

SOFTWARE VERIFICATION

정적 분석 & 시스템테스트 도구

TEAM 1

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Summary



Static Analysis

1. Static Analysis

- 정적 분석은 프로그램을 실행하지 않고 컴퓨터 소프트웨어를 분석하는 것이다. 프로그램에 내재한 논리적 오류는 보통 프로그램을 실행하지 않으면 찾기가 힘들지만, 정적 분석은 실행하지 않은 상태에서 프로그램의 오류를 찾을 수 있다.



1. Static Analysis

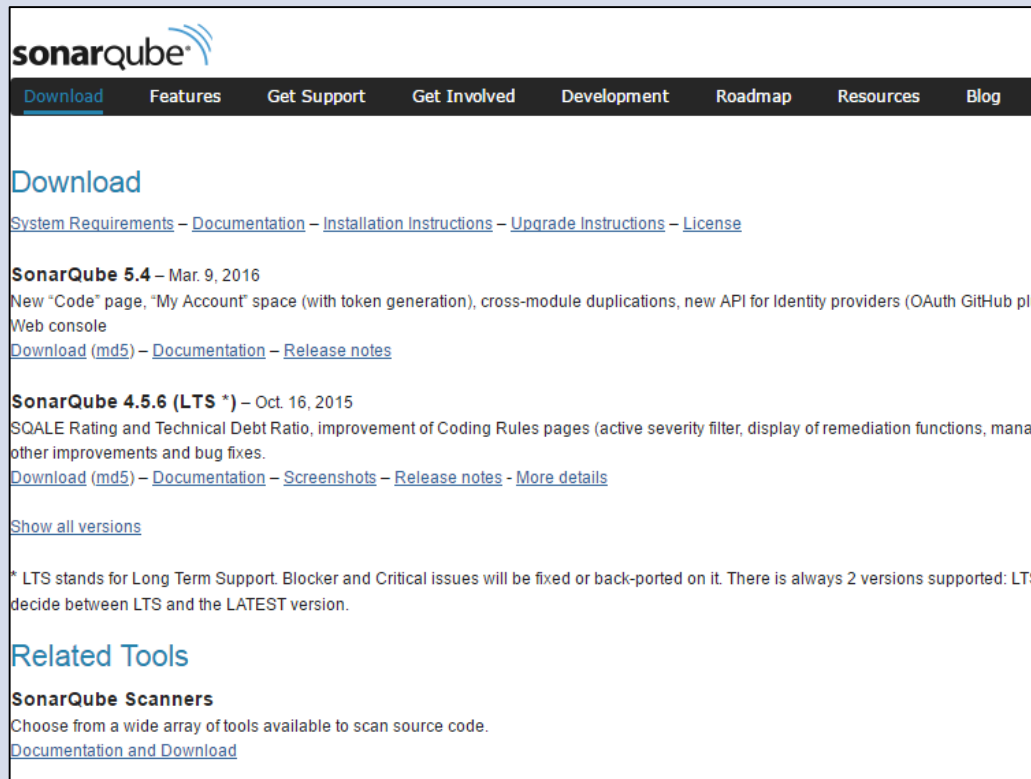
Sonarqube

- Source Code Static Analysis Tool 중에 하나
- 소스코드의 지속적인 품질 관리를 위한 도구
- JAVA 기반의 소스코드 정적 분석 도구
- 특징
 - 여러 분석 툴을 통합하여 여러 항목들을 한 번에 검색 가능
 - 웹 페이지에서 분석 결과들을 한 눈에 보기 쉬움
 - Plug-in을 이용하여 다양한 기능 제공

1. Static Analysis

Sonarqube

- <http://www.sonarqube.org/downloads/>에서 다운로드 가능
- Plug-in도 다운로드 가능



The screenshot shows the SonarQube website's download page. At the top, there is a navigation bar with links for Download, Features, Get Support, Get Involved, Development, Roadmap, Resources, and Blog. The main heading is "Download". Below it, there are links for System Requirements, Documentation, Installation Instructions, Upgrade Instructions, and License. The page lists two versions: SonarQube 5.4 (released Mar. 9, 2016) and SonarQube 4.5.6 (LTS *) (released Oct. 16, 2015). Each version entry includes a brief description of new features and links to download, documentation, and release notes. A "Show all versions" link is also present. At the bottom, there is a section for "Related Tools" titled "SonarQube Scanners" with a link to "Documentation and Download".

sonarqube

[Download](#) [Features](#) [Get Support](#) [Get Involved](#) [Development](#) [Roadmap](#) [Resources](#) [Blog](#)

Download

[System Requirements](#) - [Documentation](#) - [Installation Instructions](#) - [Upgrade Instructions](#) - [License](#)

SonarQube 5.4 - Mar. 9, 2016
New "Code" page, "My Account" space (with token generation), cross-module duplications, new API for Identity providers (OAuth GitHub plus Web console)
[Download \(md5\)](#) - [Documentation](#) - [Release notes](#)

SonarQube 4.5.6 (LTS *) - Oct. 16, 2015
SQALE Rating and Technical Debt Ratio, improvement of Coding Rules pages (active severity filter, display of remediation functions, many other improvements and bug fixes.
[Download \(md5\)](#) - [Documentation](#) - [Screenshots](#) - [Release notes](#) - [More details](#)

[Show all versions](#)

* LTS stands for Long Term Support. Blocker and Critical issues will be fixed or back-ported on it. There is always 2 versions supported: LTS decide between LTS and the LATEST version.

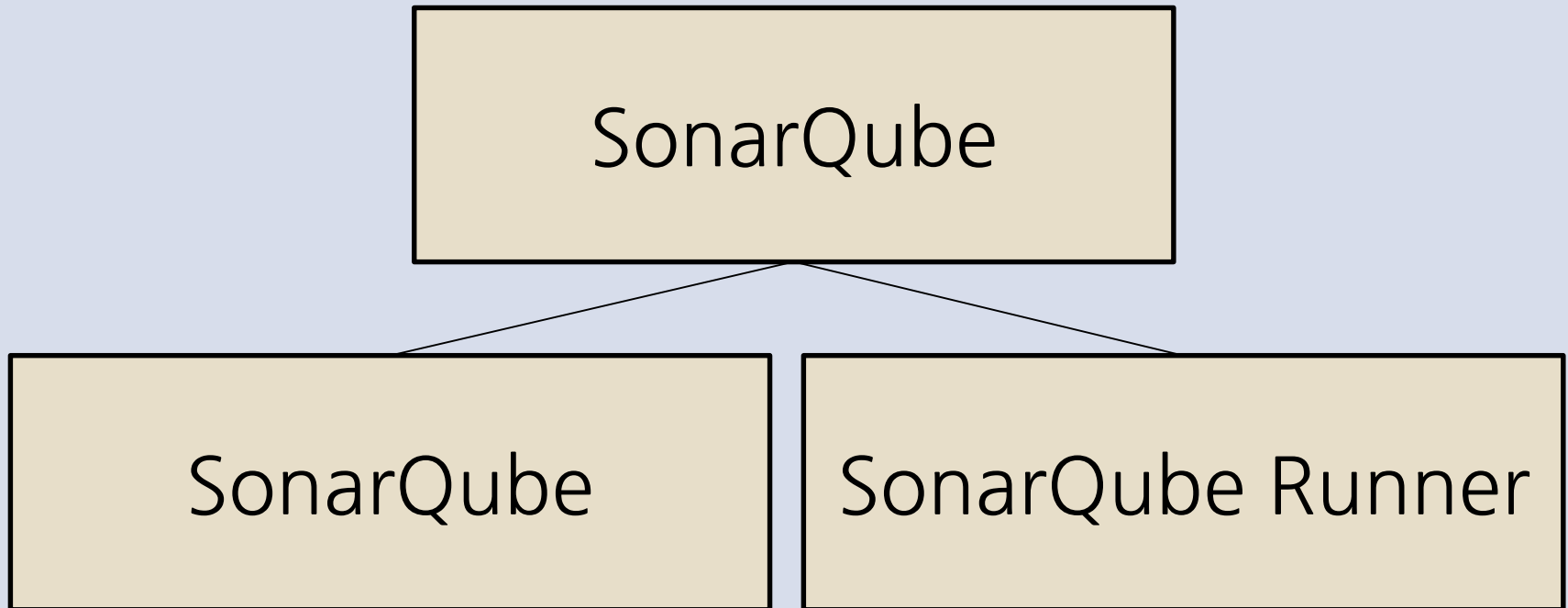
Related Tools

SonarQube Scanners
Choose from a wide array of tools available to scan source code.
[Documentation and Download](#)

1. Static Analysis

Sonarqube

- SonarQube는 크게 SonarQube와 SonarQube Runner로 분류
- 단순히 결과를 보여주는 것과 대상 소스를 분석하는 명령어가 있는 것으로 분류



1. Static Analysis

Sonarqube

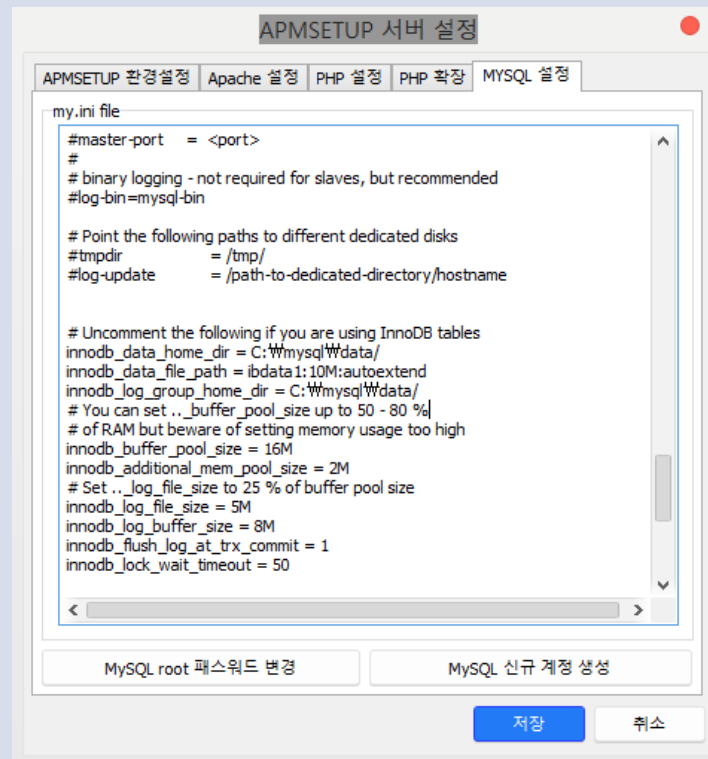
- 배포처에서 Download 받은 파일의 압축을 해제하면 아래와 같은 파일들이 존재

이름	수정한 날짜	유형	크기
bin	2016-03-28 오후...	파일 폴더	
conf	2016-03-28 오후...	파일 폴더	
data	2016-03-28 오후...	파일 폴더	
extensions	2016-03-28 오후...	파일 폴더	
lib	2016-03-28 오후...	파일 폴더	
logs	2016-03-28 오후...	파일 폴더	
temp	2016-03-28 오후...	파일 폴더	
web	2016-03-28 오후...	파일 폴더	
COPYING	2016-03-08 오후...	파일	8KB

1. Static Analysis

Sonarqube

- MySQL Database Server에 데이터를 저장하기 위해 위와 같이 옵션을 변경



1. Static Analysis

Sonarqube

- MySQL Database Server에 아래와 같이 sonar라는 이름의 Database를 생성

```
C:\Windows\System32>mysql -u root -p
Enter password: *****
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 2
Server version: 5.1.41-community MySQL Community Server (GPL)

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> create database
  -> sonar;
Query OK, 1 row affected (0.00 sec)

mysql> .
```

1. Static Analysis

Sonarqube

- MySQL Database Server에 아래와 같이 sonar라는 이름의 사용자를 생성

```
mysql> create user 'sonar';  
Query OK, 0 rows affected (0.00 sec)
```

