

2018 SOFTWARE VERIFICATION

# Static Analyzers

SonarQube, PMD, FindBugs

201311263 김민환

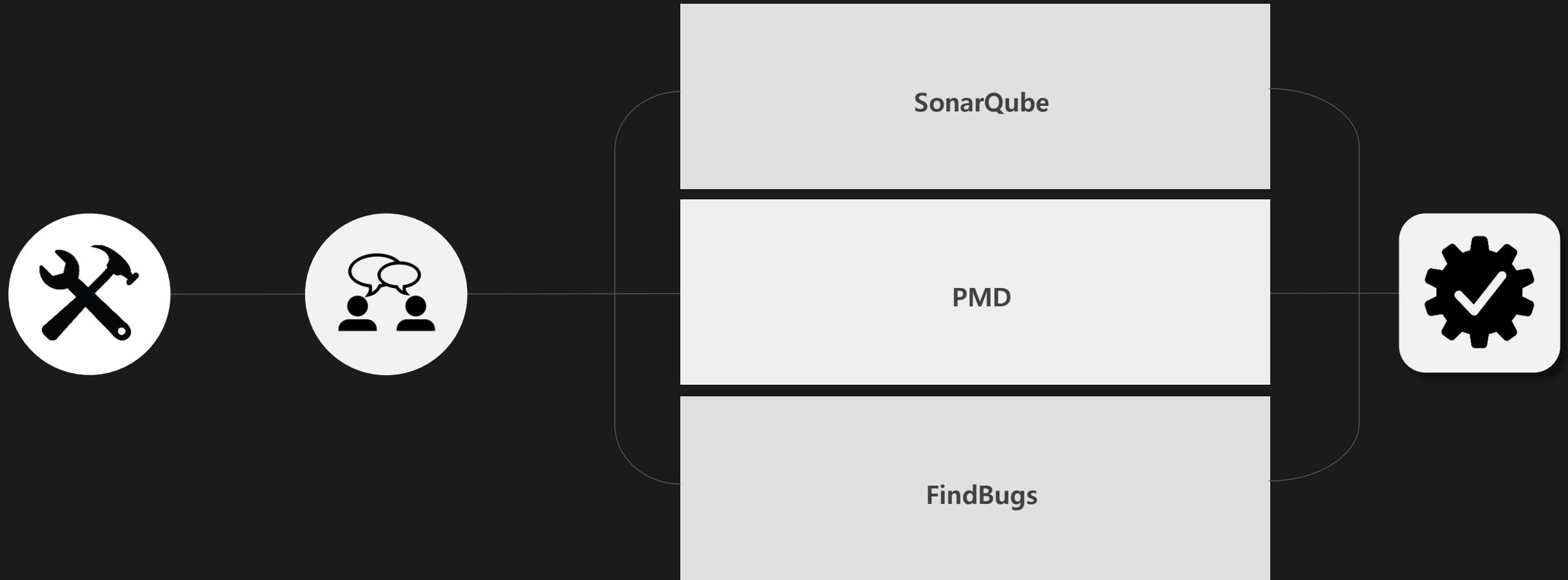
201311308 전세진

201411278 서희진

201411317 조민규

# Static Analyzers

2018 SOFTWARE VERIFICATION





- 프로젝트의 품질을 관리할 수 있도록 여러가지 모니터링 툴을 제공하는 오픈소스 플랫폼.
- CI Server 와 연동하여 사용.
- Java 포함 20가지 이상의 Programming Language로 제작된 프로젝트의 모니터링을 제공.



- Opensource Project인 관계로 License 비용 없이 다운 받아서 사용이 가능.
- 강력하고 심플한 Dashboard(Web Monitoring UI) 제공.
- Table과 Chart를 이용하여 시간이 지남에 따라 프로젝트가 얼마나 개선되고 있는지 시각적으로 보여줌.
- 코딩품질 개선을 위한 정보(소스의 중복이나 복잡도 그리고 유닛 테스트의 커버리지 및 잠재적인 버그의 정보 등)를 프로젝트 단위부터 파일단위까지 제공.

