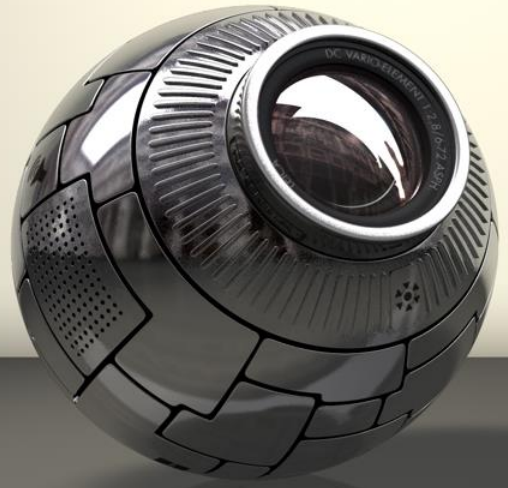
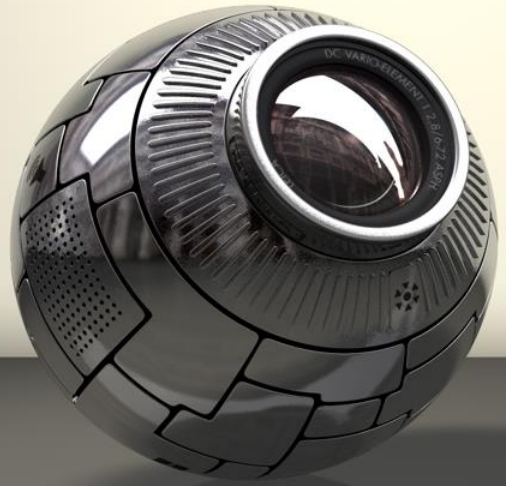


Software Verification
#1. Tool Analysis

T3. SangYoon Kim
Green Kim

INDEX



- eclipse
- Static Analysis
- Junit
- JDepend
- Clover
- Code Pro

eclipse

eclipse

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- Eclipse Juno (4.2)
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- Updating Eclipse
- Forums
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Hint:

You will need a Java runtime environment (JRE) to use Eclipse (Java SE 6 or greater is recommended). All downloads are provided under the terms and conditions of the Eclipse Foundation

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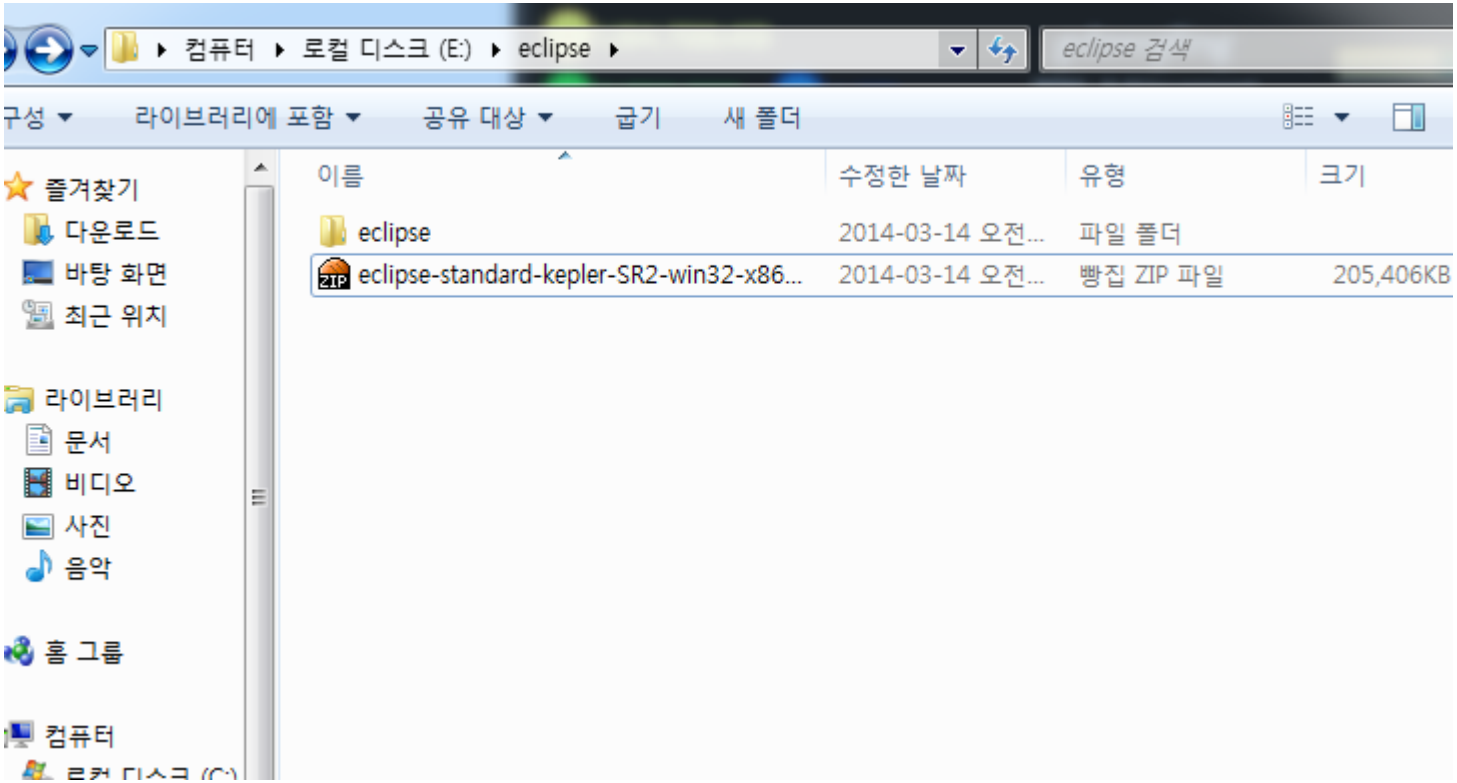
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How to install JDK?

http://www.oracle.com/technetwork/java/javase/downloads/index.html

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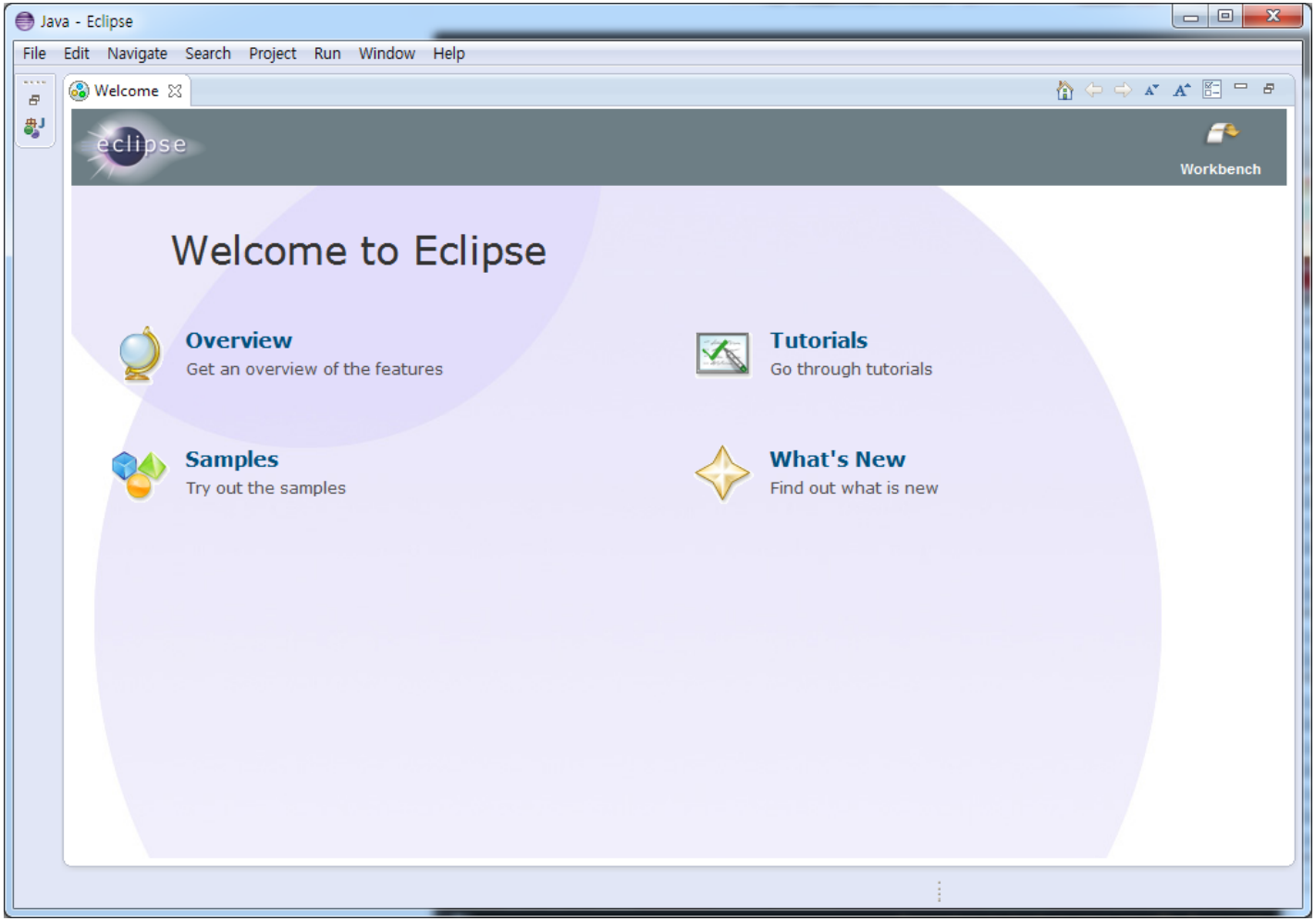

Java - Eclipse
File Edit Navigate Search Project Run Window Help
Welcome
eclipse
Workbench
Welcome to Eclipse
Overview
Get an overview of the features
Tutorials
Go through tutorials
Samples
Try out the samples
What's New
Find out what is new

VS

Think about function?

Or

Simple is the best?

eclipse

Vim

- SSH Telnet으로도 사용가능
- 컴퓨터에 접속만 가능하다면 어디서나 이용 가능

Eclipse

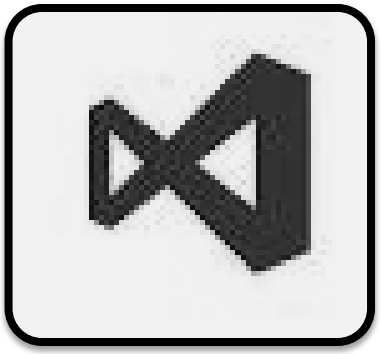
- 다른 컴퓨터에서 해당 컴퓨터의 소스를 수정하기 위해서는 반드시 해당 컴퓨터에 원격으로 접속 해야만 하는 문제

VS

IDE Big Match

Open Source or Microsoft

eclipse



Visual Studio

- Express Version 에 한하여 무료
- 자바 개발 환경 구축을 위해선 상당한 튜닝을 거쳐야 함.