- MySQL Database Server에 아래와 같이 sonar라는 이름의 Database에 sonar라는 이름의 사용자에게 모든 권한 부여

```
mysql> grant all privileges on `sonar_%`.* to sonar@localhost identified by 'password' with grant option;  
Query OK, 0 rows affected (0.00 sec)
```

1. Static Analysis

Sonarqube

- 이후 sonarqube 압축해제 폴더/bin/운영체제 버전 /StartSonarqube.bat을 실행

```
C:\Users\Chester\Downloads\sonarqube-5.4\sonarqube-5.4\bin\windows-x86-64>StartSonar.bat
wrapper      --> Wrapper Started as Console
wrapper      |-----|
wrapper      |-----| Launching a JVM...
jvm 1        |-----| Error occurred during initialization of VM
jvm 1        |-----| GC triggered before VM initialization completed. Try increasing NewSize, current value 1536K.
wrapper      |-----| JVM exited while loading the application.
wrapper      |-----| JVM Restarts disabled. Shutting down.
wrapper      |-----| <-- Wrapper Stopped
계속하려면 아무 키나 누르십시오 . . .
```

1. Static Analysis

Sonarqube

- Memory 부족으로 인한 오류가 발생 시,
sonarqube 압축해제 폴더/conf/wrapper.conf을 워드패드 등으로
열어서 다음과 같이 수정

```
wrapper.java.additional.1=-Djava.awt.headless=true  
wrapper.java.mainclass=org.tanukisoftware.wrapper.WrapperSimple  
App  
wrapper.java.classpath.1=../../lib/jsw/*.jar  
wrapper.java.classpath.2=../../lib/*.jar  
wrapper.java.library.path.1=./lib  
wrapper.app.parameter.1=org.sonar.application.App  
wrapper.java.initmemory=32  
wrapper.java.maxmemory=64
```

1. Static Analysis

Sonarqube

- 정상적으로 실행되면 아래와 같은 화면을 볼 수 있다.

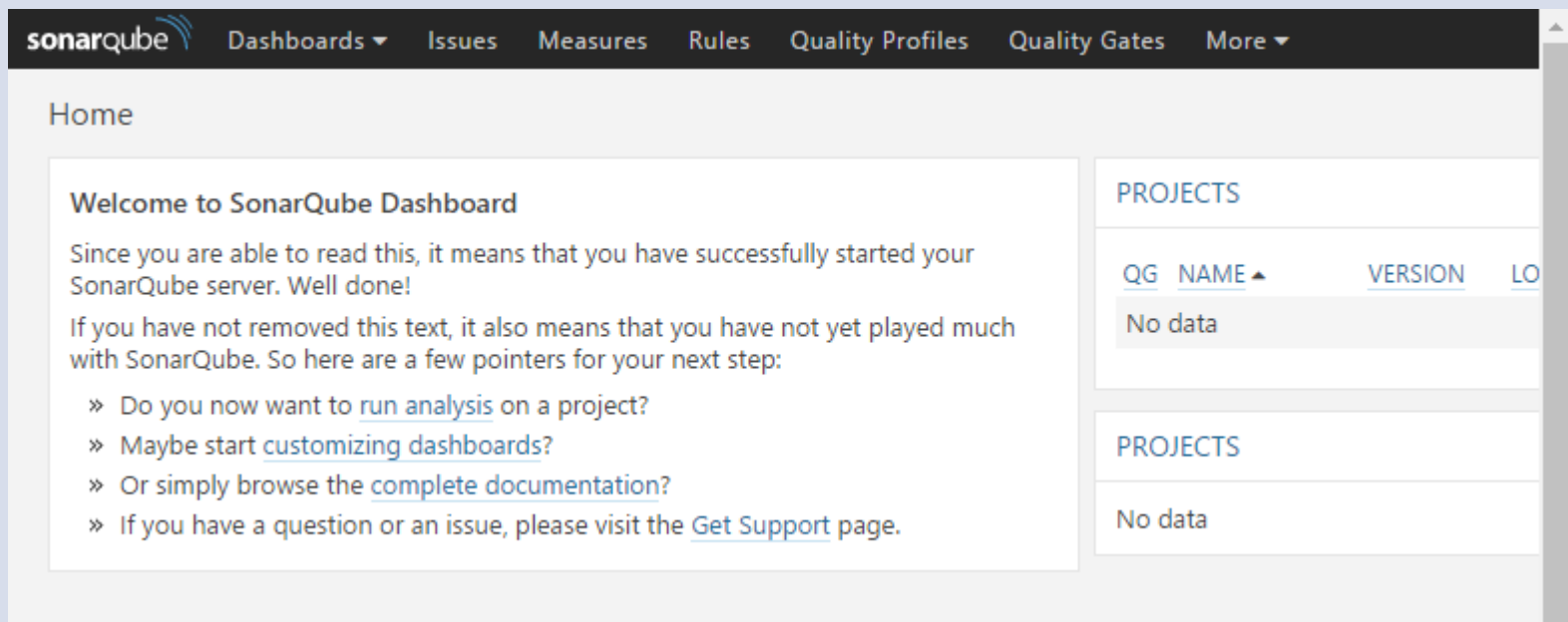
```
SonarQube
C:\Users\Chester\Downloads\sonarqube-5.4\sonarqube-5.4\bin\windows-x86-64>StartSonar.bat
wrapper --> Wrapper Started as Console
wrapper Launching a JVM...
jvm 1 Error occurred during initialization of VM
jvm 1 GC triggered before VM initialization completed. Try increasing NewSize, current value 1536K.
wrapper JVM exited while loading the application.
wrapper JVM Restarts disabled. Shutting down.
wrapper <-- Wrapper Stopped
계속하려면 아무 키나 누르십시오 . . .

C:\Users\Chester\Downloads\sonarqube-5.4\sonarqube-5.4\bin\windows-x86-64>StartSonar.bat
wrapper --> Wrapper Started as Console
wrapper Launching a JVM...
jvm 1 Wrapper (Version 3.2.3) http://wrapper.tanukisoftware.org
jvm 1 Copyright 1999-2006 Tanuki Software, Inc. All Rights Reserved.
jvm 1
jvm 1 2016.03.28 21:22:15 INFO app[o.s.a.AppFileSystem] Cleaning or creating temp directory C:\Users\Chester\Downloads\
sonarqube-5.4\sonarqube-5.4\temp
jvm 1 | 2016.03.28 21:22:15 INFO app[o.s.p.m.JavaProcessLauncher] Launch process[search]: C:\Program Files\Java\jre1.8.0_
73\bin\java -Djava.awt.headless=true -Xmx1G -Xms256m -Xss256k -Djava.net.preferIPv4Stack=true -XX:+UseParNewGC -XX:+UseConcMa
rkSweepGC -XX:CMSInitiatingOccupancyFraction=75 -XX:+UseCMSInitiatingOccupancyOnly -XX:+HeapDumpOnOutOfMemoryError -Djava.io.
tmpdir=C:\Users\Chester\Downloads\sonarqube-5.4\sonarqube-5.4\temp -cp ./lib/common/*;./lib/search/* org.sonar.search.SearchS
erver C:\Users\Chester\AppData\Local\Temp\sq-process1912721620328340888properties
jvm 1 | 2016.03.28 21:22:22 INFO app[o.s.p.m.Monitor] Process[search] is up
jvm 1 | 2016.03.28 21:22:22 INFO app[o.s.p.m.JavaProcessLauncher] Launch process[web]: C:\Program Files\Java\jre1.8.0_73\
bin\java -Djava.awt.headless=true -Dfile.encoding=UTF-8 -Djruby.management.enabled=false -Djruby.compile.invokedynamic=false
-Xmx768m -Xms256m -XX:MaxPermSize=160m -XX:+HeapDumpOnOutOfMemoryError -Djava.net.preferIPv4Stack=true -Djava.io.tmpdir=C:\Us
ers\Chester\Downloads\sonarqube-5.4\sonarqube-5.4\temp -cp ./lib/common/*;./lib/server/*;C:\Users\Chester\Downloads\sonarqube
-5.4\sonarqube-5.4\lib\jdbc\h2\h2-1.3.176.jar org.sonar.server.app.WebServer C:\Users\Chester\AppData\Local\Temp\sq-process97
0956414984983594properties
```

1. Static Analysis

Sonarqube

- 웹 브라우저를 통해 <http://localhost:9000>을 입력하면 Dashboard를 볼 수 있다.



The screenshot shows the SonarQube web interface. At the top is a navigation bar with the SonarQube logo and menu items: Dashboards, Issues, Measures, Rules, Quality Profiles, Quality Gates, and More. Below the navigation bar is the 'Home' section. On the left, there is a 'Welcome to SonarQube Dashboard' message with instructions on how to proceed. On the right, there are two 'PROJECTS' sections, both of which currently display 'No data'.

sonarqube Dashboards ▾ Issues Measures Rules Quality Profiles Quality Gates More ▾

Home

Welcome to SonarQube Dashboard

Since you are able to read this, it means that you have successfully started your SonarQube server. Well done!

If you have not removed this text, it also means that you have not yet played much with SonarQube. So here are a few pointers for your next step:

- » Do you now want to [run analysis](#) on a project?
- » Maybe start [customizing dashboards](#)?
- » Or simply browse the [complete documentation](#)?
- » If you have a question or an issue, please visit the [Get Support](#) page.

PROJECTS

QG	NAME ▲	VERSION	LO
No data			

PROJECTS

No data

1. Static Analysis

Sonarqube

- Eclipse의 plug-in 형태로 제공
본 환경에서는 Eclipse의 plug-in을 설치하여 사용

SonarQube 3.5.0

This plugin is deprecated and is replaced by SonarLint
(<https://marketplace.eclipse.org/content/sonarlint>). [more info](#)



by [SonarSource](#), LGPL

★ 90



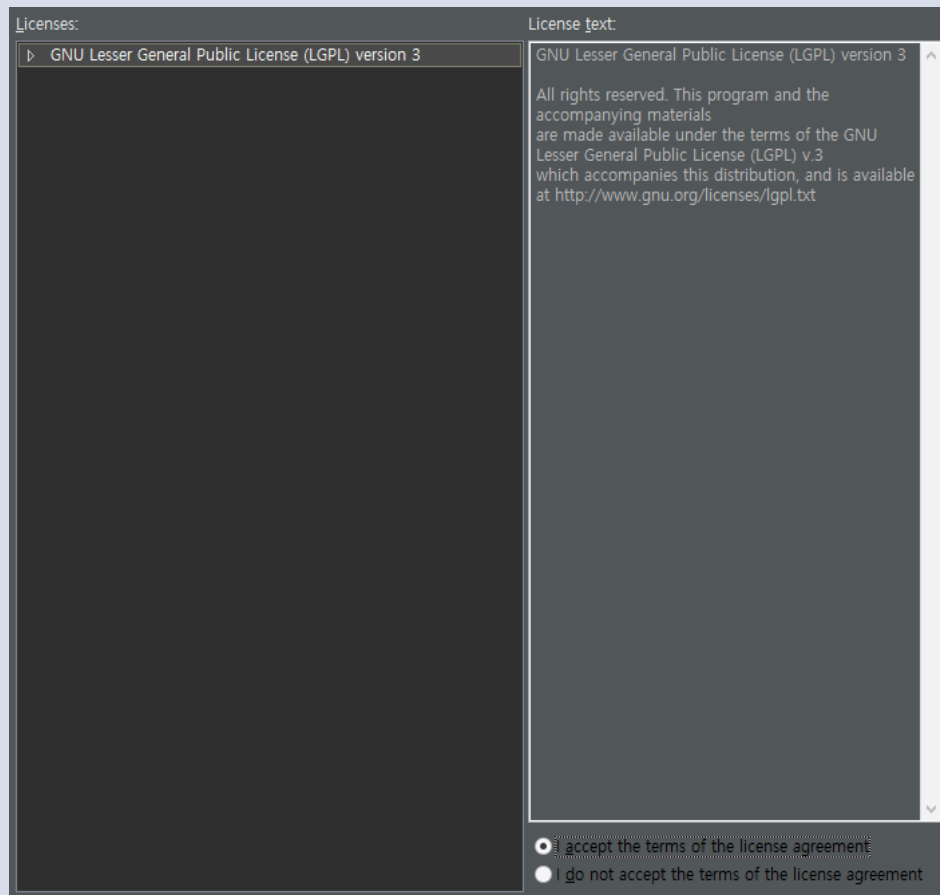
Installs: 133K (2,902 last month)