## MySQL DB생성 및 권한 부여(with Docker)

```
konkuk-sv-mysql:
  image: mysql:latest
  container_name: konkuk-sv-mysql
  ports:
    - "3333:3306"
  volumes:
    - /data/mysql/lib:/var/lib/mysql
    - /data/mariadb/configure/utf8.cnf:/etc/mysql/conf.d/utf8.cnf
    - /etc/localtime:/etc/localtime
  environment:
    MYSQL_ROOT_PASSWORD:
  networks:
    bridge:
      ipv4_address: 10.2.0.2
```

# MySQL DB생성 및 권한 부여(with Docker)

```
[root@nerdkim konkuk-sv]# docker-compose up -d konkuk-sv-mysql
Creating konkuk-sv-mysql ... done
[root@nerdkim konkuk-sv]# vim docker-compose.yml
[root@nerdkim konkuk-sv]# mysql -h'localhost' -u root -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MySQL connection id is 2
Server version: 5.7.21 MySQL Community Server (GPL)

Copyright (c) 2000, 2017, Oracle, MariaDB Corporation Ab and others.

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

MySQL [(none)]> show databases;
+-----+
| Database |
+-----+
| information_schema |
| mysql |
| performance_schema |
| sys |
+-----+
4 rows in set (0.00 sec)

MySQL [(none)]> create database sonarqube;
Query OK, 1 row affected (0.00 sec)

MySQL [(none)]> create database redmine;
Query OK, 1 row affected (0.00 sec)

MySQL [(none)]> grant all privileges on sonarqube.* to sonarqube@'10.2.%.%' identified by 'sonarqube';
Query OK, 0 rows affected, 1 warning (0.00 sec)

MySQL [(none)]> grant all privileges on redmine.* to sonarqube@'10.2.%.%' identified by 'sonarqube';
Query OK, 0 rows affected, 1 warning (0.00 sec)

MySQL [(none)]> █
```