Eclipse

- 자바에 의한 자바를 위한 자바의 개발도구.
- 반대로 다른 언어를 사용하기 위해선 해야 할 일이 많음.

Static Analysis

What is Static Analysis?

- **Analysis of computer software** that is performed without **actually executing programs**
- Performed on **source code** or **Object code**
- Performed by **automated tool** with **human analysis**

Why we need Static Analysis?

- To Check Errors **Before** Compile it.
- To Calculate **Efficiency** of Source.
- At the company, you are not alone.
- If source line has more than 10,000 line, can you remember every part of source code?

Why we need Static Analysis?

I am profiling my game on low-end Pentium 4 and found out that ~85% of execution time is wasted on calculating sinus, cosinus and square root (from standard C++ library in Visual Studio), and this seems to be heavily CPU dependent (on my I7 the same functions got only 5% of execution time, and the game is*waaaaaaaaaay* faster), . I cannot optimize this three functions out, nor calculate both sine and cosine in one pass (there interdependent), but I don't need too accurate results for my simulation, so I can live with faster approximation.

Source : http://stackoverflow.com/questions/18662261/fastest-implementation-of-sine-cosine-and-square-root-in-c-doesnt-need-to-b

Why we need Static Analysis?

- Binary Performance Time is **Machine dependent**
- Cause now days **ALU** is SO MUCH Powerful, old solution may not work.

JUnit

What is JUnit?

- **unit testing framework** for the Java programming language. Important in the development of **test driven development**.
- **http://www.junit.org/**

What is Unit Testing?

- method by which **individual units of source code**, sets of one or more computer program modules together with associated control data, usage procedures, and operating procedures are tested to determine **if they are fit for use**.

Goal of unit Testing

- isolate each part of the program and show that the individual parts are correct.

Benefits of Unit Testing

- Find problems early
- Facilitates change
- Simplifies Integration
- Documentation

Limitation of unit testing?

- Testing will not catch every error in the program

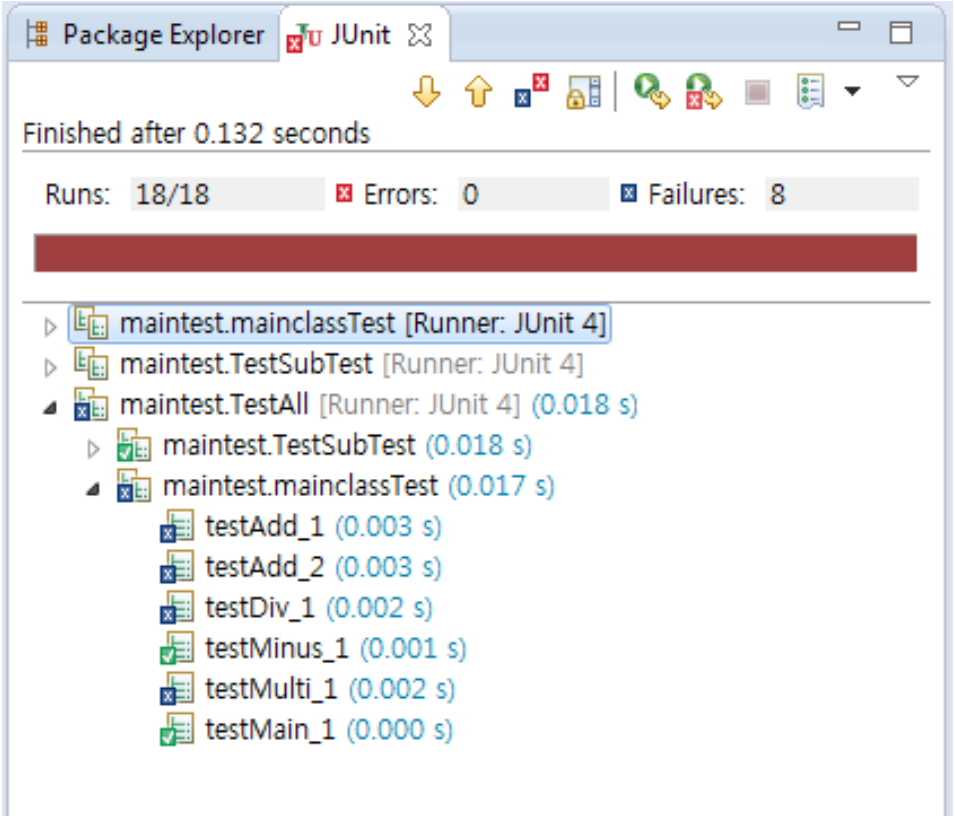
Process of JUnit

1. **Set up** : 테스트 진행할 환경 마련
2. **Test** : 테스트 진행
3. **Tear Down** :
   테스트 종료 후 프로그램 종료처리

How to install JUnit?

- You have **Nothing** to do.
- Just Install **Eclipse**.

Result of JUnit



JDepend

What is Jdepend?

- JDepend allows you to **automatically** measure the **quality of a design** in terms of its **extensibility**, **reusability** and **maintainability** to manage **package dependencies effectively**.

- JDepend traverses Java class file directories and generates **design quality metrics** for each Java package

Why we use JDepend?

- 패키지간 **의존성** 확인이 용이하다

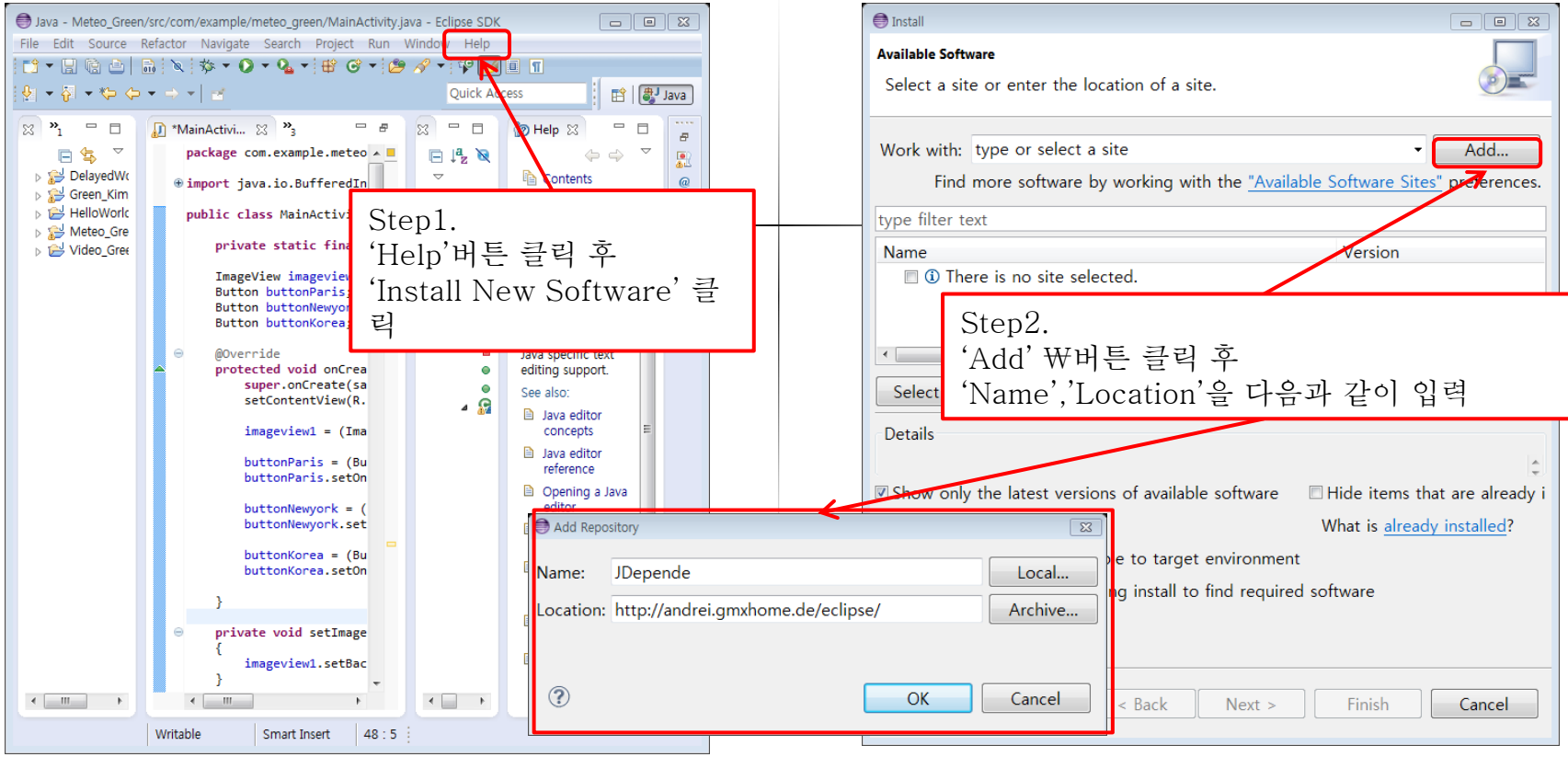
- Cyclic Dependency를 찾아낼 수 있다.
  ⇒ 순환참조 관계의 패키지들은 부분적 배포가 불가능하고, 한 패키지를 변경할 때 그 영향력을 파악하기가 힘들다.