Install

1. Static Analysis

Sonarqube

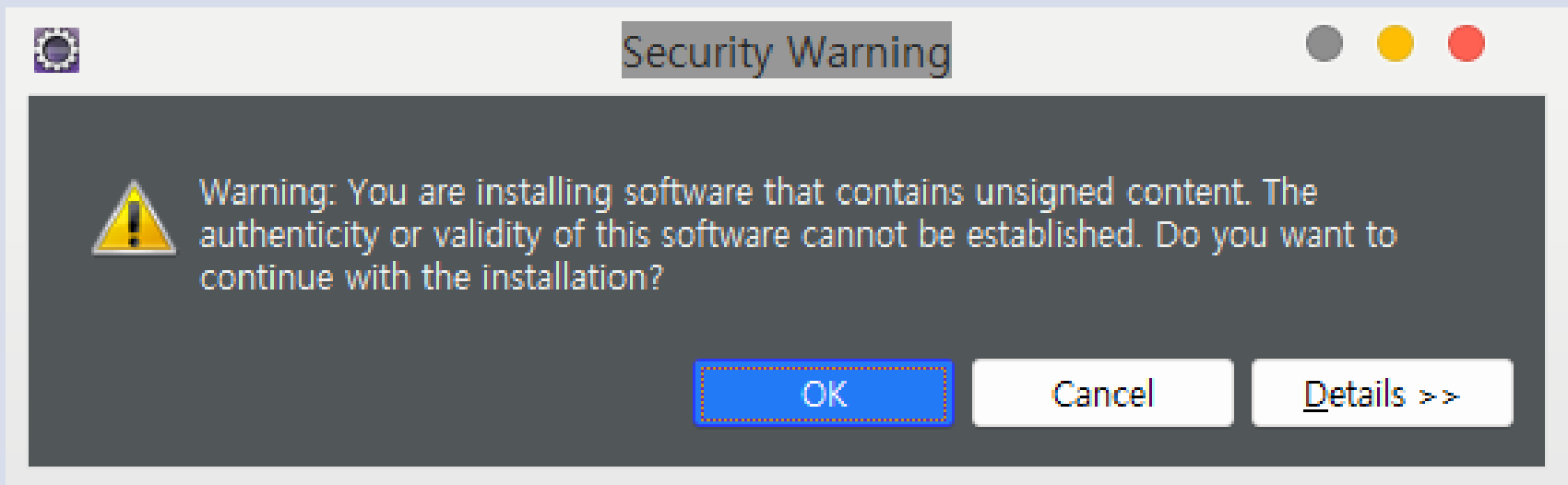
- License 동의 후 Finish 클릭



1. Static Analysis

Sonarqube

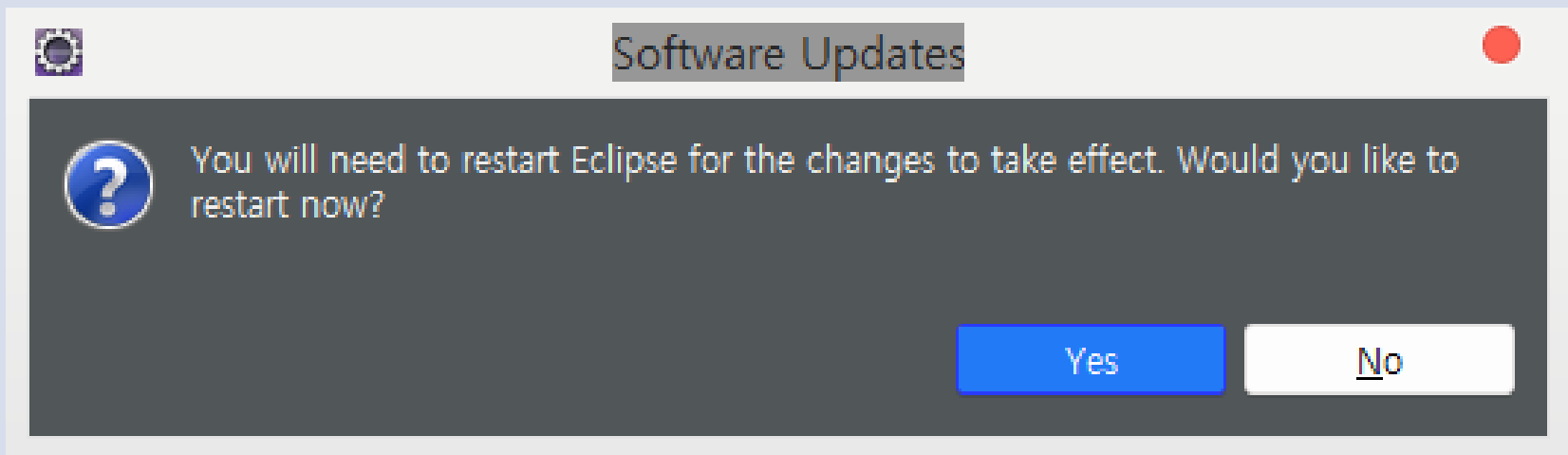
- 지금 설치하는 plug-in이 믿을만한 소프트웨어인지 판단을 위한 Warning이므로 OK를 클릭 후 설치를 계속 진행



1. Static Analysis

Sonarqube

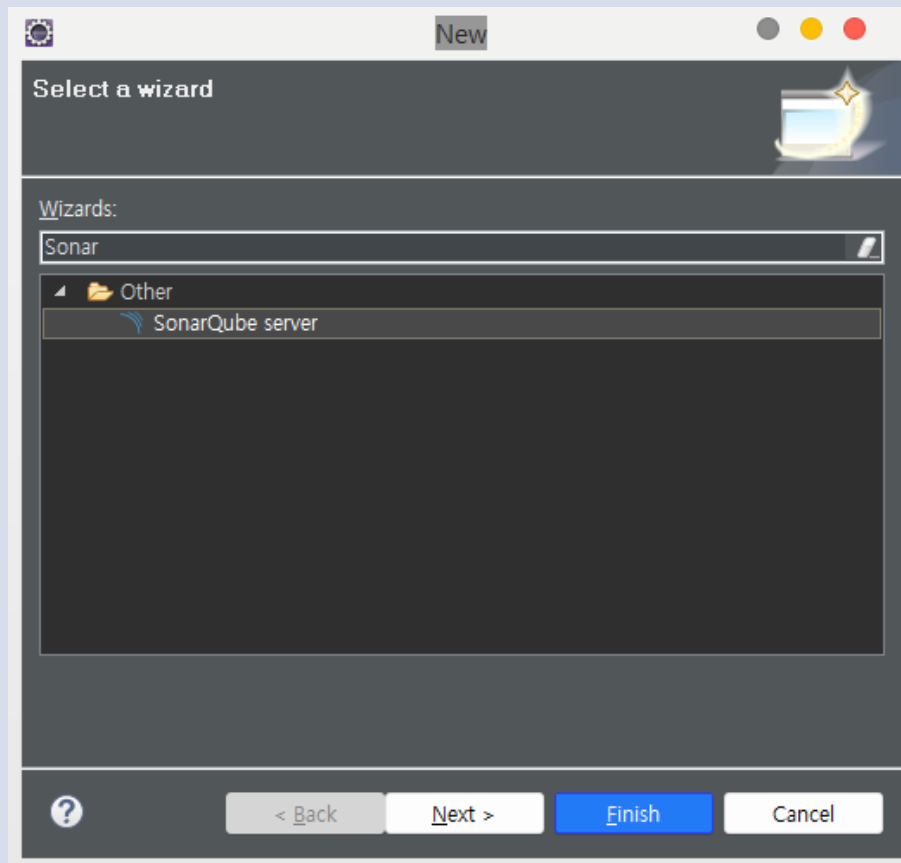
- 설치가 끝나면 Eclipse의 재실행 필요



1. Static Analysis

Sonarqube

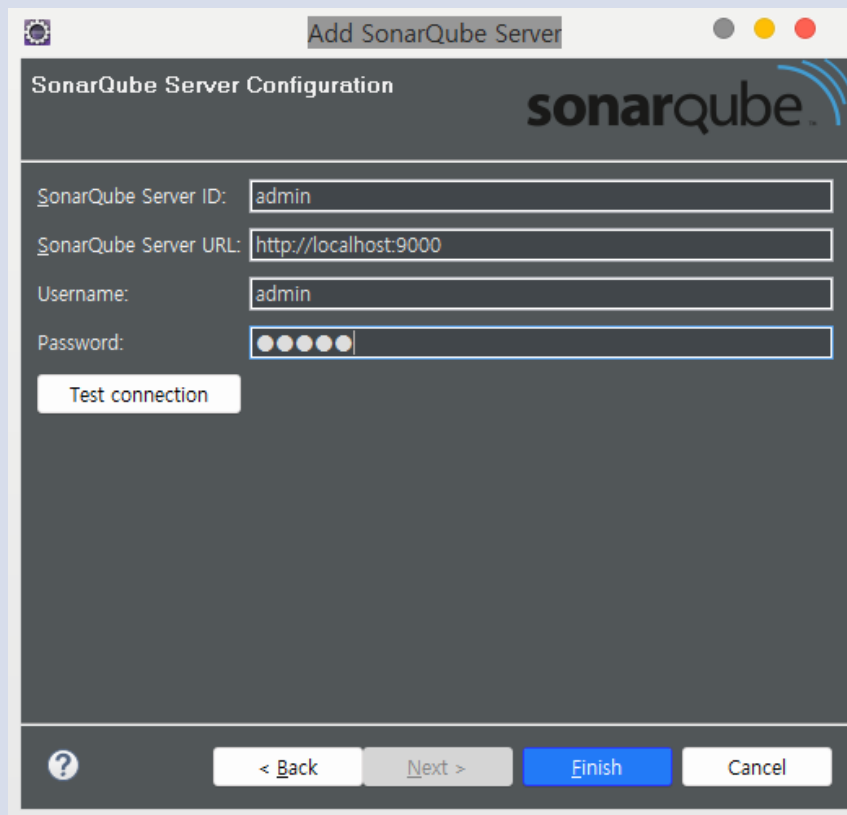
- New – others에서 SonarQube를 입력, SonarQube server를 선택