# Jenkins/Redmine/SonarQube 설치(with Docker)

```
konkuk-sv-sonarqube:
  image: sonarqube
  container_name: konkuk-sv-sonarqube
  ports:
    - "9000:9000"
    - "9092:9092"
  volumes:
    # - /data/konkuk-sv/sonarqube:/opt/sonarqube
    - /etc/localtime:/etc/localtime
  environment:
    SONARQUBE_JDBC_USERNAME:
    SONARQUBE_JDBC_PASSWORD:
    SONARQUBE_JDBC_URL:
  network_mode: "konkuksv_bridge"

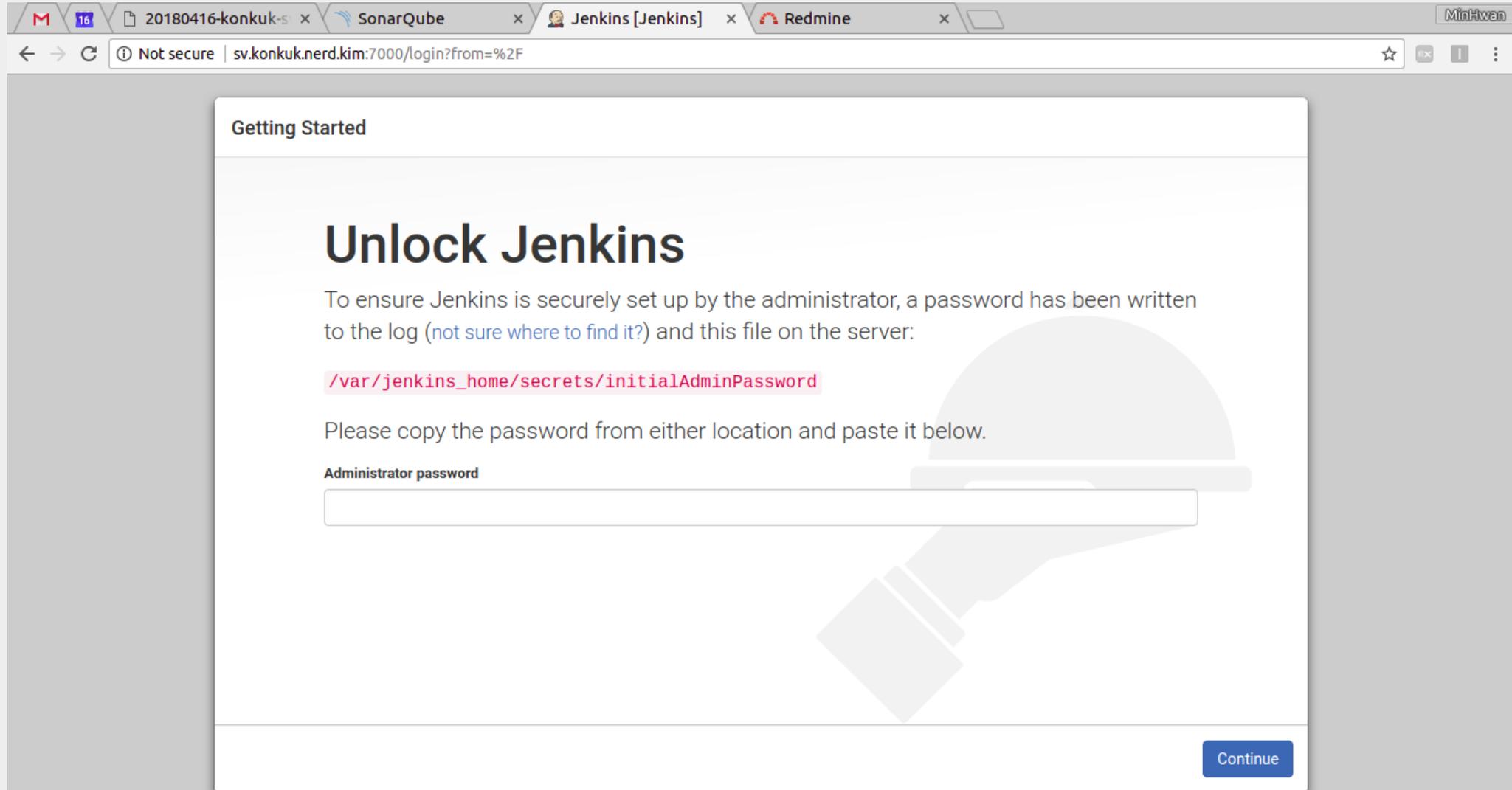
konkuk-sv-redmine:
  image: redmine
  container_name: konkuk-sv-redmine
  ports:
    - "8000:3000"
  volumes:
    - /data/konkuk-sv/redmine:/usr/src/redmine/files
    - /etc/localtime:/etc/localtime
  environment:
    REDMINE_DB_MYSQL: "10.2.0.2"
    REDMINE_DB_PORT: "3306"
    REDMINE_DB_USERNAME:
    REDMINE_DB_PASSWORD:
    REDMINE_DB_DATABASE: "redmine"
  network_mode: "konkuksv_bridge"

konkuk-sv-jenkins:
  image: jenkins
  container_name: konkuk-sv-jenkins
  ports:
    - "7000:8080"
    - "50000:50000"
  volumes:
    - /data/konkuk-sv/jenkins:/var/jenkins_home
    - /etc/localtime:/etc/localtime
  network_mode: "konkuksv_bridge"
```