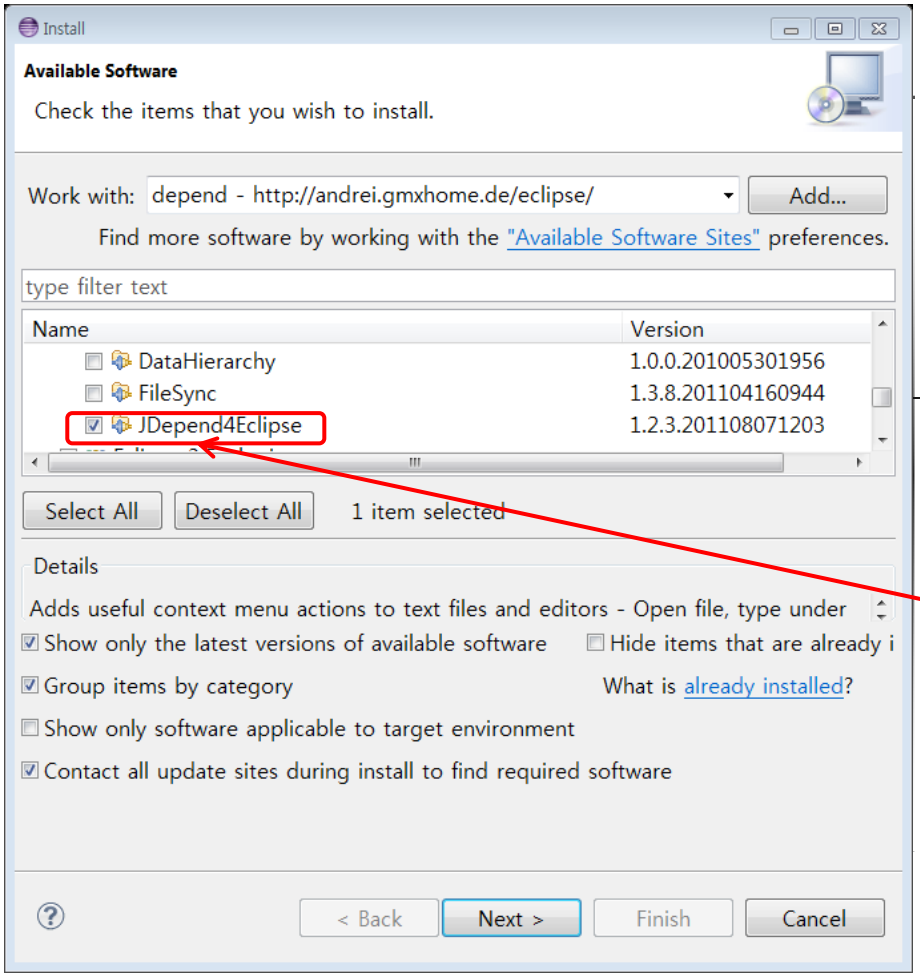
- 개발완료가 아닌 **개발 중**에도 문제점을 체크할 수 있다.

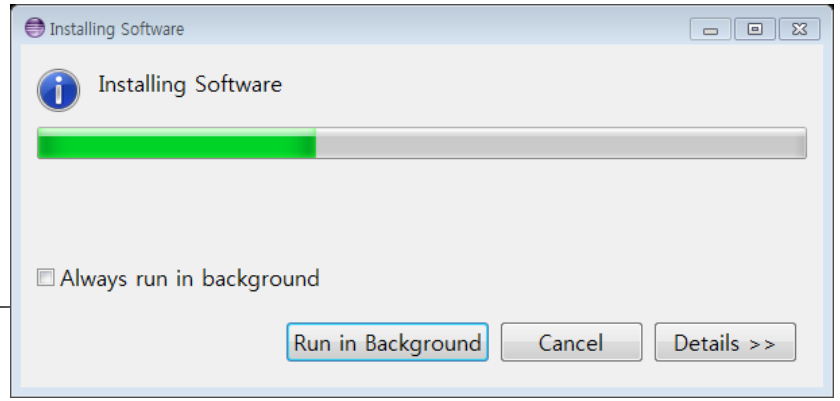
What can we get from JDpend?

Measure Design Quality	Invert Dependencies
Foster Parallel, Extreme Programming	Isolate Third-Party Package Dependencies
Package Release Modules	Identify Package Dependency Cycles

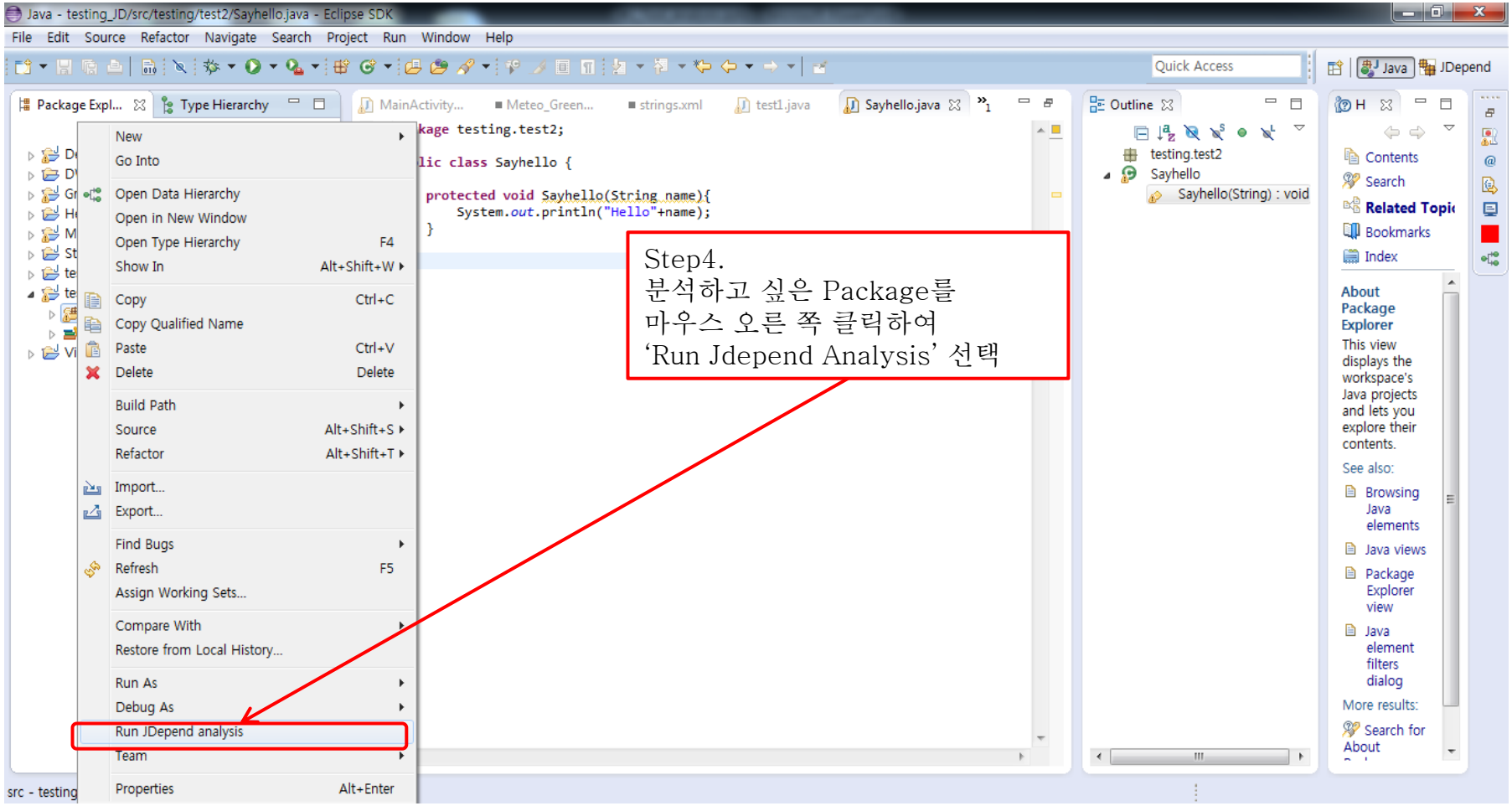
How to install JDepend?







Step3.
'JDepend4Eclipse'선택 하여 설치 시작


Java - testing_JD/src/testing/test2/Sayhello.java - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Window Help
Quick Access
Java
JDepend
Package Expl...
Type Hierarchy
MainActivity...
Meteo_Green...
strings.xml
test1.java
Sayhello.java
kage testing.test2;
lic class Sayhello {
protected void Sayhello(String name){
System.out.println("Hello"+name);
}
Outline
testing.test2
Sayhello
Sayhello(String) : void
Contents
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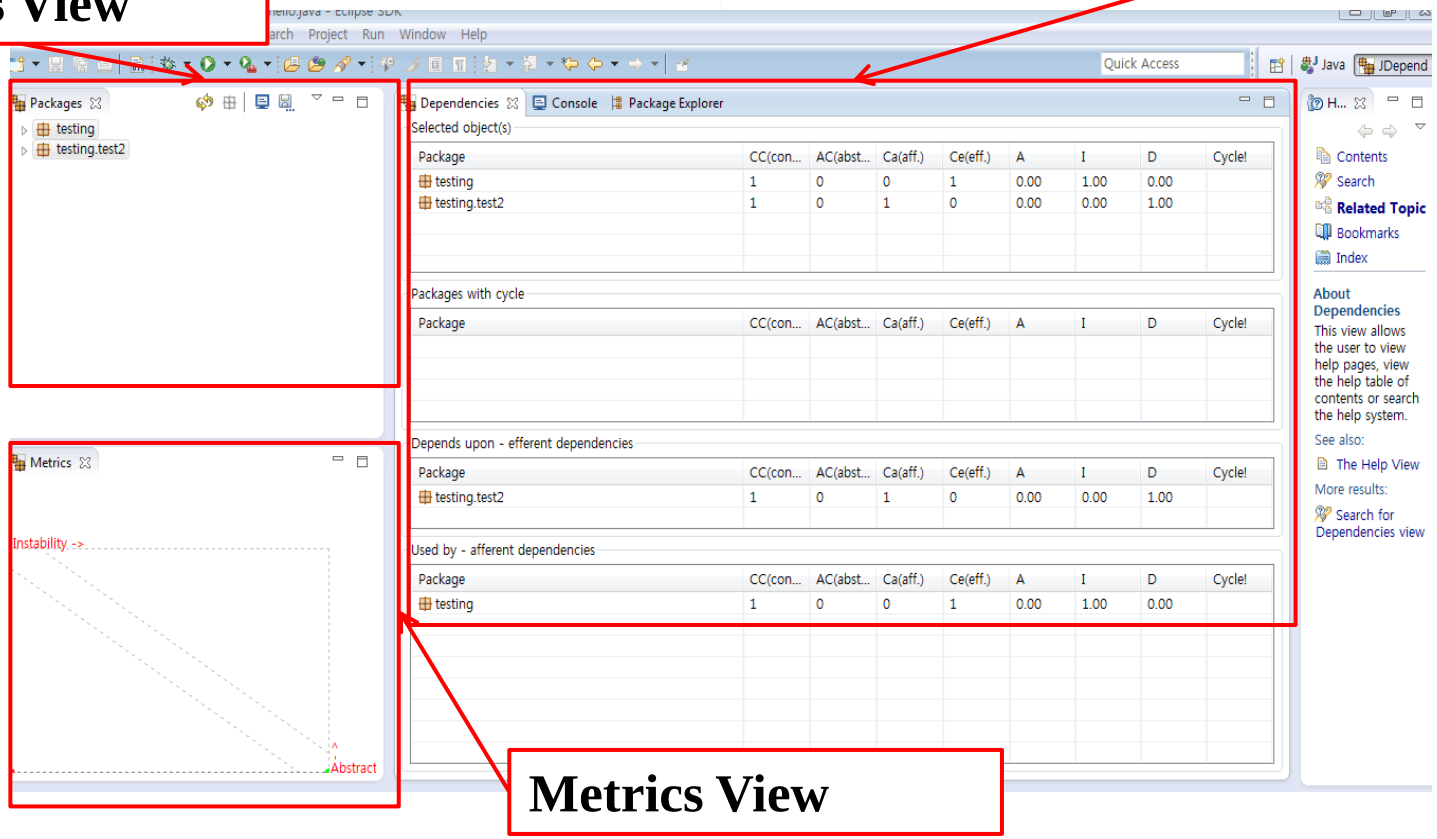
About Package Explorer
This view displays the workspace's Java projects and lets you explore their contents.
See also:
Browsing Java elements
Java views
Package Explorer view
Java element filters dialog
More results:
Search for About
New
Go Into
Open Data Hierarchy
Open in New Window
Open Type Hierarchy F4
Show In Alt+Shift+W
Copy Ctrl+C
Copy Qualified Name
Paste Ctrl+V
Delete Delete
Build Path
Source Alt+Shift+S
Refactor Alt+Shift+T
Import...
Export...
Find Bugs
Refresh F5
Assign Working Sets...
Compare With
Restore from Local History...
Run As
Debug As
Run JDepend analysis
Team
Properties Alt+Enter
src - testing
Step4.
분석하고 싶은 Package를
마우스 오른 쪽 클릭하여
'Run Jdepend Analysis' 선택