1. Static Analysis

Sonarqube

- Server의 Setting대로 접속하면 연동을 마칩

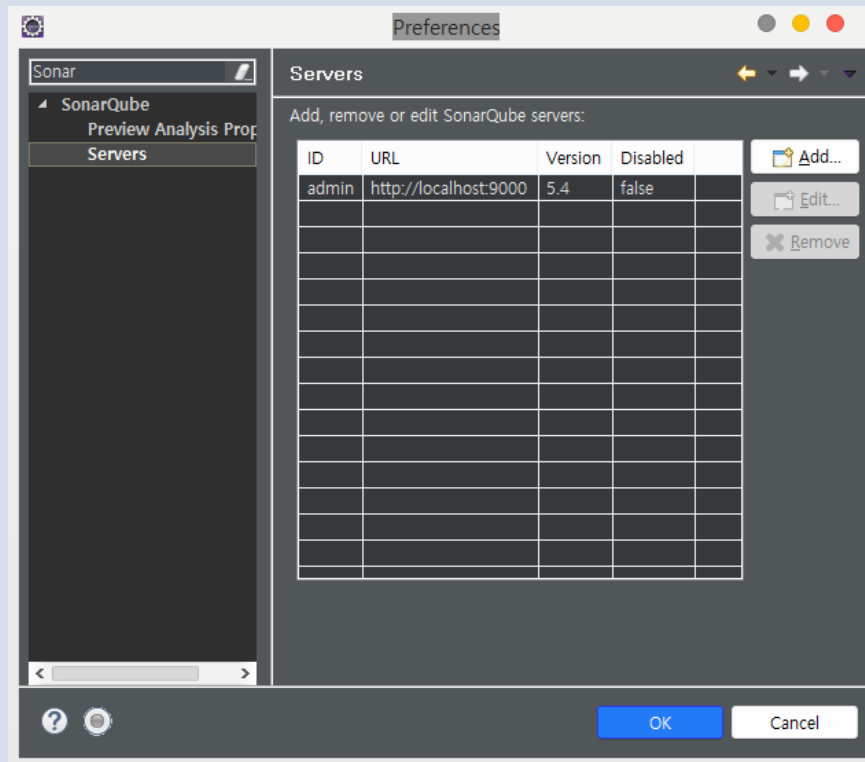


The image shows a screenshot of a software dialog box titled "Add SonarQube Server". The dialog box has a dark grey background and a white border. At the top left, there is a small icon of a gear. The title bar contains the text "Add SonarQube Server" and three window control buttons (minimize, maximize, close). Below the title bar, the text "SonarQube Server Configuration" is displayed on the left, and the "sonarqube" logo is on the right. The main area of the dialog box contains four input fields: "SonarQube Server ID:" with the value "admin", "SonarQube Server URL:" with the value "http://localhost:9000", "Username:" with the value "admin", and "Password:" with five dots. Below these fields is a "Test connection" button. At the bottom of the dialog box, there is a row of four buttons: a help button (question mark icon), a "< Back" button, a "Next >" button, and a "Finish" button (highlighted in blue). To the right of the "Finish" button is a "Cancel" button.

1. Static Analysis

Sonarqube

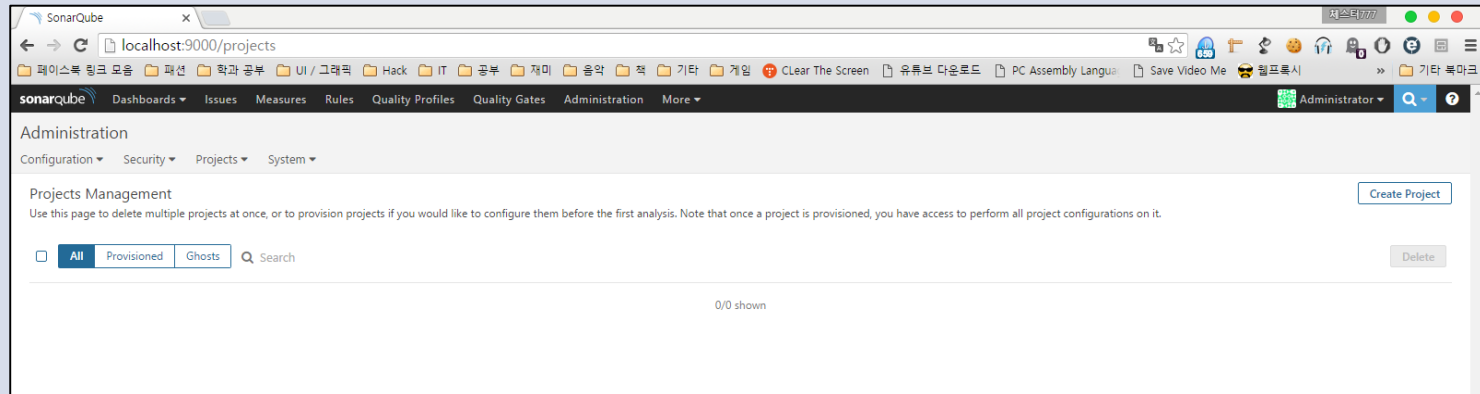
- 등록된 서버는 여기서 확인 할 수 있다.



1. Static Analysis

Sonarqube

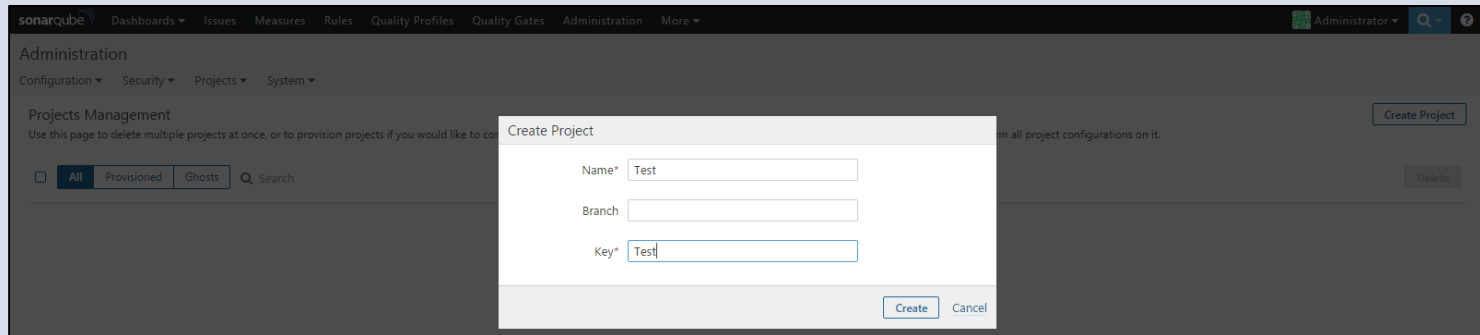
- 이후 Sonarqube 서버와 Eclipse를 연동하기 위해 Sonarqube에서 프로젝트를 생성



1. Static Analysis

Sonarqube

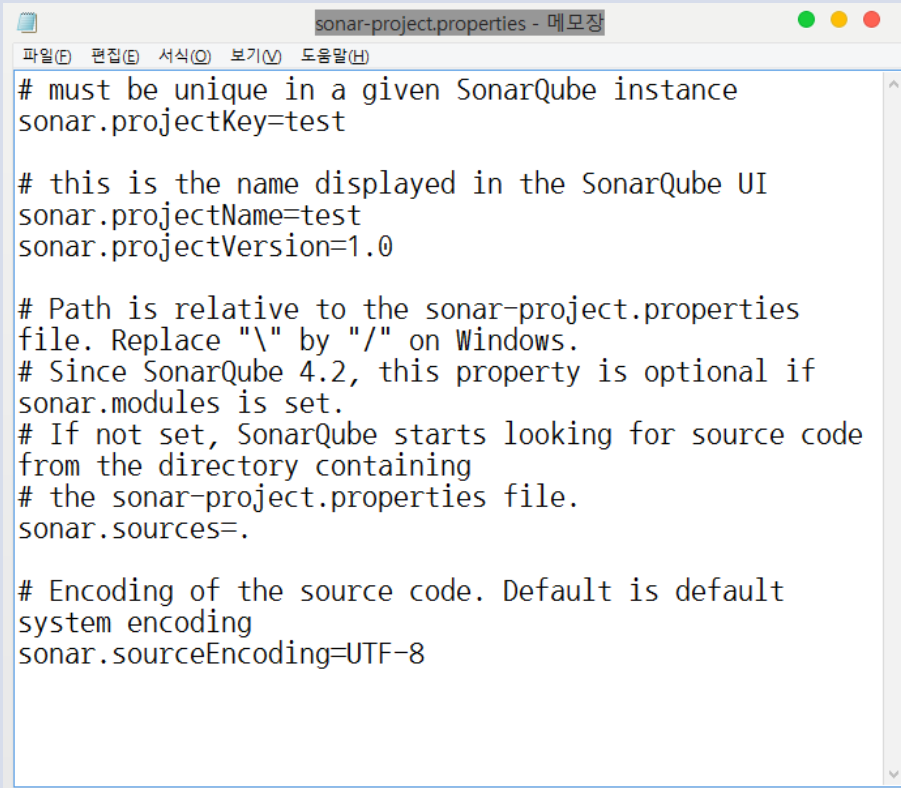
- Login(admin/admin) 후,
Administration – Project – Management –Create



1. Static Analysis

Sonarqube

- 정적 테스트를 진행하고자 하는 프로젝트의 루트폴더로 이동
파일명이 sonar-project.properties인 파일을 생성하고 아래의 내용을 입력



```
sonar-project.properties - 메모장
파일(F) 편집(E) 서식(O) 보기(V) 도움말(H)
# must be unique in a given SonarQube instance
sonar.projectKey=test

# this is the name displayed in the SonarQube UI
sonar.projectName=test
sonar.projectVersion=1.0

# Path is relative to the sonar-project.properties
file. Replace "\" by "/" on Windows.
# Since SonarQube 4.2, this property is optional if
sonar.modules is set.
# If not set, SonarQube starts looking for source code
from the directory containing
# the sonar-project.properties file.
sonar.sources=.

# Encoding of the source code. Default is default
system encoding
sonar.sourceEncoding=UTF-8
```

1. Static Analysis

Sonarqube

- 프로젝트 Root Directory에서 sonar-runner를 실행

```
C:\Users\Chester\SourceCode\Java\Eclipse Workspace\Multi_Client_Test>sonar-runner
C:\Users\Chester\Downloads\sonar-runner-dist-2.4
SonarQube Runner 2.4
Java 1.8.0_77 Oracle Corporation (64-bit)
Windows 8.1 6.3 amd64
INFO: Runner configuration file: C:\Users\Chester\Downloads\sonar-runner-dist-2.4\conf\sonar-runner.properties
INFO: Project configuration file: C:\Users\Chester\SourceCode\Java\Eclipse Workspace\Multi_Client_Test\sonar-project.properties
INFO: Default locale: "ko_KR", source code encoding: "UTF-8"
INFO: Work directory: C:\Users\Chester\SourceCode\Java\Eclipse Workspace\Multi_Client_Test\.\sonar
INFO: SonarQube Server 5.4
20:08:45.600 INFO - Load global repositories
20:08:47.354 INFO - Load global repositories (done) | time=1748ms
20:08:47.451 INFO - User cache: C:\Users\Chester\.sonar\cache
20:08:48.176 INFO - Load plugins index
20:08:48.211 INFO - Load plugins index (done) | time=35ms
20:08:50.480 INFO - Process project properties
20:08:51.027 INFO - Load project repositories
20:08:51.108 INFO - Load project repositories (done) | time=81ms
20:08:51.145 INFO - Apply project exclusions
20:08:51.262 INFO - Load quality profiles
20:08:51.722 INFO - Load quality profiles (done) | time=459ms
20:08:51.752 INFO - Load active rules
20:08:57.364 INFO - Load active rules (done) | time=5612ms
20:08:57.401 WARN - SCM provider autodetection failed. No SCM provider claims to support this project. Please use sonar.scm.provider to define SCM of your project.
20:08:57.402 INFO - Publish mode
20:08:57.408 INFO - ----- Scan test
20:08:57.880 INFO - Load server rules
20:08:58.752 INFO - Load server rules (done) | time=872ms
20:08:59.079 INFO - Base dir: C:\Users\Chester\SourceCode\Java\Eclipse Workspace\Multi_Client_Test
20:08:59.081 INFO - Working dir: C:\Users\Chester\SourceCode\Java\Eclipse Workspace\Multi_Client_Test\.\sonar
20:08:59.089 INFO - Source paths: .
20:08:59.090 INFO - Source encoding: UTF-8, default locale: ko_KR
20:08:59.092 INFO - Index files
20:08:59.197 WARN - Invalid character encountered in file C:\Users\Chester\SourceCode\Java\Eclipse Workspace\Multi_Client_Test\src\ServerThread.java at line 8 for encoding UTF-8. Please fix file content or configure the encoding to be used using property 'sonar.sourceEncoding'.
20:08:59.246 INFO - 4 files indexed
```

1. Static Analysis

Sonarqube

- 마지막으로 결과를 서버에서 확인 가능

The screenshot displays the SonarQube web interface in a browser window. The address bar shows the URL `localhost:9000/issues/search`. The page title is "SonarQube" and the user is logged in as "Administrator". The main navigation bar includes "Dashboards", "Issues", "Measures", "Rules", "Quality Profiles", "Quality Gates", "Administration", and "More".