## Jenkins/Redmine/SonarQube 설치(with Docker)

```
root@nerdkim:~/docker-compose/konkuk-sv 21:48
2018.04.16 12:48:17 INFO web[][DbMigrations] #1614 'Upgrade loaded template entries for quality profiles'...
2018.04.16 12:48:17 INFO web[][o.s.s.p.d.m.s.MassUpdate] 0 loaded templates for quality profiles processed (0 items/sec)
2018.04.16 12:48:17 INFO web[][DbMigrations] #1614 'Upgrade loaded template entries for quality profiles': success | time=221ms
2018.04.16 12:48:17 INFO web[][DbMigrations] #1615 'Create table RULES_METADATA'...
2018.04.16 12:48:17 INFO web[][DbMigrations] #1615 'Create table RULES_METADATA': success | time=147ms
2018.04.16 12:48:17 INFO web[][DbMigrations] #1616 'Populate table RULES_METADATA'...
2018.04.16 12:48:17 INFO web[][o.s.s.p.d.m.s.MassUpdate] 0 rules metadata processed (0 items/sec)
2018.04.16 12:48:17 INFO web[][DbMigrations] #1616 'Populate table RULES_METADATA': success | time=156ms
2018.04.16 12:48:17 INFO web[][DbMigrations] #1617 'Drop metadata columns from RULES'...
2018.04.16 12:48:17 INFO web[][DbMigrations] #1617 'Drop metadata columns from RULES': success | time=212ms
2018.04.16 12:48:17 INFO web[][DbMigrations] #1618 'Make index on ORGANIZATIONS.KEE unique'...
2018.04.16 12:48:18 INFO web[][DbMigrations] #1618 'Make index on ORGANIZATIONS.KEE unique': success | time=188ms
2018.04.16 12:48:18 INFO web[][DbMigrations] #1619 'Restore 'sonar-users' group'...
2018.04.16 12:48:18 INFO web[][DbMigrations] #1619 'Restore 'sonar-users' group': success | time=49ms
2018.04.16 12:48:18 INFO web[][DbMigrations] #1620 'Delete 'sonar.defaultGroup' setting'...
2018.04.16 12:48:18 INFO web[][DbMigrations] #1620 'Delete 'sonar.defaultGroup' setting': success | time=21ms
2018.04.16 12:48:18 INFO web[][DbMigrations] #1621 'Set all users into 'sonar-users' group'...
2018.04.16 12:48:18 INFO web[][o.s.s.p.d.m.s.MassUpdate] 0 users processed (0 items/sec)
2018.04.16 12:48:18 INFO web[][DbMigrations] #1621 'Set all users into 'sonar-users' group': success | time=40ms
2018.04.16 12:48:18 INFO web[][DbMigrations] #1622 'Create 'Members' group in each organization'...
2018.04.16 12:48:18 INFO web[][DbMigrations] #1622 'Create 'Members' group in each organization': success | time=30ms
2018.04.16 12:48:18 INFO web[][DbMigrations] #1623 'Set organization members into 'Members' group'...
2018.04.16 12:48:18 INFO web[][o.s.s.p.d.m.s.MassUpdate] 0 users not belonging to 'members' group processed (0 items/sec)
2018.04.16 12:48:18 INFO web[][DbMigrations] #1623 'Set organization members into 'Members' group': success | time=111ms
2018.04.16 12:48:18 INFO web[][DbMigrations] #1624 'Add ORGANIZATIONS.DEFAULT_GROUP_ID'...
2018.04.16 12:48:18 INFO web[][DbMigrations] #1624 'Add ORGANIZATIONS.DEFAULT_GROUP_ID': success | time=289ms
2018.04.16 12:48:18 INFO web[][DbMigrations] #1625 'Populate column ORGANIZATIONS.DEFAULT_GROUP_ID'...
2018.04.16 12:48:18 INFO web[][o.s.s.p.d.m.s.MassUpdate] 1 organizations processed (0 items/sec)
2018.04.16 12:48:18 INFO web[][DbMigrations] #1625 'Populate column ORGANIZATIONS.DEFAULT_GROUP_ID': success | time=37ms
2018.04.16 12:48:18 INFO web[][DbMigrations] #1626 'Clean orphan rows in table GROUPS_USERS'...
2018.04.16 12:48:18 INFO web[][o.s.s.p.d.m.s.MassUpdate] 0 orphan user group membership processed (0 items/sec)
2018.04.16 12:48:18 INFO web[][DbMigrations] #1626 'Clean orphan rows in table GROUPS_USERS': success | time=22ms
2018.04.16 12:48:18 INFO web[][DbMigrations] #1627 'Delete permission templates linked to removed users'...
2018.04.16 12:48:18 INFO web[][o.s.s.p.d.m.s.MassUpdate] 0 permission templates linked to removed users processed (0 items/sec)
2018.04.16 12:48:18 INFO web[][DbMigrations] #1627 'Delete permission templates linked to removed users': success | time=52ms
2018.04.16 12:48:18 INFO web[][DbMigrations] #1628 'Add columns CE_QUEUE.WORKER_UUID and EXECUTION_COUNT'...
2018.04.16 12:48:18 INFO web[][DbMigrations] #1628 'Add columns CE_QUEUE.WORKER_UUID and EXECUTION_COUNT': success | time=84ms
2018.04.16 12:48:18 INFO web[][DbMigrations] #1629 'Make CE_QUEUE.EXECUTION_COUNT not nullable'...
2018.04.16 12:48:18 INFO web[][DbMigrations] #1629 'Make CE_QUEUE.EXECUTION_COUNT not nullable': success | time=119ms
2018.04.16 12:48:18 INFO web[][DbMigrations] #1630 'Add columns CE_ACTIVITY.WORKER_UUID and EXECUTION_COUNT'...
2018.04.16 12:48:19 INFO web[][DbMigrations] #1630 'Add columns CE_ACTIVITY.WORKER_UUID and EXECUTION_COUNT': success | time=195ms
2018.04.16 12:48:19 INFO web[][DbMigrations] #1631 'Make columns CE_ACTIVITY.EXECUTION_COUNT not nullable'...
```