Result of JDepend

Packages View

Dependencies View

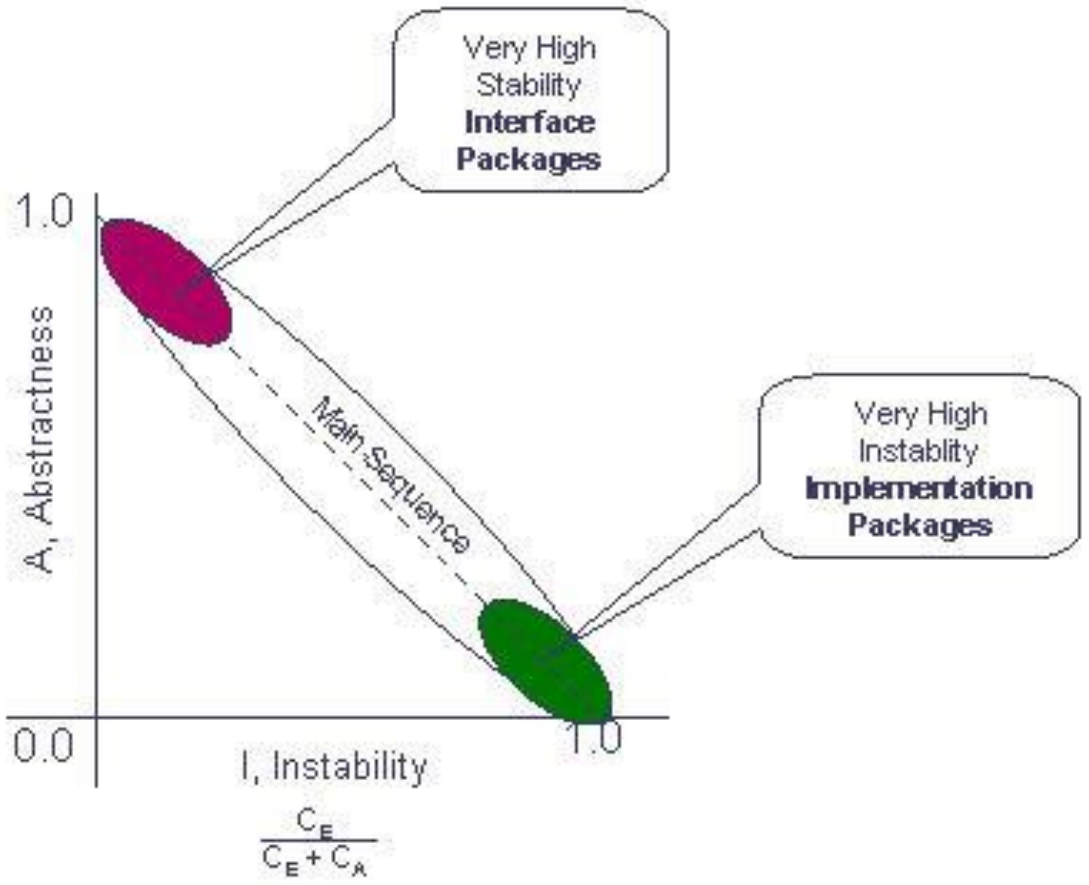


Metrics View

Dependencies View

CC	Concrete Class : Concrete Class의 개수
AC	Abstract Class : 추상클래스나 인터페이스의 개수 (확장성의 척도)
Ca	Afferent Couplings : 종속성을 가지는 패키지의 개수 (책임의 척도)
Ce	Efferent Couplings : 종속하고 있는 패키지의 개수 (독립성의 척도)
A	추상화 정도 (1:완전 추상적인 패키지)
I	변화에 대한 탄력도 (1:작은 변화에도 쉽게 흔들림)
D	Main Sequence로 부터의 거리 (1:완전 먼 상태)

Metrics View



Limitations of JDepend

Cyclic dependency detection **may not report** all cycles reachable from a given package
JDepend **does not collect** source code complexity metrics.
The design quality metrics generated by JDepend are **imperfect**.
Java **interfaces** are treated as **equals** with Java **abstract classes**.
JDepend does not currently support the calculation of Ca and Ce in terms of the number of classes inside a package that have afferent or efferent couplings to classes inside other packages.

Clover

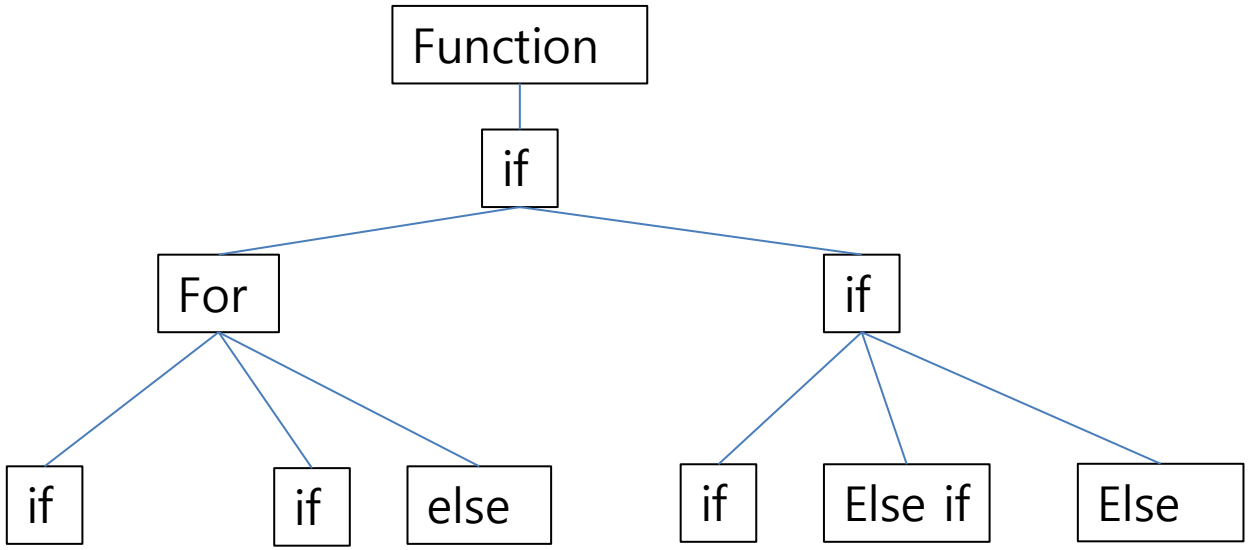
What is Clover?

- Code Coverage Test tool
- Visualization Result

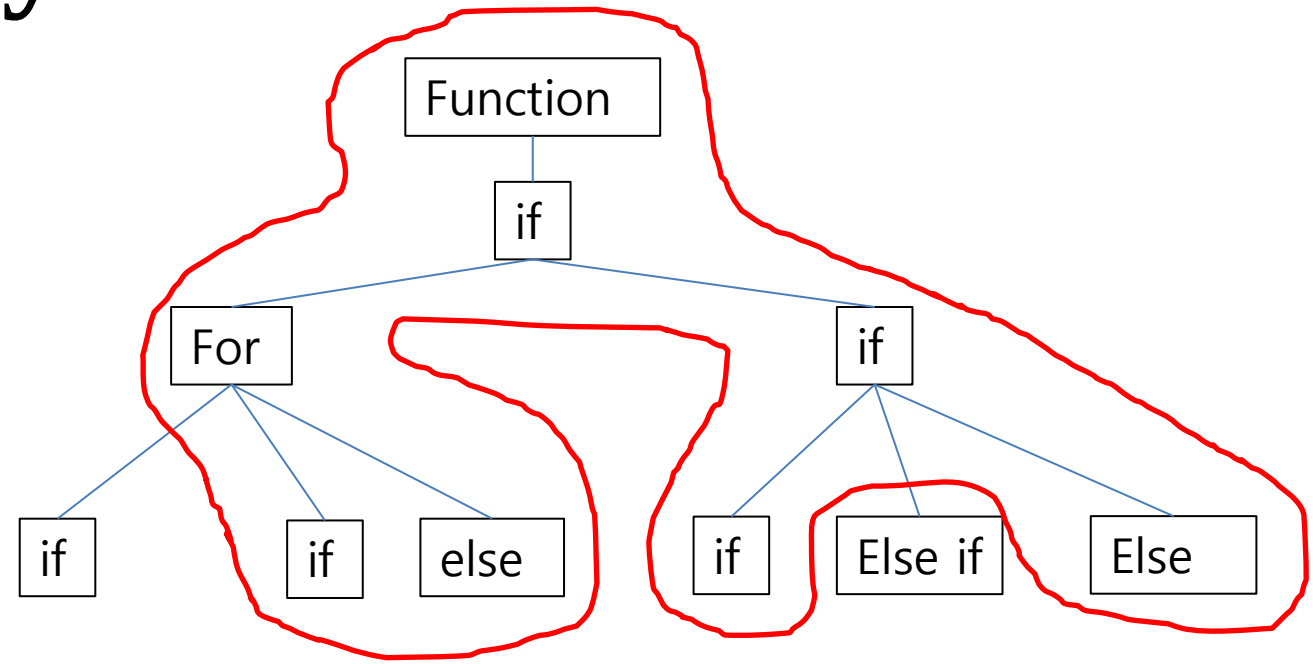
Why we use Clover?