The "Issues" section is active, showing a list of search results. The left sidebar contains filters for "Issues" and "Debt", and a "Severity" table:

Severity	Count	Info	Count
Blocker	1	Minor	12
Critical	3	Info	0
Major	15		

The "Resolution" table shows:

Resolution	Count	Fixed	Count
Unresolved	31	Fixed	0
False Positive	0	Won't fix	0
Removed	0		

The main content area displays a list of issues for the file `test/src/Client.java`. The issues are:

- Move this file to a named package.** (Minor, Open, Not assigned, Not planned, 10min debt, convention)
- Add a private constructor to hide the implicit public one.** (Major, Open, Not assigned, Not planned, 30min debt, design)
- Remove the declaration of thrown exception 'java.net.UnknownHostException' which is a subclass of 'java.io.IOException'.** (Minor, Open, Not assigned, Not planned, 5min debt, clumsy, unused)
- Remove this useless assignment to local variable 'socket'.** (Major, Open, Not assigned, Not planned, 15min debt, cert, cwe, suspicious, unused)
- Remove this useless assignment to local variable 'oos'.** (Major, Open, Not assigned, Not planned, 15min debt, cert, cwe, suspicious, unused)
- Remove this useless assignment to local variable 'ois'.** (Major, Open, Not assigned, Not planned, 15min debt, cert, cwe, suspicious, unused)
- Close this 'Socket'.** (Blocker, Open, Not assigned, Not planned, 5min debt, bug, cert, cwe, denial-of-service, leak, security)
- Replace this usage of System.out or System.err by a logger.** (Major, Open, Not assigned, Not planned, 10min debt, bad-practice)
- Replace this usage of System.out or System.err by a logger.** (Major, Open, Not assigned, Not planned, 10min debt, bad-practice)

The bottom of the screenshot shows the start of another issue for `test/src/Server.java`: **Move this file to a named package.** (Minor, Open, Not assigned, Not planned, 10min debt, convention)



2

System Analysis Tool

2. System Analysis Tool

- 시스템 분석은 어떤 업무를 컴퓨터를 써서 시스템화하려고 할 경우에 먼저 그 업무를 분석하고, 업무의 흐름을 조사하며, 어떤 정보가 언제 발생하고 어떤 정보를 필요로 하는가 등을 파악해서 시스템을 위한 준비다.

2. System Analysis Tool

Testlink

- 테스트 케이스가 어떻게 요구 사항에 맵핑이 되는지, 테스트 케이스의 시나리오가 어떻게 되고 요구 되는 결과는 어떻게 되는지, 테스트 결과는 어떻게 되는지, 그리고 Version 별 릴리즈에 따른 테스트 계획과 결과는 어떻게 되는지를 관리한다.
- 오픈 소스 도구 중에서 널리 사용되며, Learning Curve가 낮은 도구 중 하나이다.



2. System Analysis Tool

Testlink

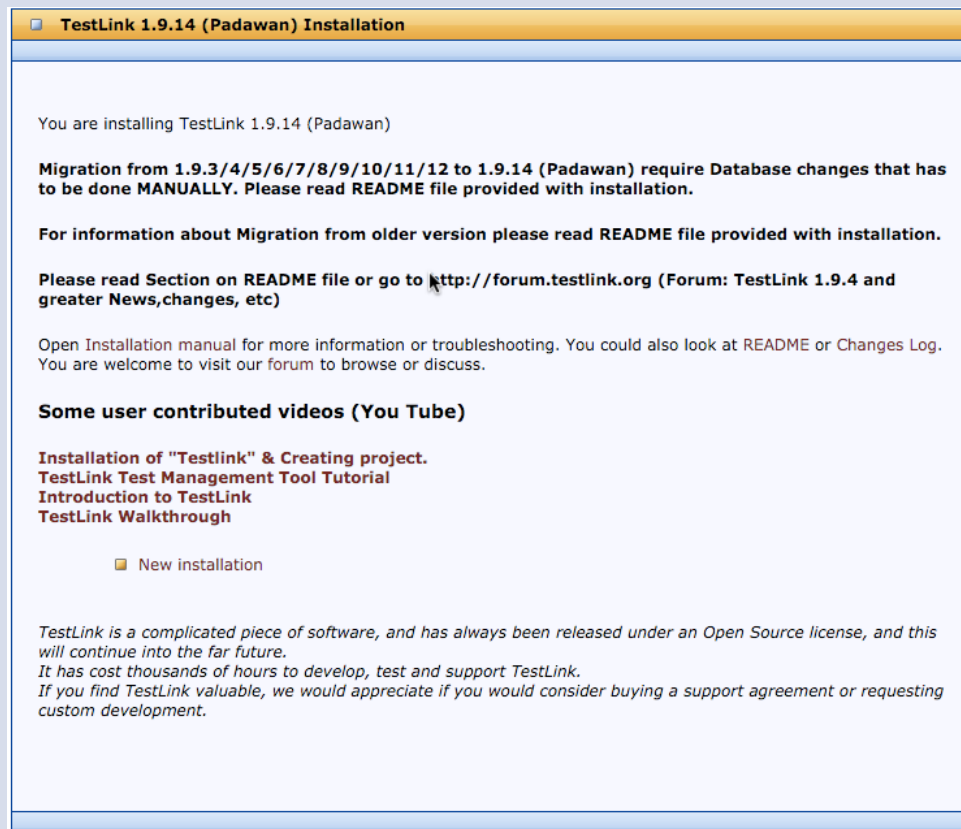
- Testlink 다운로드
<http://teamst.org> → 최신의 testlink 파일 download
- 사전에 APM 설치가 필요



2. System Analysis Tool

Testlink

- 설치파일을 실행시킨 뒤 초기 화면



2. System Analysis Tool

Testlink

- 라이선스 동의 후 Continue 선택

TestLink is developed and shared under GPL license. You are welcome to share your changes with community. Please, confirm your understanding below.

The GNU General Public License is a Free Software license.

Like any Free Software license, it grants to you the four following freedoms:

- *The freedom to run the program for any purpose.*
- *The freedom to study how the program works and adapt it to your needs.*
- *The freedom to redistribute copies so you can help your neighbor.*
- *The freedom to improve the program and release your improvements to the public, so that the whole community benefits.*

You may exercise the freedoms specified here provided that you comply with the express conditions of this license. The principal conditions are:

- *You must conspicuously and appropriately publish on each copy distributed an appropriate copyright notice and disclaimer of warranty and keep intact all the notices that refer to this License and to the absence of any warranty; and give any other recipients of the Program a copy of the GNU General Public License along with the Program. Any translation of the GNU General Public*

I agree to the terms set out in this license.

Continue

2. System Analysis Tool

Testlink

- Testlink를 설치 뒤 Continue 선택

Read/write permissions

For security reasons we suggest that directories tagged with [S] on following messages, will be made UNREACHABLE from browser.
Give a look to README file, section 'Installation & SECURITY' to understand how to change the defaults.

Checking if /var/www/testlink/gui/templates_c directory exists	OK
Checking if /var/www/testlink/gui/templates_c directory is writable (by user used to run webserver process)	OK
Checking if /var/testlink/logs/ directory exists [S]	OK
Checking if /var/testlink/logs/ directory is writable (by user used to run webserver process)	OK
Checking if /var/testlink/upload_area/ directory exists [S]	OK
Checking if /var/testlink/upload_area/ directory is writable (by user used to run webserver process)	OK

Your system is prepared for TestLink configuration (no fatal problem found).

2. System Analysis Tool

Testlink

- Database 접근을 위한 아이디와 비밀번호 입력

Set an existing database user with administrative rights (root):

Database admin login

Database admin password

*This user requires permission to create databases and users on the Database Server.
These values are used only for this installation procedures, and is not saved.*

Define database User for Testlink access:

TestLink DB login

TestLink DB password

*This user will have permission only to work on TestLink database and will be stored in TestLink configuration.
All TestLink requests to the Database will be done with this user.*

After successful installation You will have the following login for TestLink Administrator:
login name: admin
password : admin

2. System Analysis Tool

Testlink

- Database 접근을 위한 아이디와 비밀번호 입력

TestLink setup will now attempt to setup the database:

Creating connection to Database Server:OK!

Database testlink does not exist.

Will attempt to create:

Creating database `testlink` :OK!

Creating Testlink DB user `jinh574` :OK! (ok - new user)

Processing:sql/mysql/testlink_create_tables.sql

OK!

Writing configuration file:**Failed!**

TestLink couldn't write the config file. Please copy the following into the `../config_db.inc.php` file:

```
<?php
// Automatically Generated by TestLink Installer - Tue, 12 Apr 16 17:52:59
+0900
define('DB_TYPE', 'mysql');
define('DB_USER', 'jinh574');
define('DB_PASS', 'dhaprk12');
define('DB_HOST', 'localhost');
define('DB_NAME', 'testlink');
define('DB_TABLE_PREFIX', '');
```

Once that's been done, you can log into TestLink by pointing your browser at your TestLink site.

2. System Analysis Tool

Testlink

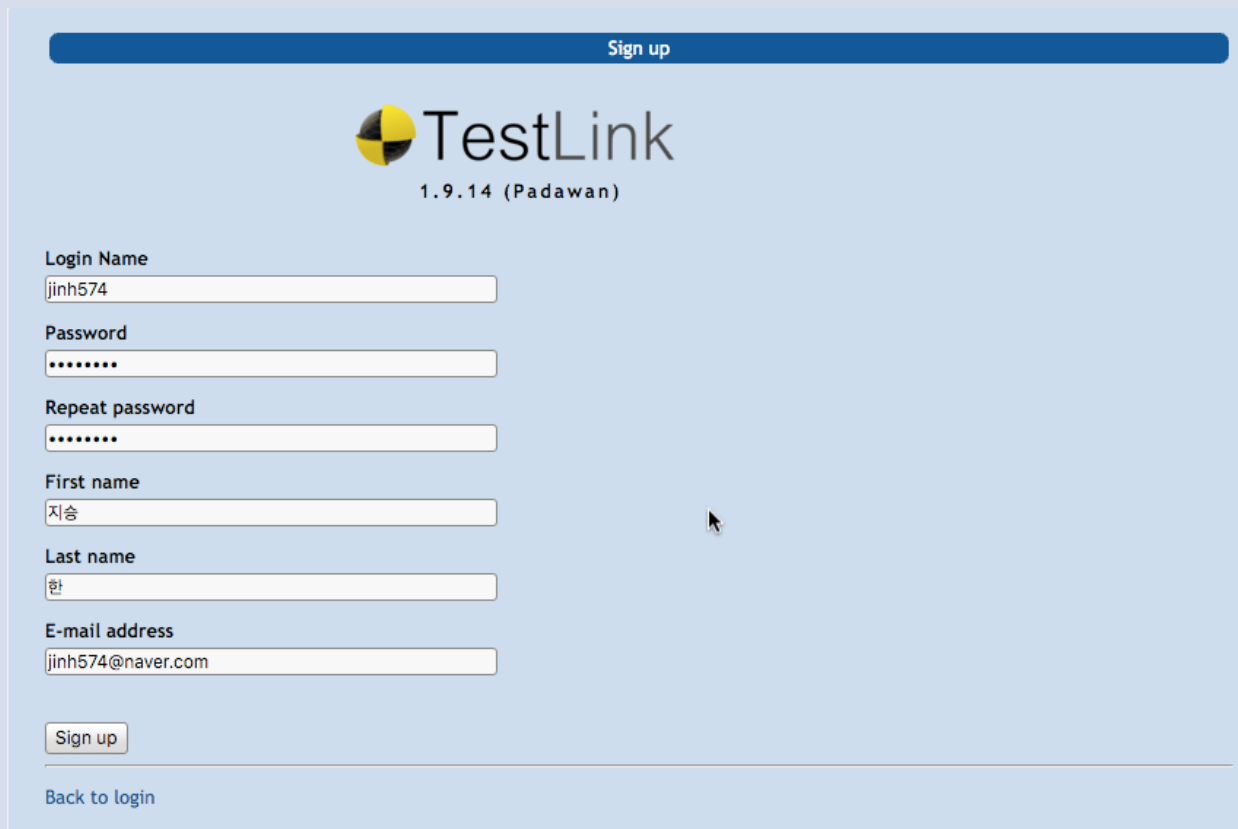
- Database 환경 설정 값 수정

```
<?php
// Automatically Generated by TestLink Installer - Tue, 12 Apr 16 17:57:35 +0900
define('DB_TYPE', 'mysql');
define('DB_USER', 'jinh574');
define('DB_PASS', 'dhaprk12');
define('DB_HOST', 'localhost');
define('DB_NAME', 'testlink');
define('DB_TABLE_PREFIX', '');
~
```


