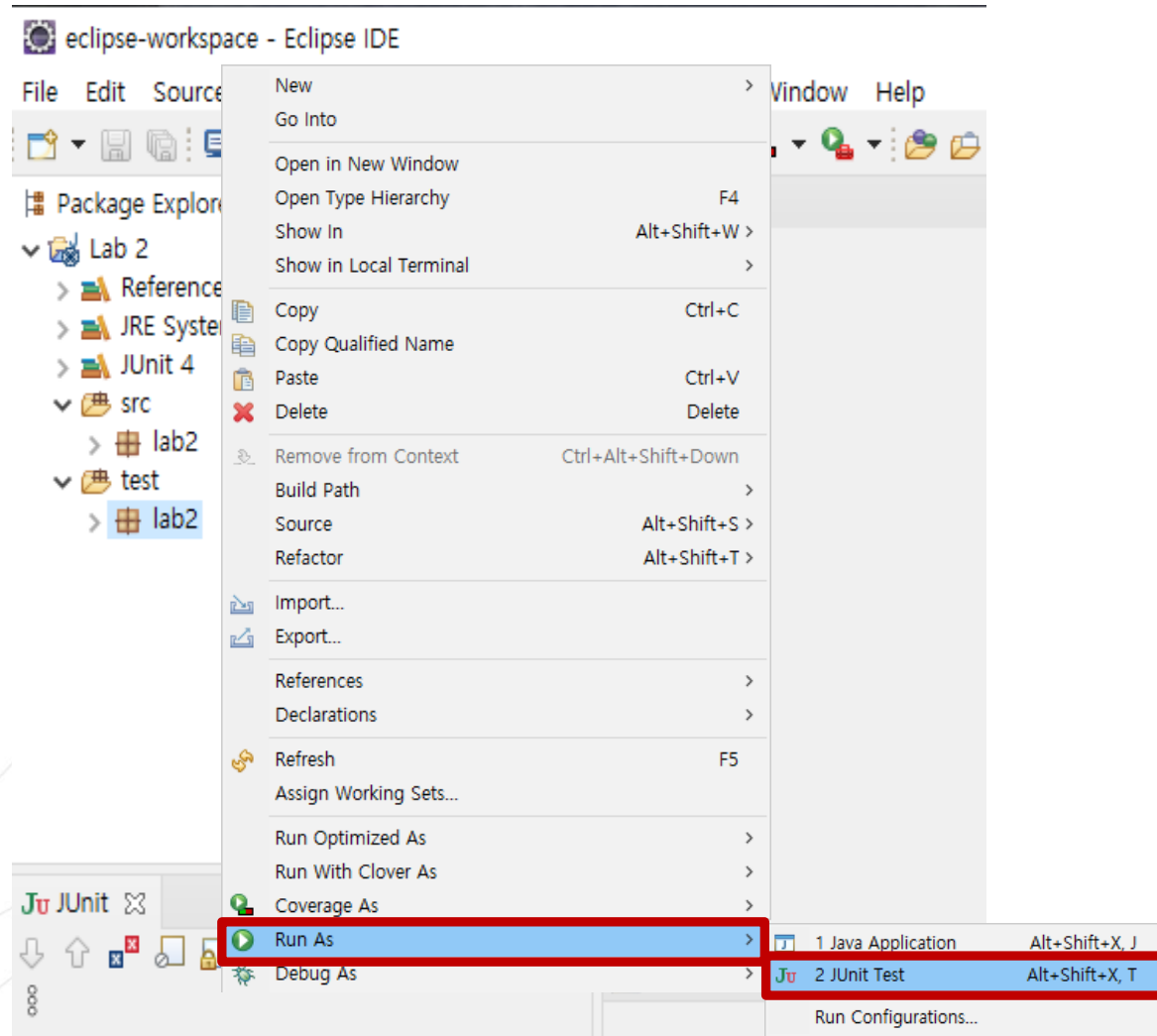
Clover 실행

- 그림과 같이 생성되었는지 확인



Clover 실행

- Lab 2/test/lab2 마우스 오른쪽 클릭 – Run As – Junit Test



Clover 실행

- 그림과 같이 생성되었는지 확인

The screenshot shows the Eclipse IDE interface with the Clover plugin. The Package Explorer on the left shows the test results for Lab 2, including tests for ParameterTest and ValueTest. The bottom right pane displays the 'Metrics for: Lab 2' table, which provides a detailed breakdown of code coverage and test execution statistics.