1. To Check **Code Coverage**
2. Reporting **JUnit Test**
3. To **Optimize** test execution

Why we use Clover?



Why we use Clover?



Calculate **Test Codes Coverage**

Clover

eclipse | JUnit | JDepend | Clover | CodePro

How to install Clover?

https://confluence.atlassian.com/display/CLOVER/Clover-for-Eclipse+Installation+Guide

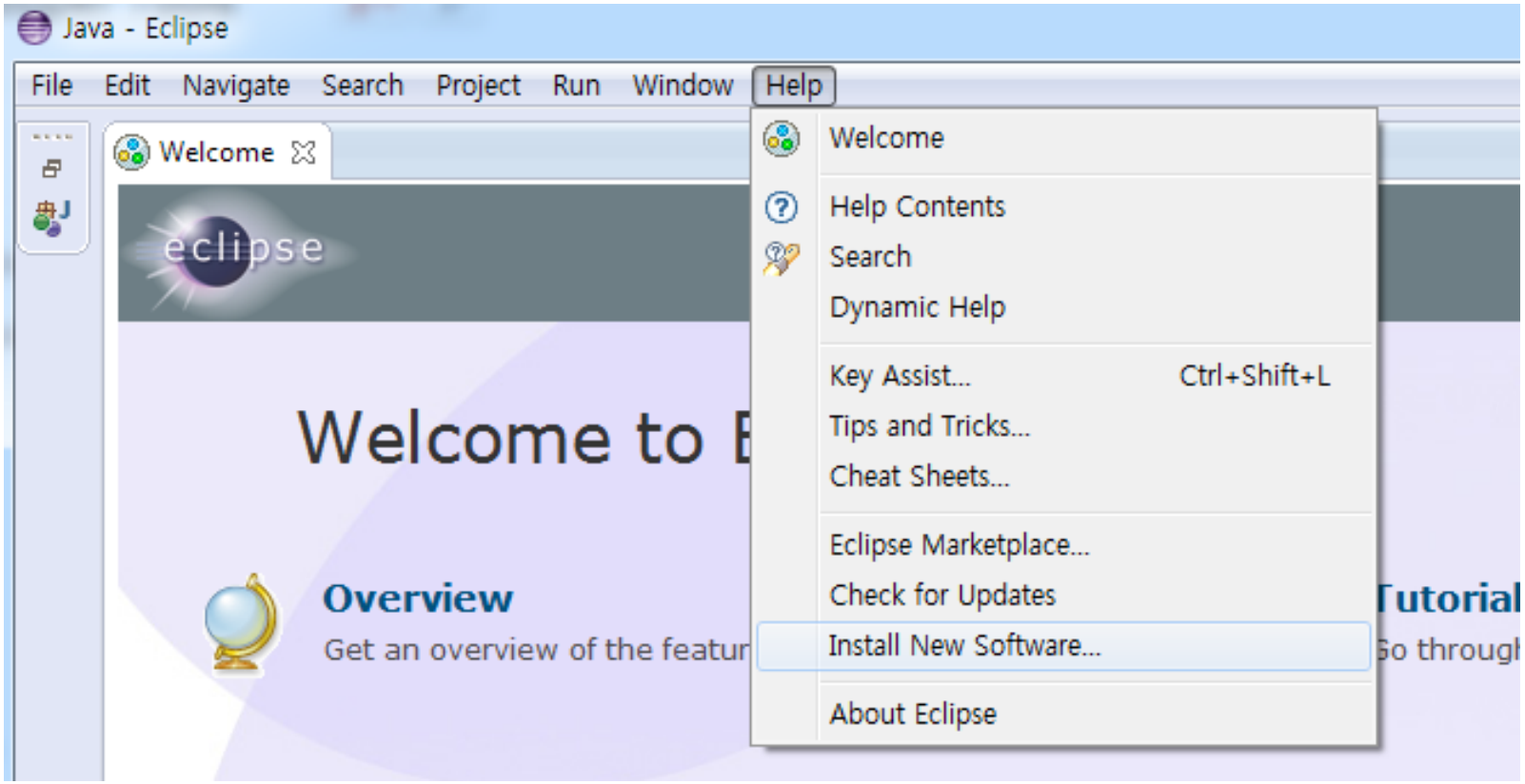
1. Installing the plugin

You can either install the Clover-for-Eclipse from the live Clover Eclipse update site or from a zipped archive downloaded manually.

1a. Installing the plugin from the live Clover Eclipse update site

In Eclipse 3.4 or Later:

1. Select from the menu "Help | Software Updates" to start the installation process.
2. Click "Available Software"
3. Select "Add Site..." and enter http://update.atlassian.com/eclipse/clover then click OK. This will point Eclipse to the Clover update site from where it will download the plugin and an entry to the sites in the
4. Expand the entry "http://update.atlassian.com/eclipse/clover" and its child entry "Clover 2.3.2" until you see "Clover 2 (for Eclipse 3.2/3.3/3.4)" and "Clover 2 Ant Support (3.2/3.3/3.4)".
5. Click the checkboxes next to "Clover 2 (for Eclipse 3.2/3.3/3.4)" and "Clover 2 Ant Support (3.2/3.3/3.4)" and then click "Install..."
6. The "Install" dialog should now show the two features to install. Click "Finish".
7. You may be asked if you agree to the license terms. If you agree, click the radio button next to '**I accept the license agreement**' and click the "Next" button.
8. Finally, you will be asked if you want to restart Eclipse after installing the plugin. Click "Yes" to restart and complete the installation.