# Jenkins/Redmine/SonarQube 설치(with Docker)



The screenshot shows a web browser window with the following tabs: 20180416-konkuk-s, SonarQube, Jenkins [Jenkins], and Redmine. The address bar shows the URL `sv.konkuk.nerd.kim:7000/login?from=%2F`. The main content area displays the 'Getting Started' page for Jenkins, which includes the following text:

## Getting Started

### Unlock Jenkins

To ensure Jenkins is securely set up by the administrator, a password has been written to the log ([not sure where to find it?](#)) and this file on the server:

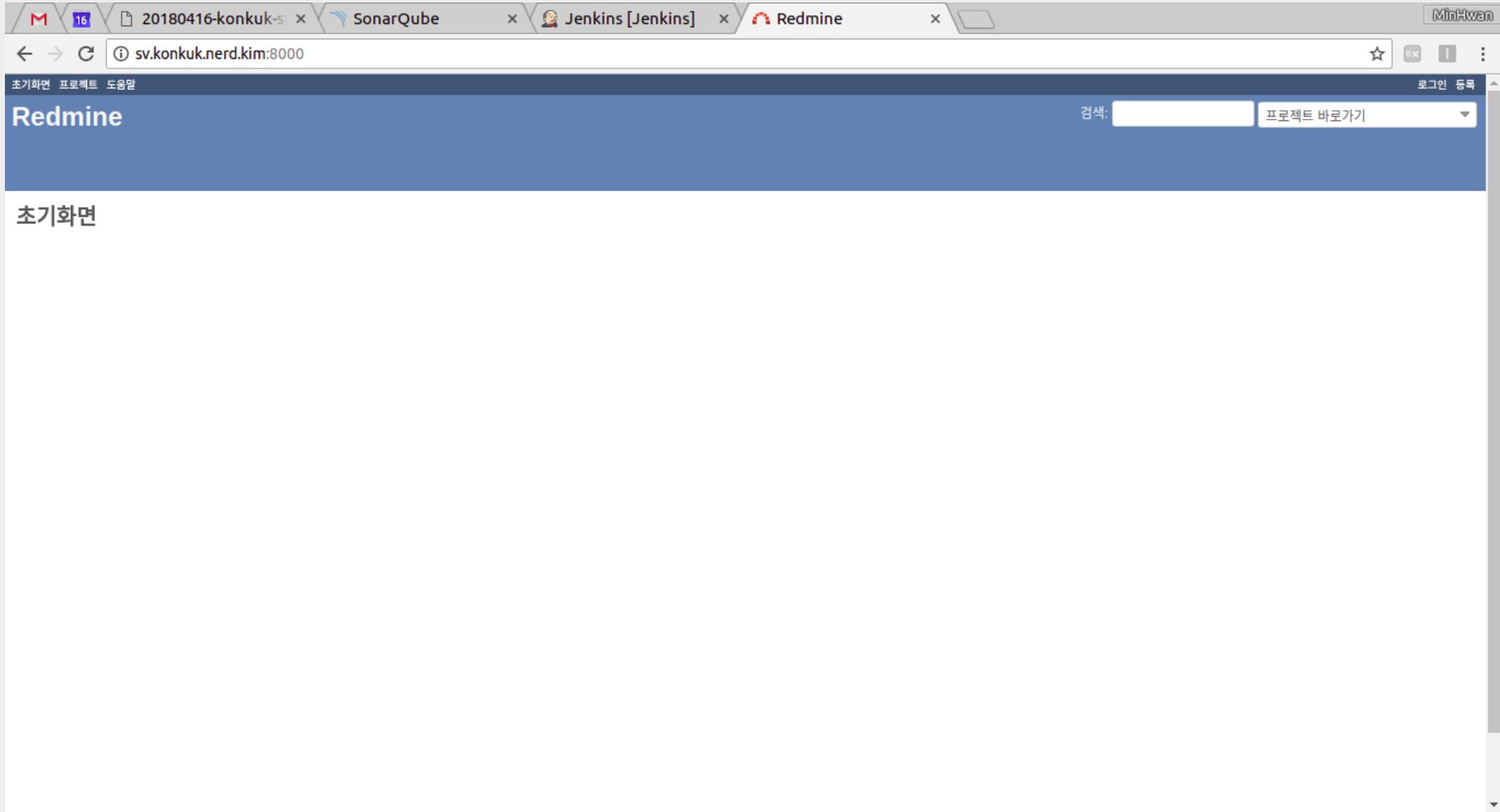
```
/var/jenkins_home/secrets/initialAdminPassword
```