| Metrics for: Lab 2 | |
|--------------------|-------------------|
| Structure | Test Executions |
| Packages: 1 | Executed Tests: 4 |
| Files: 4 | Passes: 4 |
| Classes: 4 | Fails: 0 |
| Methods: 23 | Errors: 0 |
| Statements: 73 | |
| Source | |
| LOC: 441 | |
| Total Cmn: 35 | |

Clover 실행

- 추가 도구 상자 클릭 – Edit Clover Working Set...

The screenshot shows the Clover IDE interface. The top toolbar contains several icons, with the 'Edit Clover Working Set...' icon (a red square with a white 'X') highlighted by a red box. A context menu is open, displaying various options. The 'Edit Clover Working Set...' option is highlighted by a red box. The background shows a table of metrics for 'Lab 2' and a 'Source' section.

Settings

| Av Me Cpx | Cpx |
|-----------|------|
| 1.5 | 35.0 |
| 1.5 | 35.0 |
| 1.8 | 22.0 |
| 1.0 | 2.0 |
| 1.3 | 9.0 |
| 1.0 | 2.0 |

Metrics for: Lab 2

| Structure | Test Execution |
|----------------|-------------------|
| Packages: 1 | Executed Tests: 1 |
| Files: 4 | Passes: 1 |
| Classes: 4 | Fails: 0 |
| Methods: 23 | Errors: 0 |
| Statements: 73 | |

Source

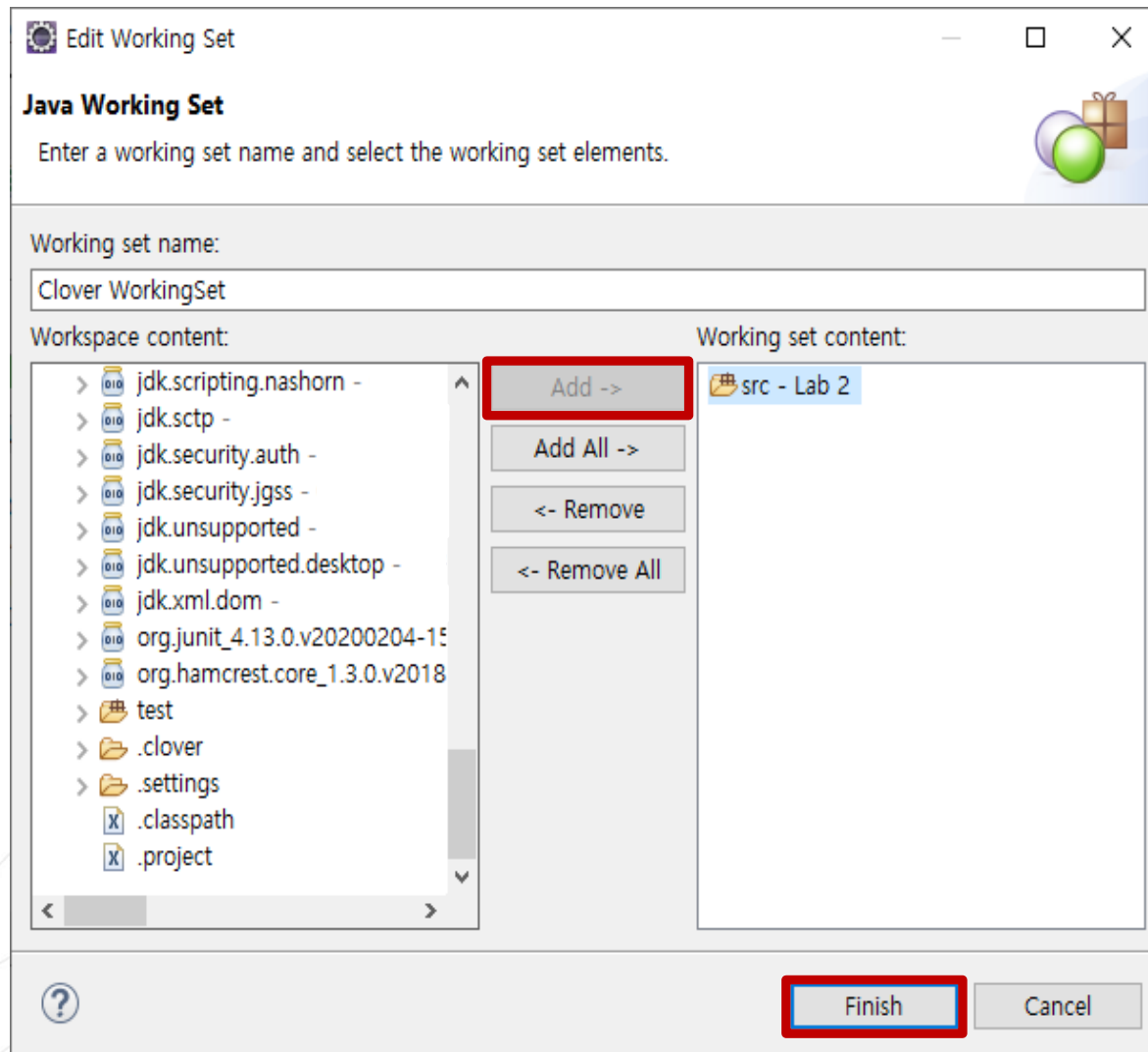
| |
|----------------|
| LOC: 441 |
| Total Comm: 35 |