Java - Eclipse
File Edit Navigate Search Project Run Window Help
Welcome
eclipse
Welcome to E
Overview
Get an overview of the featur
Tutorial
Go through
Welcome
Help Contents
Search
Dynamic Help
Key Assist... Ctrl+Shift+L
Tips and Tricks...
Cheat Sheets...
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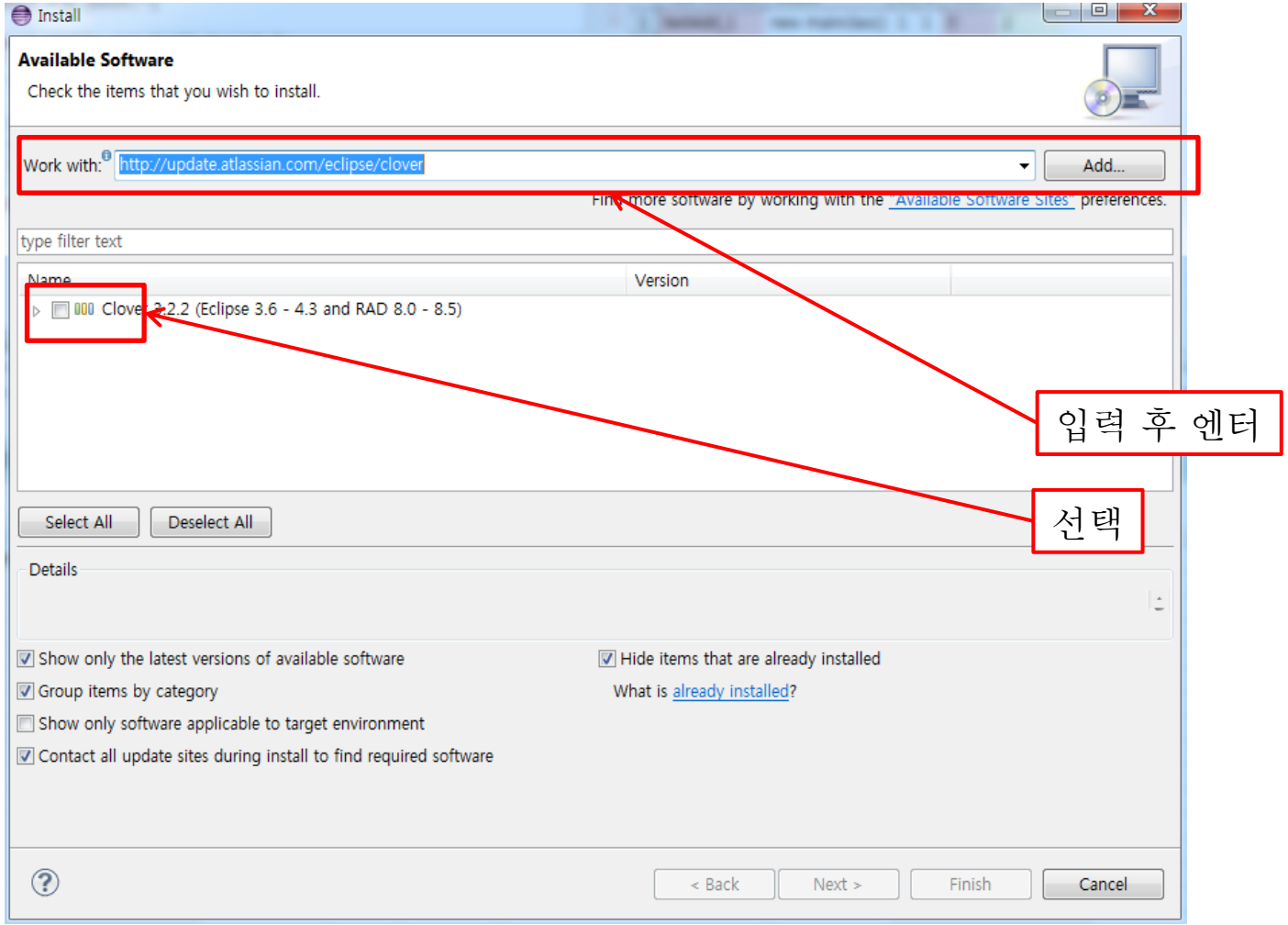
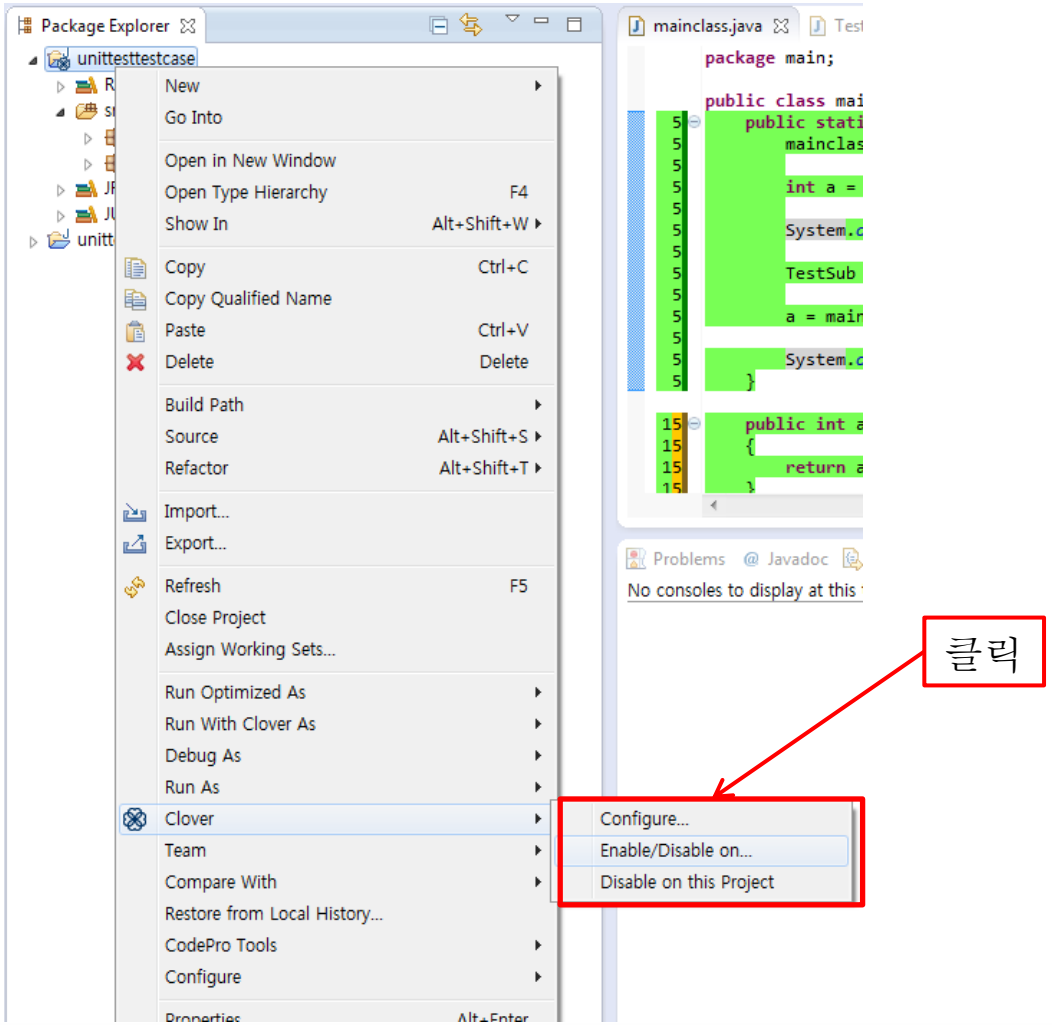
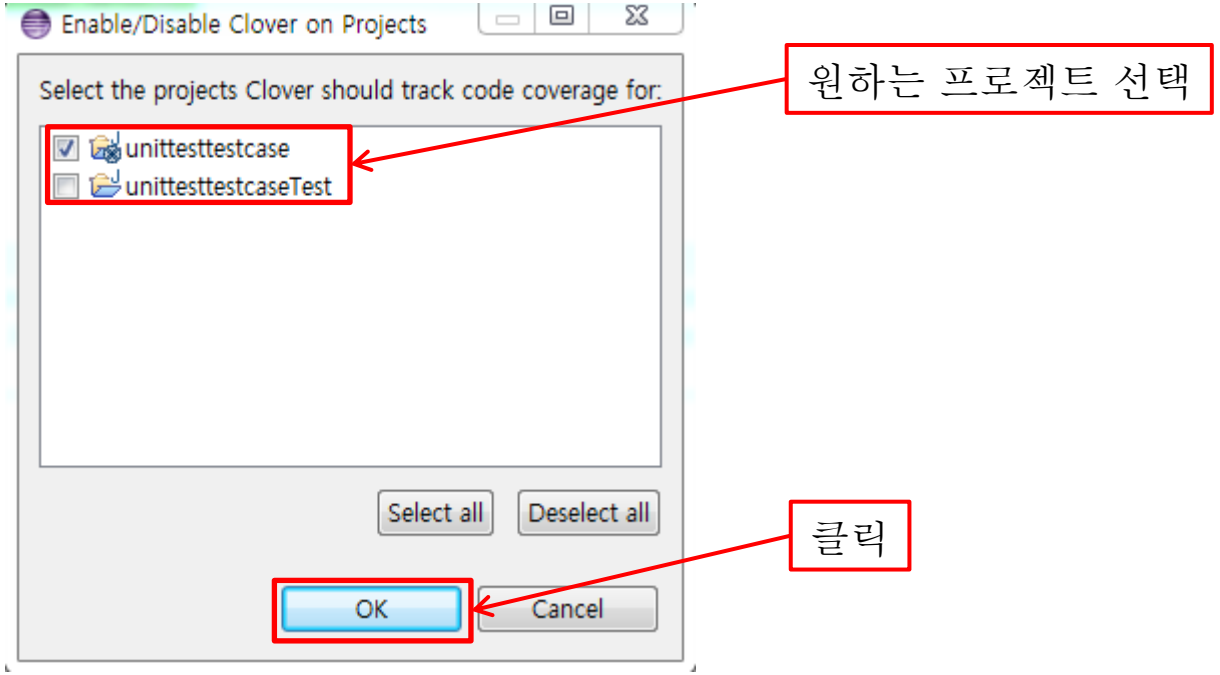
Check for Updates
Install New Software...
About Eclipse


Install
Available Software
Check the items that you wish to install.
Work with:
http://update.atlassian.com/eclipse/clover
Add...
Find more software by working with the "Available Software Sites" preferences.
type filter text
Name
Version
Clover 3.2.2 (Eclipse 3.6 - 4.3 and RAD 8.0 - 8.5)
Select All
Deselect All
Details
Show only the latest versions of available software
Group items by category
Show only software applicable to target environment
Contact all update sites during install to find required software
Hide items that are already installed
What is already installed?
< Back
Next >
Finish
Cancel
입력 후 엔터
선택

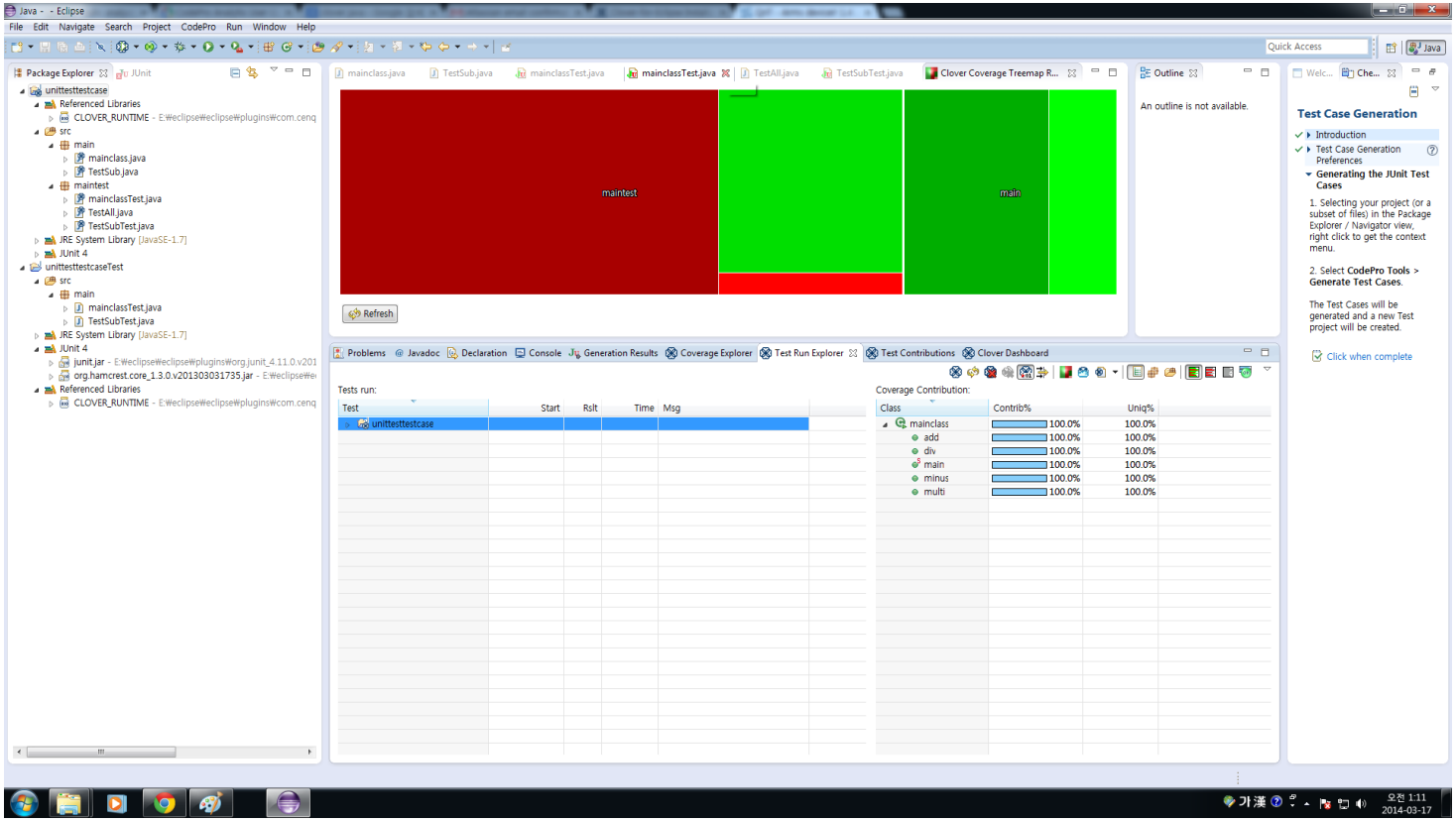
Clover

eclipse | JUnit | JDepend | Clover | CodePro




Enable/Disable Clover on Projects
Select the projects Clover should track code coverage for:
unittesttestcase
unittesttestcaseTest
Select all
Deselect all
OK
Cancel
원하는 프로젝트 선택
클릭

Result of Clover



Limitations of Clover

1. No test case, no result
2. It`s Unit test **Coverage** test. NOT Unit test Generator!
3. 100% coverage is not '**silver bullet**'
4. **Proprietary** Software, it`s not free.