Please copy the password from either location and paste it below.

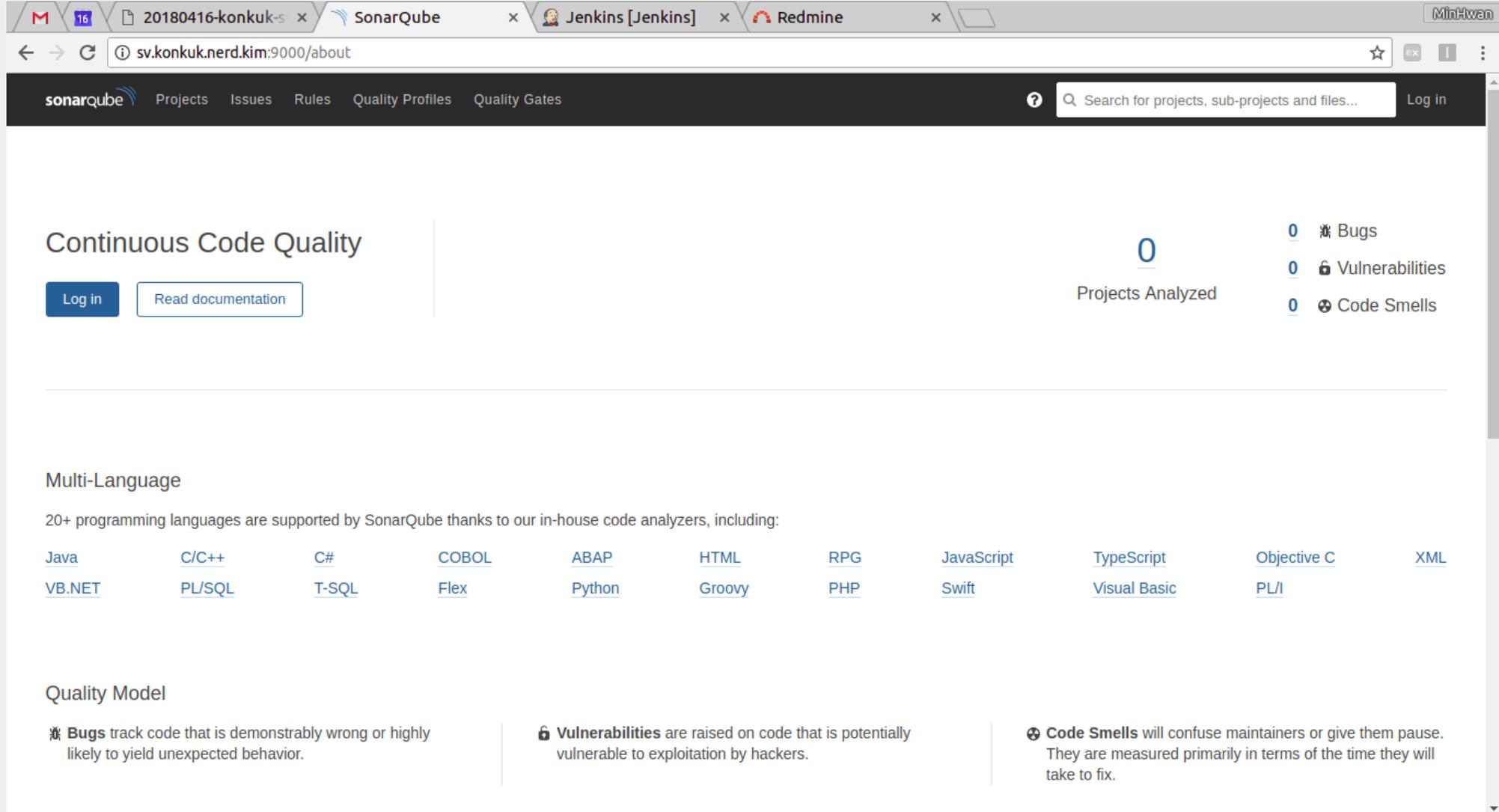
**Administrator password**

[Continue](#)

# Jenkins/Redmine/SonarQube 설치(with Docker)



# Jenkins/Redmine/SonarQube 설치(with Docker)





## About PMD

PMD is a source code analyzer. It finds common programming flaws like unused variables, empty catch blocks, unnecessary object creation, and so forth. It supports Java, JavaScript, Salesforce.com Apex and Visualforce, PLSQL, Apache Velocity, XML, XSL.

Additionally it includes CPD, the copy-paste-detector. CPD finds duplicated code in Java, C, C++, C#, Groovy, PHP, Ruby, Fortran, JavaScript, PLSQL, Apache Velocity, Scala, Objective C, Matlab, Python, Go, Swift and Salesforce.com Apex and Visualforce.

공식 홈페이지(<https://pmd.github.io/>)의 설명