2. System Analysis Tool

Testlink

- Testlink 가입 화면



Sign up

 TestLink
1.9.14 (Padawan)

Login Name

Password

Repeat password

First name

Last name

E-mail address

[Back to login](#)

2. System Analysis Tool

Testlink

- Testlink 와 Redmine 연동

Issue Tracker	<input type="text" value="JS-redmine"/>
Type	redmine (Interface: rest) Show configuration example
Configuration	<pre><issuetracker> <urlbase>http://localhost/redmine/</urlbase> <urlview>http://localhost/issues/</urlview> </issuetracker></pre>
Configuration example	

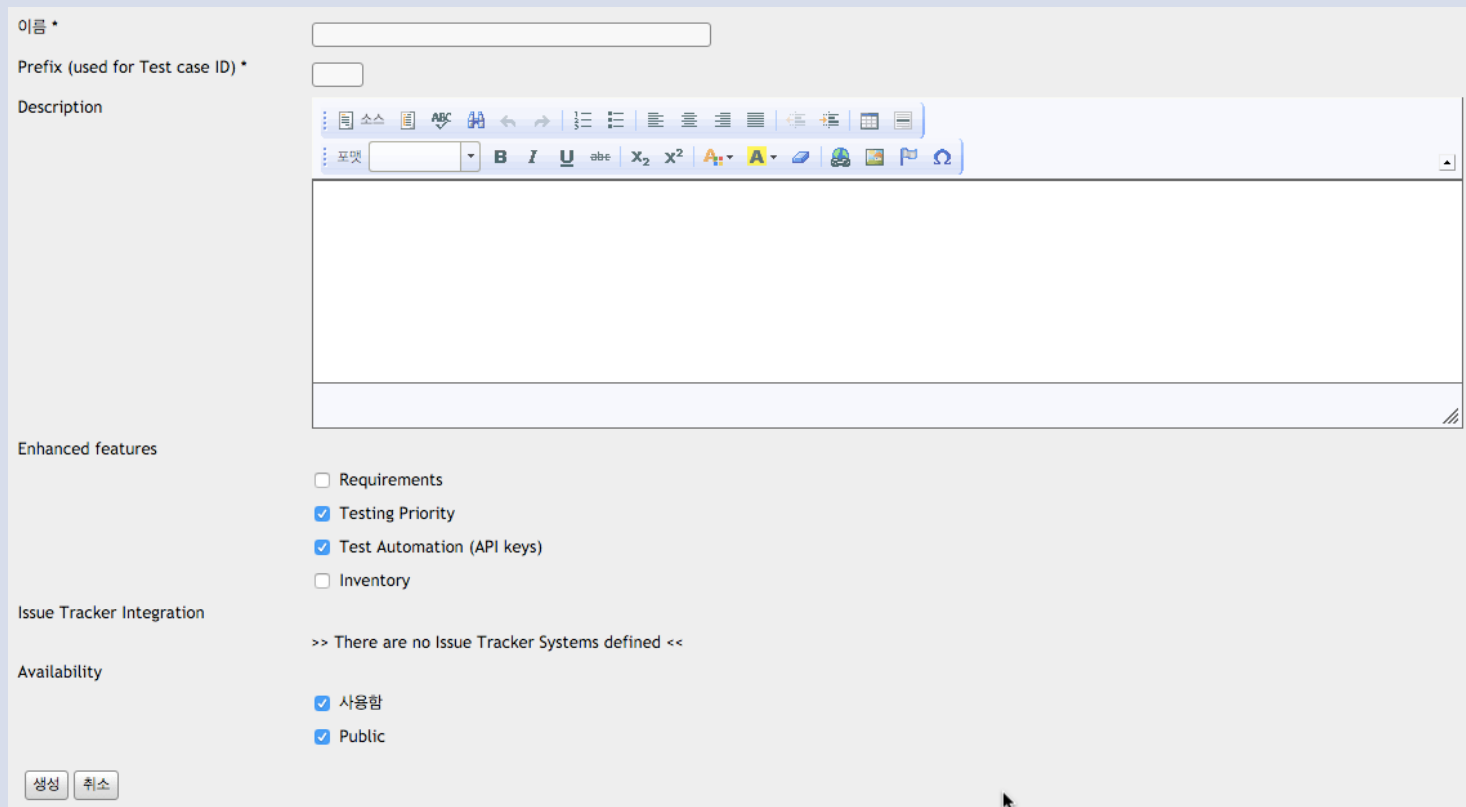
저장

취소

2. System Analysis Tool

Testlink

- Testlink 프로젝트 생성



The screenshot shows the Testlink project creation interface. It includes the following sections:

- 이름 ***: A text input field for the project name.
- Prefix (used for Test case ID) ***: A text input field for the prefix.
- Description**: A rich text editor with a toolbar containing icons for bold, italic, underline, text color, background color, link, unlink, and other formatting options.
- Enhanced features**: A list of checkboxes for additional features:
 - Requirements
 - Testing Priority
 - Test Automation (API keys)
 - Inventory
- Issue Tracker Integration**: A message that reads ">> There are no Issue Tracker Systems defined <<".
- Availability**: A list of checkboxes for project availability:
 - 사용함
 - Public

At the bottom left, there are two buttons: "생성" (Create) and "취소" (Cancel).

2. System Analysis Tool

Testlink

- Testlink 프로젝트 이름, 설명, 추가 항목, 이슈 트래커 등 추가 가능

The screenshot shows the Testlink project configuration form. The form is divided into several sections:

- 이름 ***: A text input field containing "연습프로젝트".
- Prefix (used for Test case ID) ***: A text input field containing "JS".
- Description**: A rich text editor with a toolbar. The content of the editor is "연습 프로젝트 생성". Below the editor, the HTML output is shown as "body p".
- Enhanced features**: A list of checkboxes:
 - Requirements
 - Testing Priority
 - Test Automation (API keys)
 - Inventory
- Issue Tracker Integration**:
 - 사용함
 - Issue Tracker**: A dropdown menu showing "JS-redmine (redmine (Interface: rest))".
- Availability**:
 - 사용함
 - Public

At the bottom left, there are two buttons: "생성" (Create) and "취소" (Cancel).

2. System Analysis Tool

Testlink

- Testlink 요구 명세서

The screenshot displays the Testlink web interface for managing requirements. The left sidebar is titled '네비게이터 - 요구사항 명세' and contains two main sections: 'Settings' and 'Filters'. The 'Settings' section includes a checkbox for '트리 자동 업데이트' (Tree auto-update) which is checked. The 'Filters' section includes several input fields and dropdown menus: 'Document ID', '제목' (Title), '상태' (Status) with a dropdown menu showing '[모두]' (All), 'Requirement Type' with a dropdown menu showing '[모두]', 'Req. Spec. Type' with a dropdown menu showing '[모두]', 'Expected no. of testcases' (input field), 'Has relation of type' with a dropdown menu showing '[모두]', and 'TC ID' with the value 'JS-'. Below the filters are buttons for '적용' (Apply), 'Reset Filters', and '상세한 필터' (Detailed filters). At the bottom of the sidebar are buttons for 'Expand tree' and 'Collapse tree', and a folder icon labeled '연습프로젝트 (0)'. The main content area is titled '테스트 프로젝트 : 연습프로젝트 : 요구사항 명세' and contains three buttons: '새 요구사항 명세' (New requirement specification), 'Export All Requirement Specifications', and '가져오기' (Import).

2. System Analysis Tool

Testlink

- Testlink 요구사항 operation 추가

요구사항 명세 생성 테스트 프로젝트 : 연습프로젝트 ?

저장 취소

Document ID
js1

제목
요구사항

범위

소스

포맷 Normal B I U X₂ X² A A

- 사용자 로그인 정보를 받는다.
- 사용자 정보를 출력

body p

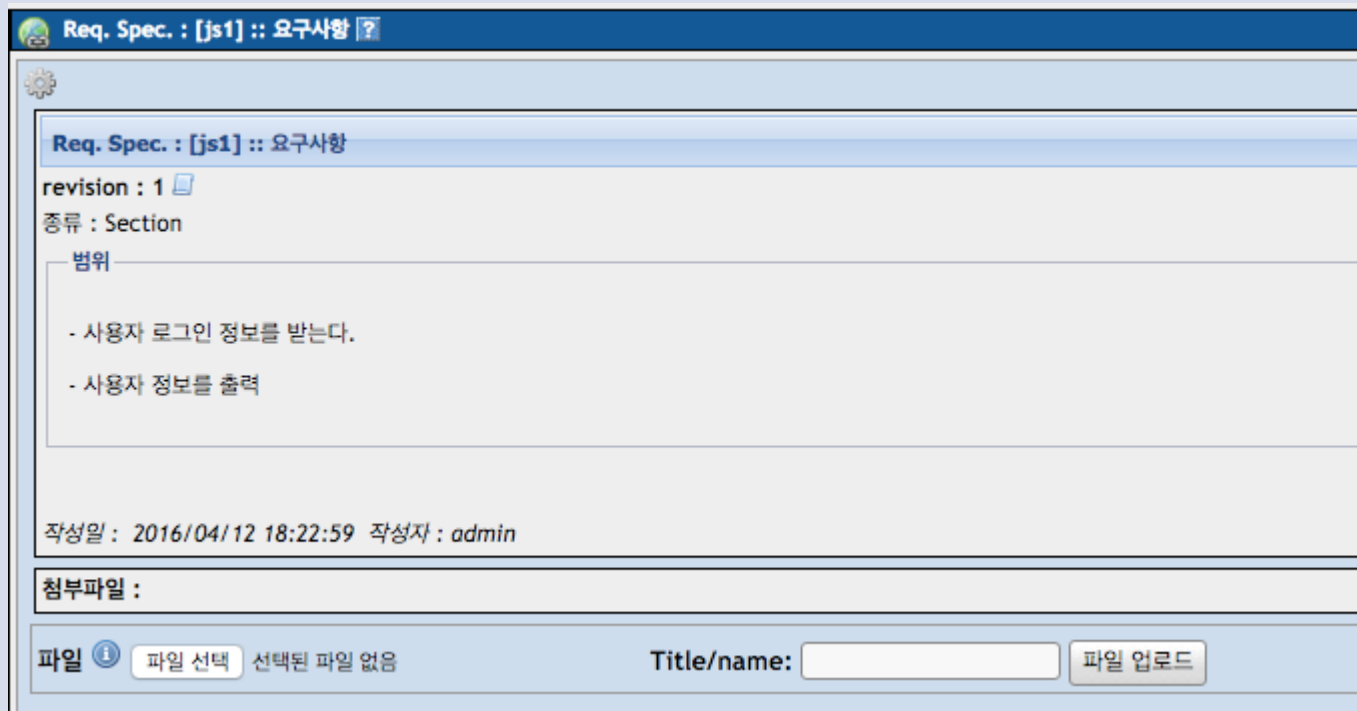
종류 Section

저장 취소

2. System Analysis Tool

Testlink

- Testlink 요구사항 operation 추가 후 모습



The screenshot displays the Testlink web interface for editing a requirement specification. The browser title bar shows "Req. Spec. : [js1] :: 요구사항?". The main content area is titled "Req. Spec. : [js1] :: 요구사항" and includes the following details:

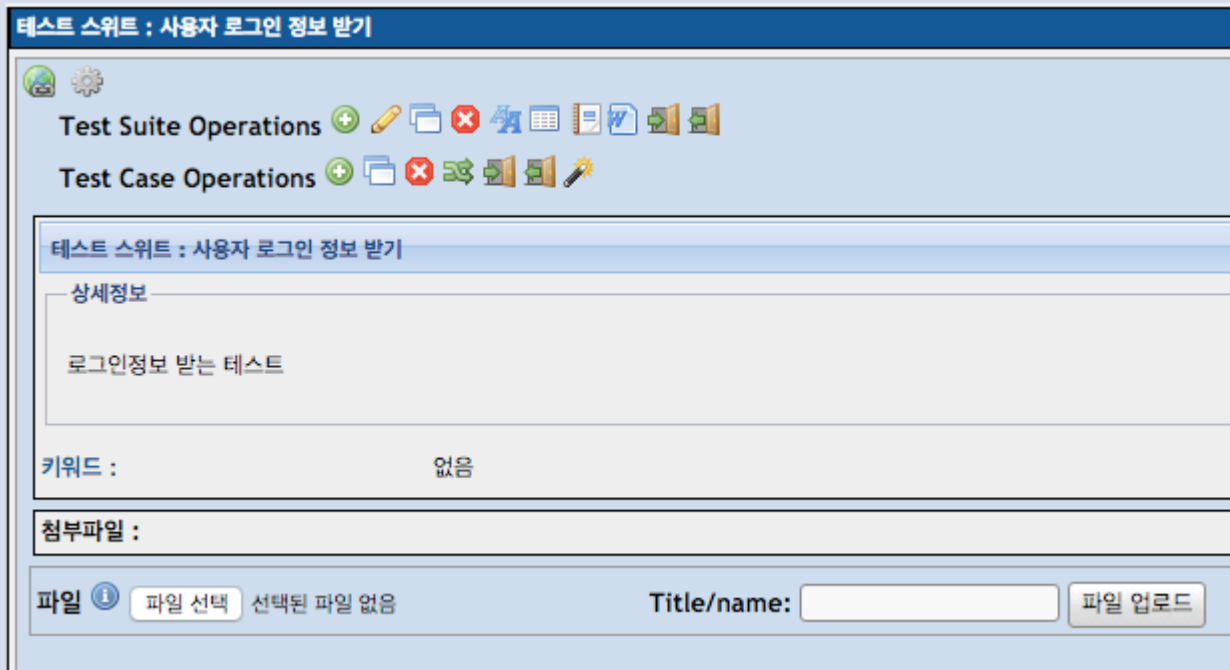
- revision : 1
- 종류 : Section
- 범위
- 사용자 로그인 정보를 받는다.
- 사용자 정보를 출력

At the bottom of the form, it shows the creation date and author: "작성일 : 2016/04/12 18:22:59 작성자 : admin". Below this is a section for attachments labeled "첨부파일 :". At the very bottom, there is a file upload area with a "파일" button, a "파일 선택" button, the text "선택된 파일 없음", a "Title/name:" input field, and a "파일 업로드" button.

2. System Analysis Tool

Testlink

- Testlink Test suite 만들기



The screenshot shows the Testlink web interface for creating a test suite. The title bar reads "테스트 스위트 : 사용자 로그인 정보 받기". Below the title bar, there are two rows of icons for "Test Suite Operations" and "Test Case Operations". The main content area shows the test suite name "테스트 스위트 : 사용자 로그인 정보 받기" and a "상세정보" (Detailed Information) section containing the text "로그인정보 받는 테스트". Below this, there are fields for "키워드" (Keywords) with the value "없음" (None), "첨부파일" (Attachments), and a "파일" (Files) section with a "파일 선택" (File Selection) button and a "Title/name:" input field. A "파일 업로드" (File Upload) button is also present.

2. System Analysis Tool

Testlink

- Testlink Test case 만들기

테스트 케이스

JS-1:사용자 정보

버전 1  

요약

이름 받기

Preconditions

 #	Step actions	예상결과		
1	이름을 받는다	스tring 변수 생성 및 저장		
2	스tring 변수에 값이 갺참은지 확인	스tring 값인지 확인		

Create step Resequence Steps

2. System Analysis Tool

Testlink

- Testlink Test Plan 생성

테스트 계획 관리 - 테스트 프로젝트 연습프로젝트

테스트 계획편집 - 테스트 계획 ⓘ

이름	테스트 계획
설명	<p>소스 ABC ↩ ↲ ↳ ↴ ↵ ↶ ↷ ↸ ↹ ↺ ↻ ↼ ↽ ↾ ↿ ↺ ↻ ↼ ↽ ↾ ↿</p> <p>포맷 <input type="text"/> B <i>I</i> <u>U</u> abc x_2 x^2 A: A ↵ ↶ ↷ ↸ ↹ ↺ ↻ ↼ ↽ ↾ ↿</p> <p>테스트 플랜 선택</p>
사용함	<input checked="" type="checkbox"/>
Public	<input type="checkbox"/>
API Key	4a367b0147235b6c1b5820537eadcf2e61a7f2c2422c8ac8d50e83d6beeaed15



2. System Analysis Tool

Testlink

- Testlink Test Plan 빌드 설정

빌드 관리 - 테스트 계획 : 테스트 계획

새 빌드 생성

이름	로그인관련 테스트
설명	<div style="border: 1px solid #ccc; padding: 5px;"><p>소스</p><p>Normal</p><p>B <i>I</i> <u>U</u> abc x_2 x^2 A A</p><p>body p</p></div>
사용함	<input checked="" type="checkbox"/>
진행	<input checked="" type="checkbox"/>
Release date	<input type="text"/>  

빌드는 이름으로 구별합니다. 각각의 빌드는 선택된 테스트 계획에 연결 되어 있습니다.
설명란에는 다음과 같은 것을 기재합니다 : 결과물 목록, 수정사항 또는 기능들, 승인서, 상태, 등.
빌드는 두 가지 속성을 가지고 있습니다 :
사용함 / 사용안함 - 빌드를 사용할 수 있는지 여부를 나타냅니다. 사용안함으로 설정한 빌드는 실행과 보고서에서 나타나지 않습니다.
진행 / 완료 - 진행 상태인 빌드에서만 테스트 결과를 변경할 수 있습니다.

2. System Analysis Tool

Testlink

- Testlink Test 지정

테스트 계획 : 테스트 계획 - 테스트 계획에 테스트 케이스 추가/삭제

Assign to user on add on build 테스터에게 메일로 알려 주기

Check/uncheck all Test cases for

사용자 로그인 정보 받기

테스트 케이스	버전	중요도			
<input checked="" type="checkbox"/> JS-1 : 사용자 정보	1	보통	10000	<input type="checkbox"/>	2016/04/12

2. System Analysis Tool

Testlink

- Testlink Test 실행



테스트 결과 : 빌드 로그인관련 테스트

인쇄 모든 실행결과들 보기 XML 결과 가져오기

테스트 계획 테스트 계획

빌드 로그인관련 테스트

테스트 스위트 : 사용자 로그인 정보 받기/

마지막 실행 (모든 빌드)

실행안함

아직 테스트 안함

테스트 케이스 JS-1 :: 버전: 1 :: 사용자 정보

테스터 : admin

요약

이름 받기

Preconditions

#	Step actions	예상결과	Execution notes	Result
1	이름을 받는다	스tring 변수 생성 및 저장		

파일 선택된 파일 없음



3 CTIP

3. CTIP

- Jenkins 대쉬 보드

The screenshot displays the Jenkins dashboard interface. At the top, there is a search bar and user information. The main content area shows a table of build statistics for two jobs: 'Android Build' and 'iOS Build'. The table includes columns for status (S), warning (W), name, last success, last failure, and last build time. Below the table, there are links for '아이콘: S M L' and 'Legend' with RSS feeds for '모두', '실패', and '최근 빌드'. On the left side, there is a sidebar with navigation options like '새로운 Item', '사람', '빌드 기록', 'Jenkins 관리', 'Credentials', and 'My Views'. Below these are sections for '빌드 대기 목록' (empty) and '빌드 실행 상태' (listing 'master' and 'Android Build Slave' with 2 pending builds each, and 'iOS Build Slave' as offline).

S	W	Name ↓	최근 성공	최근 실패	최근 소요 시간	
		Android Build	21 days - #44	26 days - #41	52 sec	
		iOS Build	26 days - #45	26 days - #44	36 sec	

아이콘: [S](#) [M](#) [L](#)

Legend RSS 모두 RSS 실패 RSS 최근 빌드

3. CTIP

- Jenkins와 Jdk, Git, Gradle 연동

JDK

JDK installations

JDK Name:

JAVA_HOME:

Install automatically

[Delete JDK](#)

[Add JDK](#)

List of JDK installations on this system

Git

Git installations

Git Name:

Path to Git executable:

Install automatically

[Delete Git](#)

[Add Git](#)

description

Gradle

Gradle installations

Gradle name:

GRADLE_HOME:

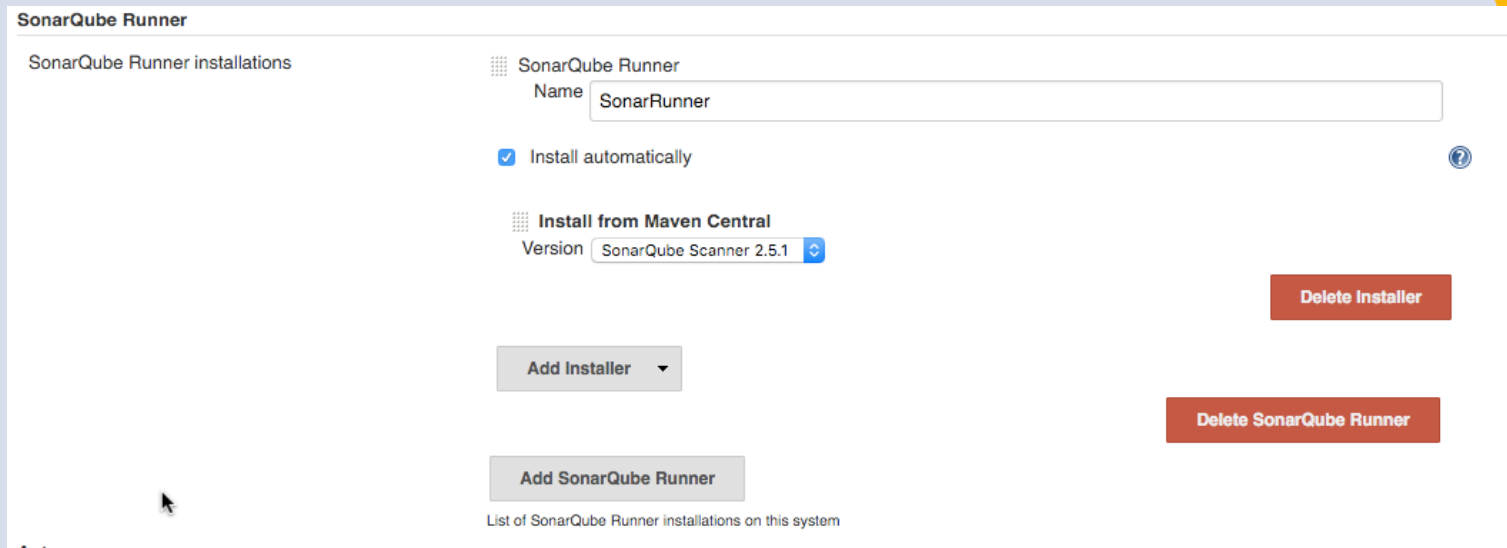
Install automatically

[Delete Gradle](#)

[저장](#) [적용](#)

3. CTIP

- Jenkins와 sonarqube runner 연동



The screenshot shows the 'SonarQube Runner' configuration page in Jenkins. The page title is 'SonarQube Runner'. Under the heading 'SonarQube Runner installations', there is a list of installers. The first entry is 'SonarQube Runner' with a name field containing 'SonarRunner'. The 'Install automatically' checkbox is checked. Below this, there is an 'Install from Maven Central' section with a version dropdown set to 'SonarQube Scanner 2.5.1'. At the bottom of the list, there is an 'Add SonarQube Runner' button. On the right side of the page, there are two red buttons: 'Delete Installer' and 'Delete SonarQube Runner'. At the bottom of the page, there is a link to 'List of SonarQube Runner installations on this system'.