Code Pro

What is Code Pro?

Google™ CodePro AnalytiX™

Why we use Code Pro?

- To Generate & Edit Junit Test **More Easily**
- To Check **Dependency**
- To **Analyze** Code
- To **Compute Metrics**

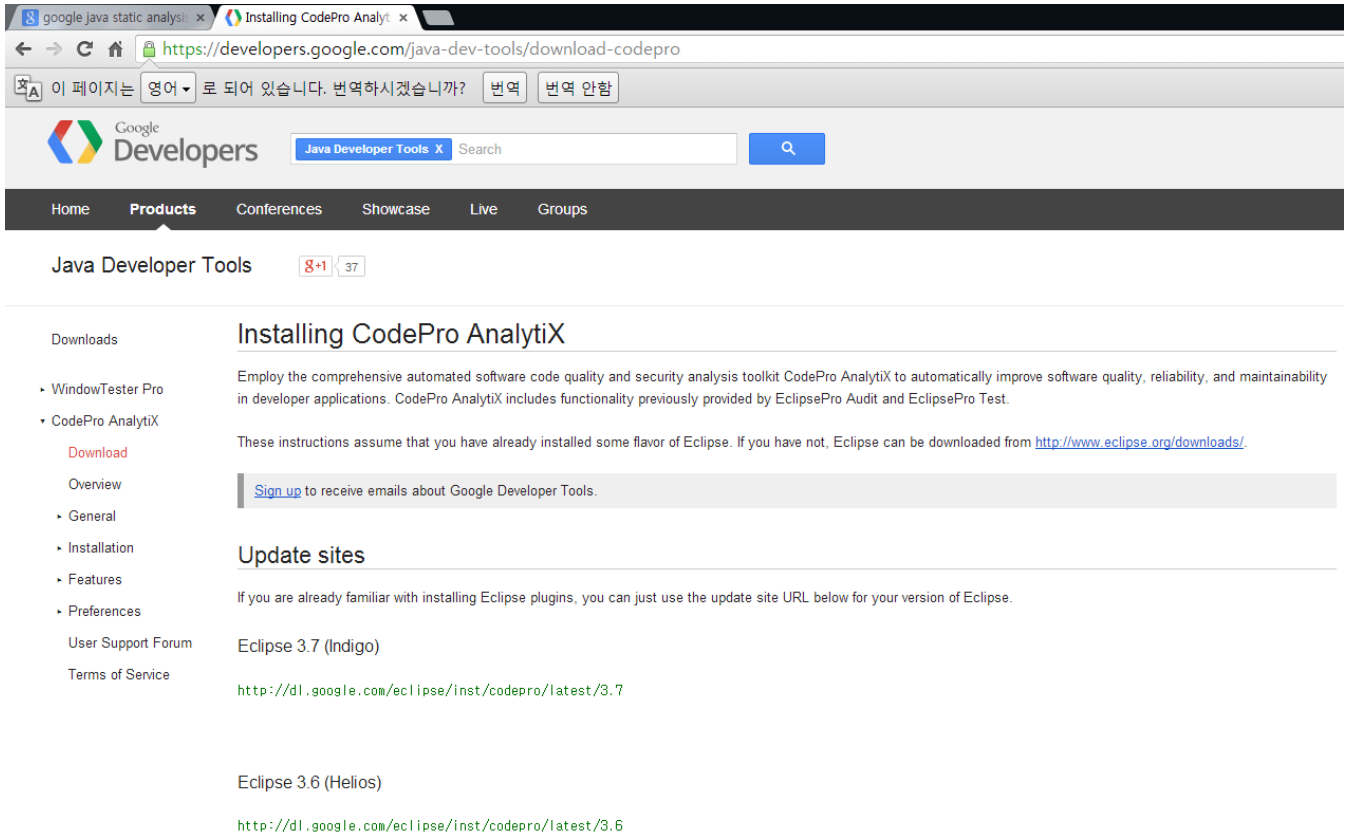
- … Because **Google** Provide it.

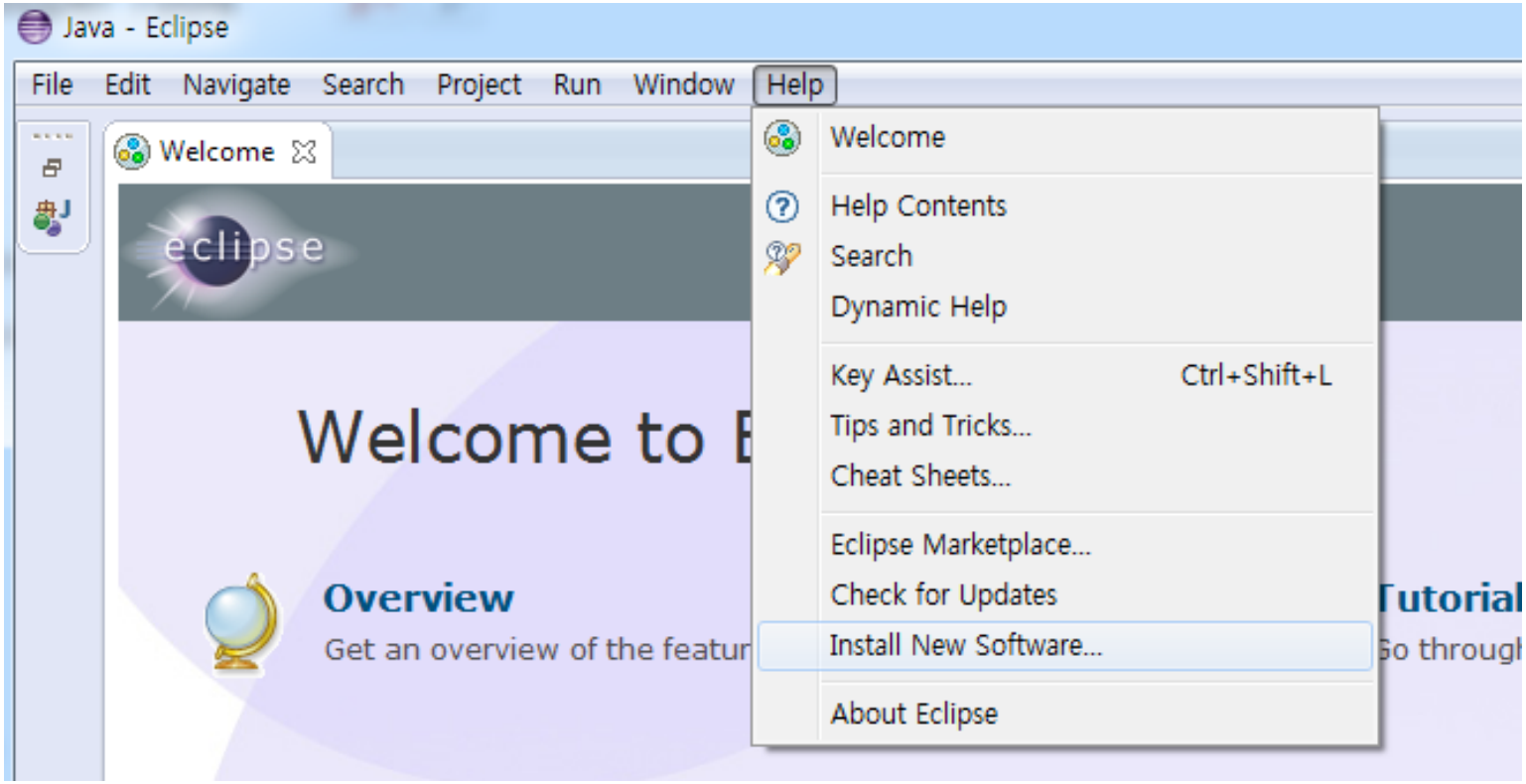
Code Pro eclipse JUnit JDepend Clover CodePro

What can we get from CodePro?

- Almost **Everything** (pray to the Godgle)

How to install Code Pro?




Java - Eclipse
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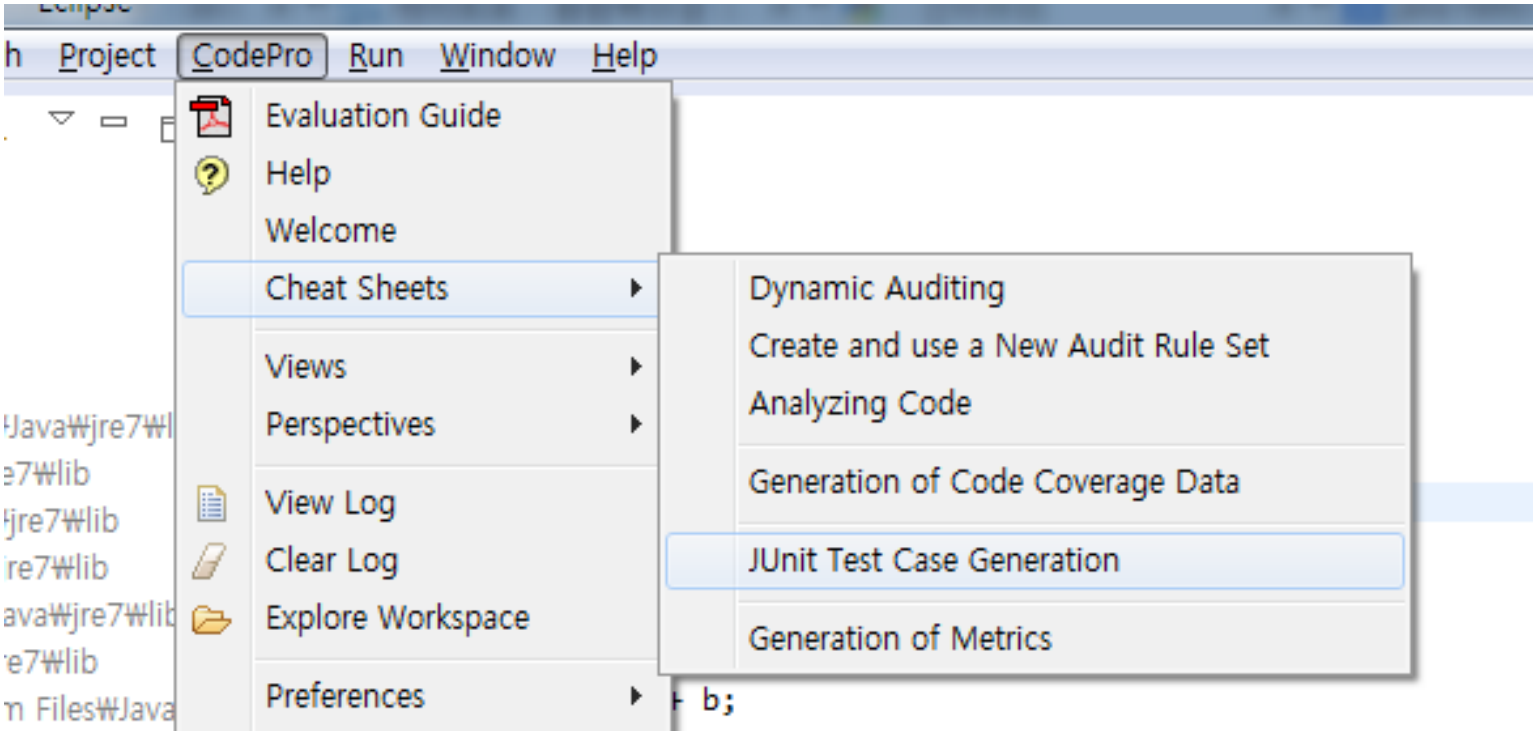
About Eclipse