Context Menu Options:

- Enable/Disable Clover on...
- Refresh Coverage Data
- Delete Coverage Recordings
- Clear Snapshot
- Compiled with Clover
- Edit Context Filter...
- Generate Coverage Treemap
- Generate Coverage Cloud
- Coverage Reports >
- Coverage in Explorer >
- Enable Clover Working Set
- Edit Clover Working Set...**
- Clear Clover Working Set
- Hide Unavailable

Clover 실행

- src선택 - Add -> 버튼 클릭 - Finish



Clover 실행

● Enable Clover Working Set

Problems Javadoc Declaration Console Test Run Explorer Coverage Explorer Test Contributions Clover Dashboard

Show: All classes

| Elem | Cov% | Av Me Cpx | Cpx |
|--------------------|--------|-----------|------|
| Lab 2 | 47.3% | 1.5 | 35.0 |
| lab2 | 47.3% | 1.5 | 35.0 |
| Parameter.java | 18.3% | 1.8 | 22.0 |
| ParameterTest.java | 100.0% | 1.0 | 2.0 |
| Value.java | 61.5% | 1.3 | 9.0 |
| ValueTest.java | 100.0% | 1.0 | 2.0 |

Settings Metrics for: Lab 2

Structure

Packages: 1
Files: 4
Classes: 4
Methods: 23
Statements: 73
Branches: 16

Source

LOC: 441
Total Cmp: 35
Avg Method Cmp: 1.5

Enable/Disable Clover on...
Refresh Coverage Data
Delete Coverage Recordings
Clear Snapshot
Compiled with Clover
Edit Context Filter...
Generate Coverage Treemap
Generate Coverage Cloud
Coverage Reports
Coverage in Explorer
Enable Clover Working Set
Edit Clover Working Set...
Clear Clover Working Set
Hide Unavailable

● 결과 확인

Problems Javadoc Declaration Console Test Run Explorer Coverage Explorer Test Contributions Clover Dashboard

Show: All classes

| Elem | Cov% | Av Me Cpx | Cpx |
|----------------|-------|-----------|------|
| Lab 2 | 31.4% | 1.6 | 31.0 |
| lab2 | 31.4% | 1.6 | 31.0 |
| Parameter.java | 18.3% | 1.8 | 22.0 |
| Value.java | 61.5% | 1.3 | 9.0 |