SonarQube Runner

SonarQube Runner installations

SonarQube Runner

Name

Install automatically ?

Install from Maven Central

Version

List of SonarQube Runner installations on this system

3. CTIP

- Jenkins와 sonarqube 연동

SonarQube

Environment variables Enable injection of SonarQube server configuration as build environment variables
If checked, jobs administrators will be able to inject a SonarQube server configuration as environment variables in the build.

SonarQube installations

Name

Server URL
Default is http://localhost:9000

SonarQube account login
SonarQube account used to perform analysis. Mandatory when anonymous access is disabled.

SonarQube account password
SonarQube account used to perform analysis. Mandatory when anonymous access is disabled.

Disable
Check to quickly disable SonarQube on all jobs.

List of SonarQube installations

3. CTIP

- Jenkins와 E-mail과 Slack 연동

E-mail로 알려줌

SMTP 서버	<input type="text" value="smtp.naver.com"/>	
Default user e-mail suffix	<input type="text"/>	
<input checked="" type="checkbox"/> Use SMTP Authentication		
사용자명	<input type="text" value="jinh574"/>	
비밀번호	<input type="password" value="....."/>	
SSL 사용	<input checked="" type="checkbox"/>	
SMTP Port	<input type="text" value="465"/>	
Reply-To Address	<input type="text" value="jinh574@naver.com"/>	
Charset	<input type="text" value="UTF-8"/>	
<input type="checkbox"/> Test configuration by sending test e-mail		

Global Slack Notifier Settings

Team Subdomain	<input type="text" value="starnight"/>	
Integration Token	<input type="text" value="OLlrRLFIPGjswxVc57cR9I7A"/>	
Channel	<input type="text"/>	
Build Server URL	<input type="text" value="http://203.252.160.1:8080/"/>	

3. CTIP

- Jenkins와 Gitlab 연동

Gitlab

Gitlab host URL

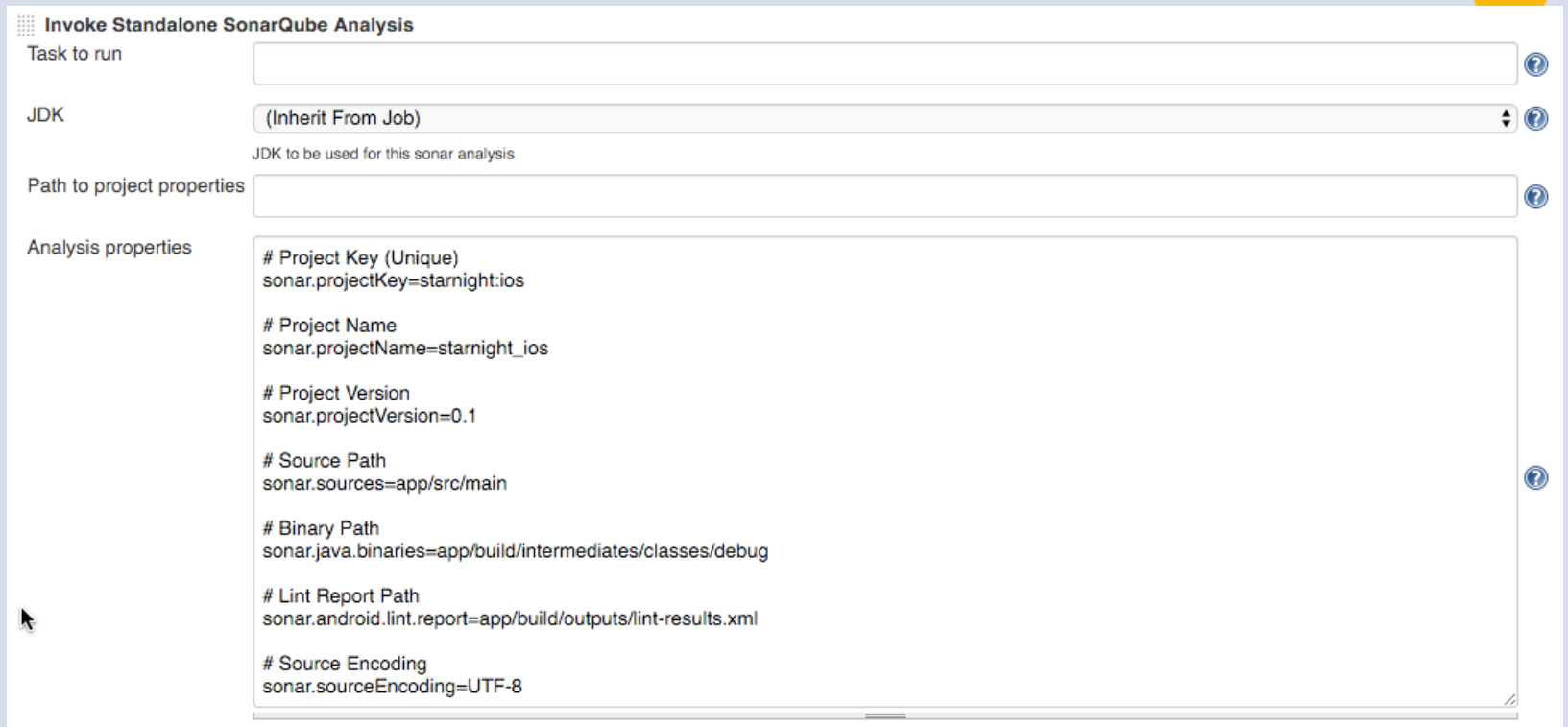
API Token
The complete URL to the Gitlab server (i.e. http://gitlab)

Ignore SSL Certificate Errors
API Token for accessing Gitlab

Test Connection

3. CTIP

- Sonarqube Runner Build 환경 설정



Invoke Standalone SonarQube Analysis

Task to run

JDK

JDK to be used for this sonar analysis

Path to project properties

Analysis properties

```
# Project Key (Unique)
sonar.projectKey=starnight:ios

# Project Name
sonar.projectName=starnight_ios

# Project Version
sonar.projectVersion=0.1

# Source Path
sonar.sources=app/src/main

# Binary Path
sonar.java.binaries=app/build/intermediates/classes/debug

# Lint Report Path
sonar.android.lint.report=app/build/outputs/lint-results.xml

# Source Encoding
sonar.sourceEncoding=UTF-8
```

3. CTIP

- Redmine 환경 설정

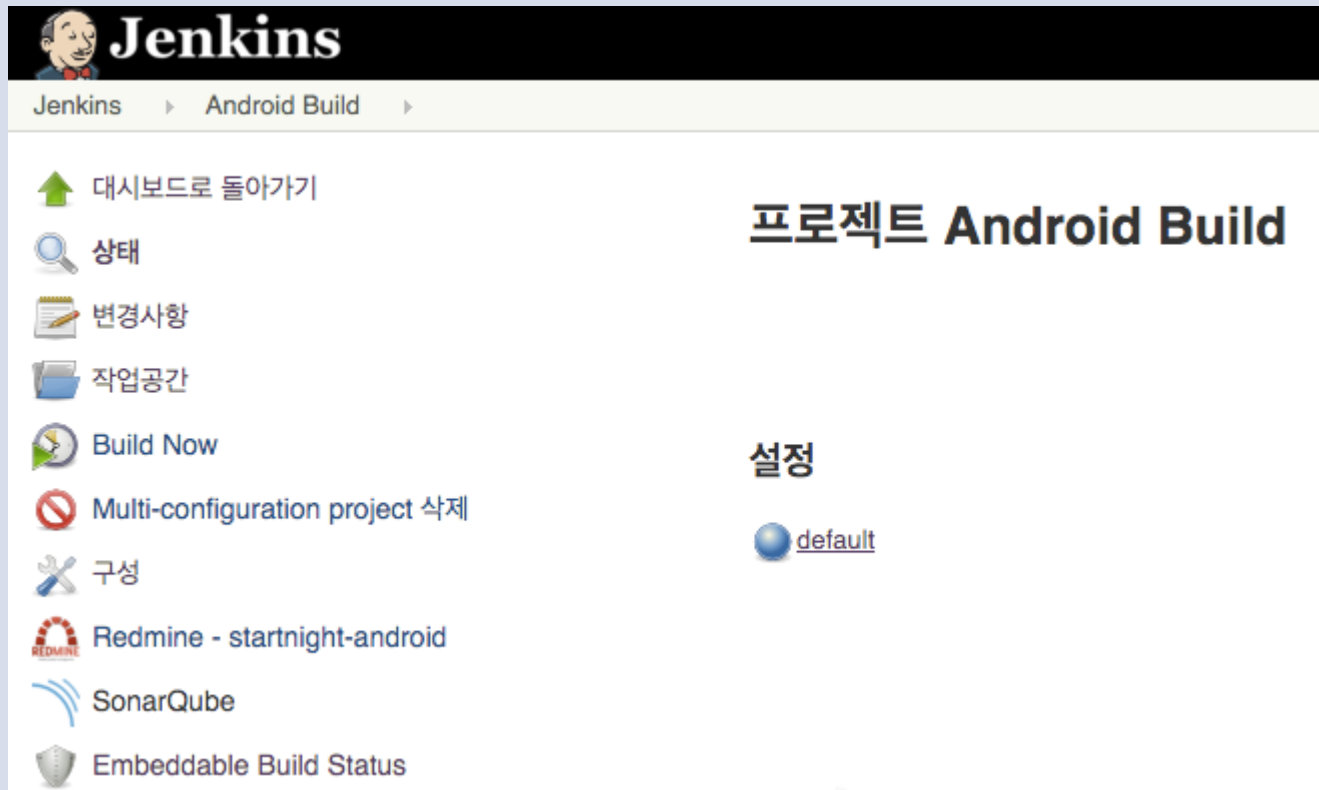
Redmine

Redmine websites

Name	<input type="text" value="redmine"/>
Base url	<input type="text" value="http://localhost:8000"/>
Version number	<input type="text" value="3.2.1"/> ⓘ

3. CTIP

- 프로젝트와 Redmine, Sonarqube 연결



Jenkins

Jenkins > Android Build >

↑ 대시보드로 돌아가기

🔍 상태

📄 변경사항

📁 작업공간

🔄 Build Now

🚫 Multi-configuration project 삭제

🔧 구성

🔗 Redmine - startnight-android

📶 SonarQube

🛡️ Embeddable Build Status

프로젝트 Android Build

설정

default



4 Summary

4. Summary

Environment

	Name	Version
운영체제	Ubuntu	12.14
자바	Jdk	1.8
개발도구	Eclipse	Mars
유닛 테스트 도구	JUnit	4.12
빌드 도구	Gradle	2.1
빌드 서버	Window	7
버전 관리	Git	2.7.2
이슈 트래커	Redmine	3.2.1
정적 분석 도구	Sonarqube	3.5
시스템 테스트 도구	Testlink	2.9.14



THANK YOU

정적 분석 & 시스템테스트 도구

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