Project
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Dynamic Auditing
Create and use a New Audit Rule Set
Analyzing Code
Generation of Code Coverage Data
JUnit Test Case Generation
Generation of Metrics
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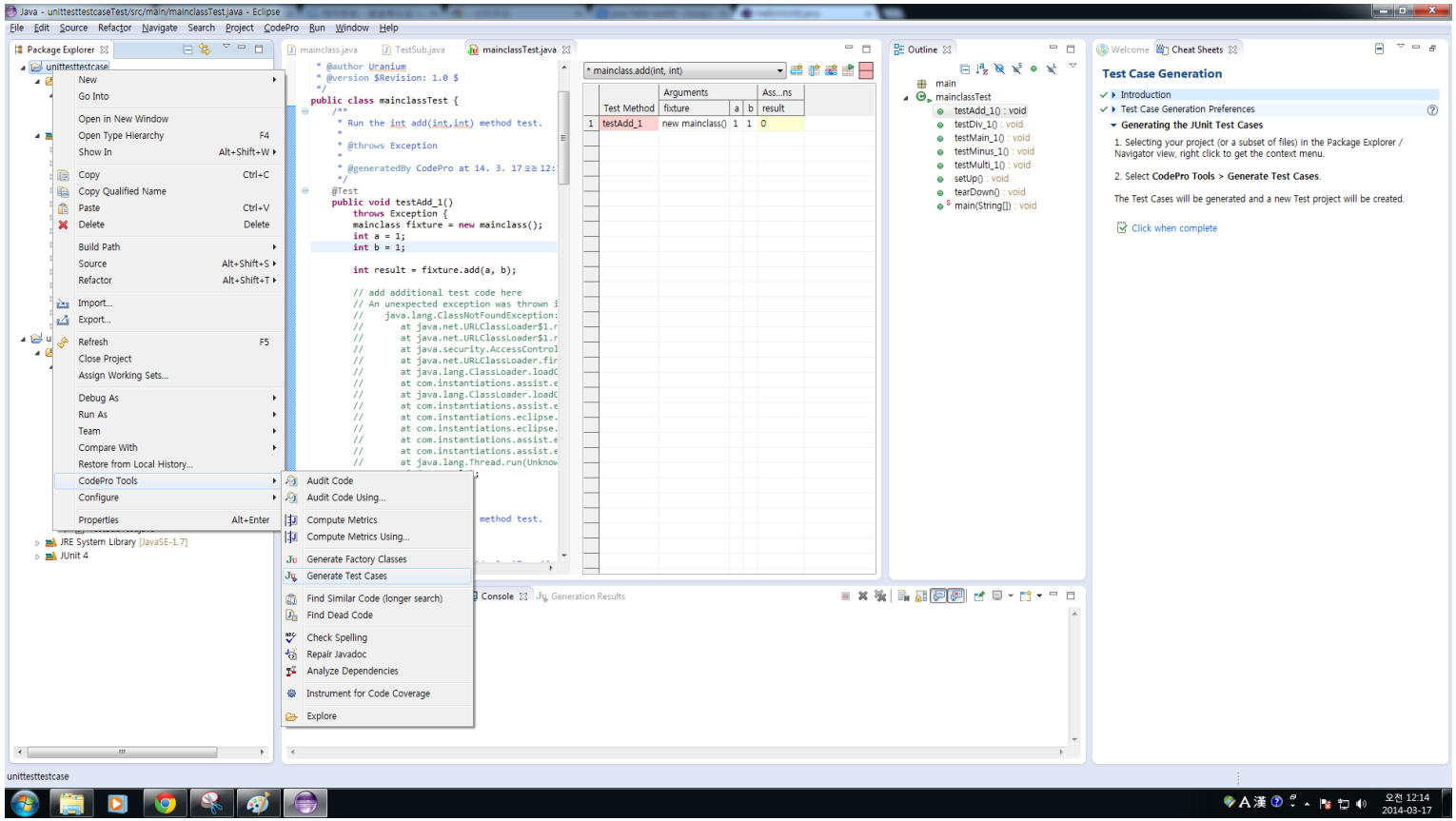
Result of Code Pro



Code Pro

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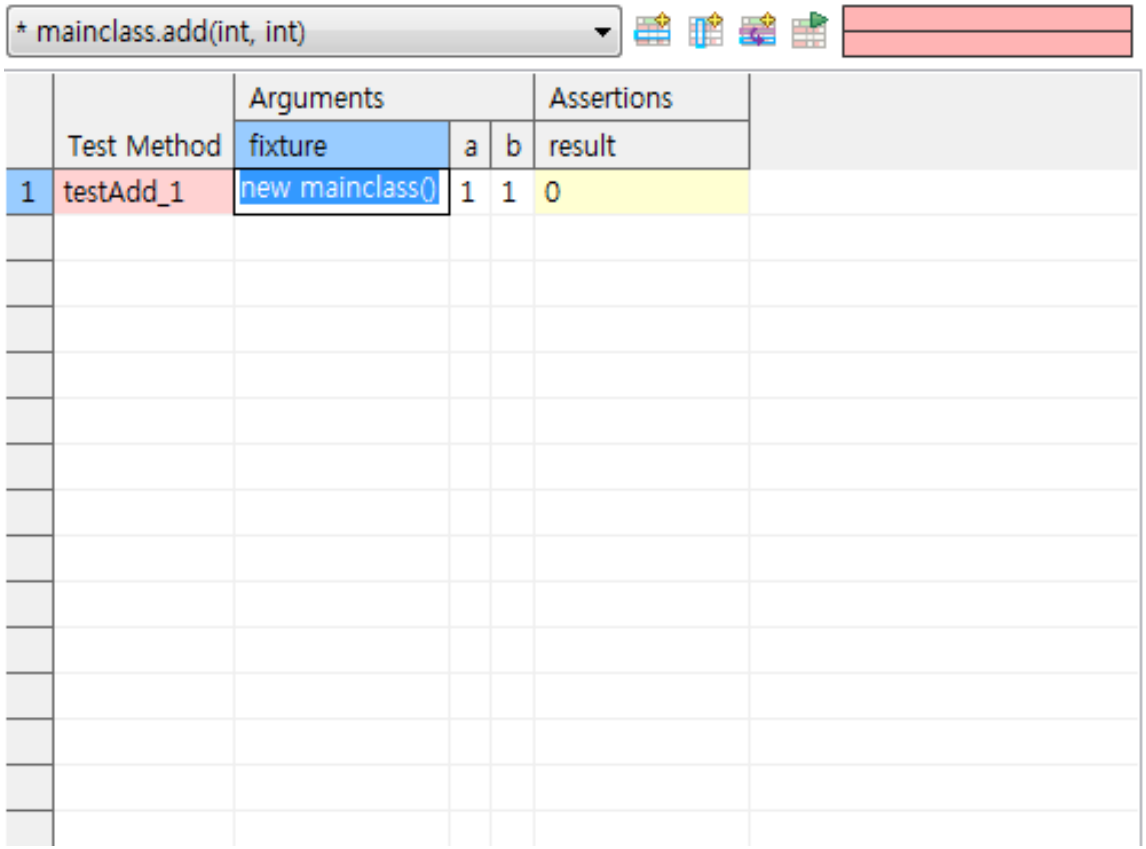
```
public class mainclassTest {
    /**
     * Run the int add(int,int) method test.
     *
     * @throws Exception
     *
     * @generatedBy CodePro at 14. 3. 17 오후 12:13
     */
    @Test
    public void testAdd_1()
        throws Exception {
        mainclass fixture = new mainclass();
        int a = 1;
        int b = 1;

        int result = fixture.add(a, b);

        // add additional test code here
        // An unexpected exception was thrown in user code while executing this test:
        //    java.lang.ClassNotFoundException: main.lass
        //       at java.net.URLClassLoader$1.run(Unknown Source)
        //       at java.net.URLClassLoader$1.run(Unknown Source)
        //       at java.security.AccessController.doPrivileged(Native Method)
        //       at java.net.URLClassLoader.findClass(Unknown Source)
        //       at java.lang.ClassLoader.loadClass(Unknown Source)
        //       at com.instantiations.assist.eclipse.junit.execution.core.UserDefinedC
        //       at java.lang.ClassLoader.loadClass(Unknown Source)
        //       at com.instantiations.assist.eclipse.junit.execution.core.ExecutionCor
        //       at com.instantiations.eclipse.analysis.expression.model.SimpleTypeExpr
        //       at com.instantiations.eclipse.analysis.expression.model.MethodInvocati
        //       at com.instantiations.assist.eclipse.junit.execution.core.ExecutionRec
        //       at com.instantiations.assist.eclipse.junit.execution.communication.Loc
        //       at java.lang.Thread.run(Unknown Source)
        assertEquals(0, result);
    }
```

Code Pro

eclipse | JUnit | JDepend | Clover | CodePro



Code Pro

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* mainclass.add(int, int)

	Test Method	Arguments			Assertions	
		fixture	a	b	result	! result
1	testAdd_1	new mainclass()	1	1	0	2
2	testAdd_2	new mainclass()	1	2	0	3

Limitations of Code Pro

- **Compatibility** is Low.

Reference

- http://ko.wikipedia.org/wiki/%EC%A0%95%EC%A0%81%EB%B6%84%EC%84%9D
- http://en.wikipedia.org/wiki/Static_analysis
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Q&A

Thank You