Settings Metrics for: Lab 2

Structure

Packages: 1
Files: 2
Classes: 2
Methods: 19
Statements: 51
Branches: 16

Test Executions

Executed Tests: 0
Passes: 0
Fails: 0
Errors: 0

● Class 단위로 확인

Problems Javadoc Declaration Console Test Run Explorer Coverage Explorer Test Contributor

Show: All classes

| Elem | Cov% | Av Me Cpx | Cpx |
|----------------------------|--------|-----------|------|
| Lab 2 | 31.4% | 1.6 | 31.0 |
| lab2 | 31.4% | 1.6 | 31.0 |
| Parameter.java | 18.3% | 1.8 | 22.0 |
| Parameter | 18.3% | 1.8 | 22.0 |
| ● addValue(Value) | 100.0% | - | 1.0 |
| ● copy() | 0.0% | - | 2.0 |
| ● getName() | 0.0% | - | 1.0 |
| ● getNumberOfValues() | 100.0% | - | 1.0 |
| ● getValue(int) | 50.0% | - | 3.0 |
| ● initialize(String, int) | 0.0% | - | 2.0 |
| ● insertValue(int, Value) | 0.0% | - | 3.0 |
| ● Parameter() | 100.0% | - | 1.0 |
| ● removeValue(int) | 0.0% | - | 3.0 |
| ● replaceValue(int, Value) | 0.0% | - | 3.0 |
| ● setName(String) | 0.0% | - | 1.0 |
| ● toString() | 0.0% | - | 1.0 |
| Value.java | 61.5% | 1.3 | 9.0 |
| Value | 61.5% | 1.3 | 9.0 |
| ● copy() | 0.0% | - | 1.0 |
| ● equals(Value) | 63.6% | - | 3.0 |
| ● getName() | 100.0% | - | 1.0 |
| ● setName(String) | 100.0% | - | 1.0 |
| ● toString() | 0.0% | - | 1.0 |
| ● Value() | 100.0% | - | 1.0 |
| ● Value(String) | 100.0% | - | 1.0 |

Increasing coverage

- ValueTest.java에 TestCase 추가

```
@Test
public void testEqualsNull()
{
    Value val1 = new Value();
    val1.setName("Hello!");

    Value val2 = null;

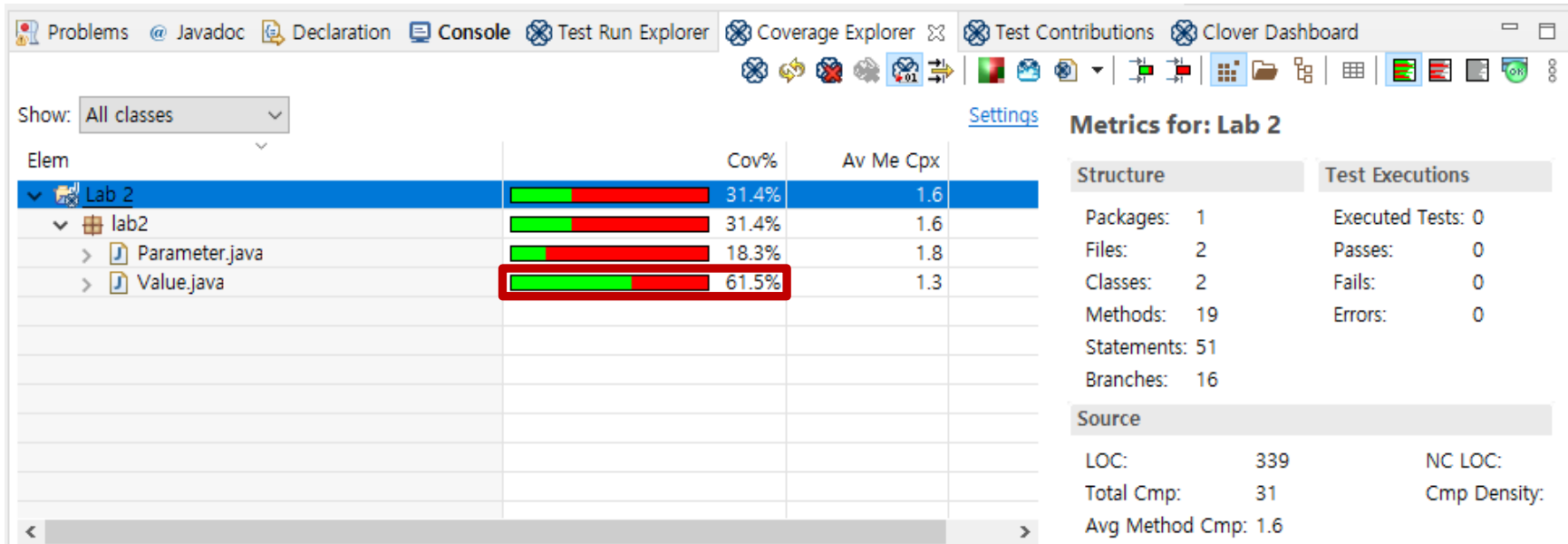
    boolean expected = false;
    boolean actual = val1.equals(val2);

    assertEquals(expected, actual);
}
```

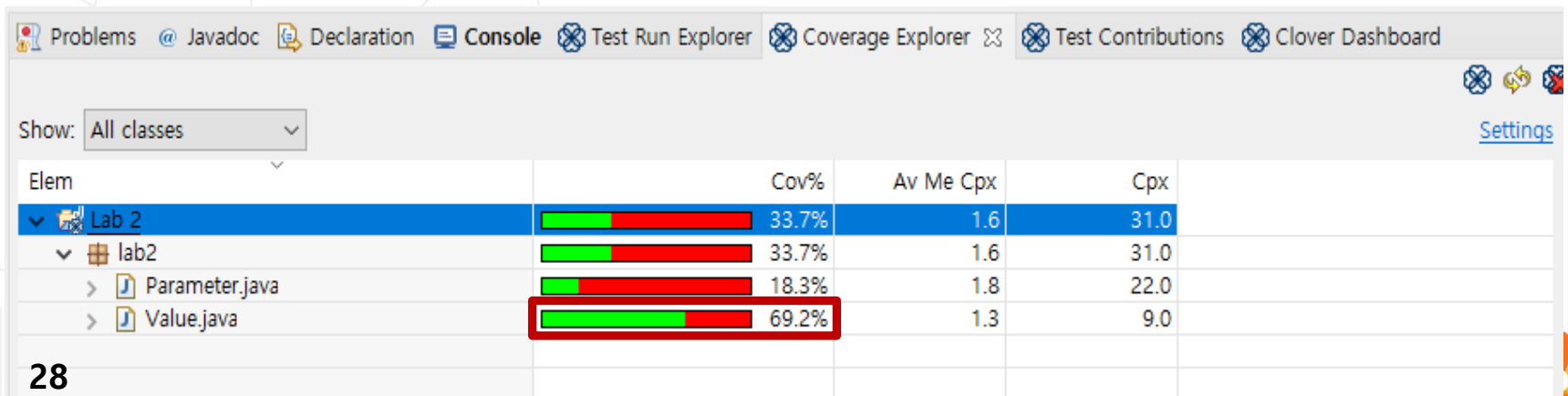
- 추가 후 Junit 테스트 실행

Increasing coverage

- 기존 결과 화면



- increasing coverage



설계 #3

- 설계 #2에서 Coffee Maker로 JUnit 테스트 한 것을 이용하여 커버리지 측정을 한다.
- Increasing Coverage를 한다.
- e-Class 제출물
 - ✓ 프로젝트 파일
 - ✓ 결과 화면 캡처 파일
- e-Class 제출시 **파일이 첨부 되었는지 반드시 확인**할 것.

Sample(Capture)

- 테스트 커버리지 증가(Increasing coverage)