## 1. 다음의 결함들을 잡아낸다.

- 안 쓰는 변수
- 빈 catch 블록
- 불필요하게 생성된 객체
- 기타 등등 (and so forth)

## 2. 다음의 언어들을 지원한다.

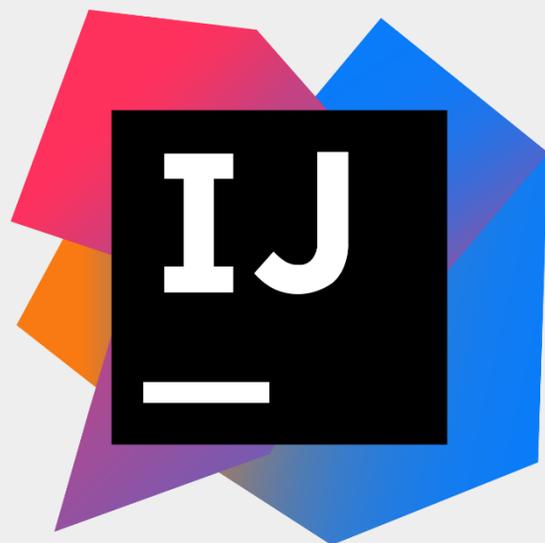


- 그 외 (Apex, VisualForce, PLSQL, ...)

# CPD (Copy-Paste-Detector)

- PMD에 기본적으로 포함된 도구.
- 중복된 코드를 잡아낸다.
- Java, Javascript, Python, C, C++, Groovy, PHP 등에 적용할 수 있다.

# Plugin Support



# 1. Rule 지정하기 (rules.xml)

```
<?xml version="1.0"?>
<ruleset name="Custom ruleset"
xmlns="http://pmd.sf.net/ruleset/1.0.0"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://pmd.sf.net/ruleset/1.0.0 http://pmd.sf.net/ruleset_xml_schema.xsd"
xsi:noNamespaceSchemaLocation="http://pmd.sf.net/ruleset_xml_schema.xsd">
<description> PMD test </description>
<rule ref="category/java/bestpractices.xml/UnusedLocalVariable" />
</ruleset>
```

```
"../rules.xml" 10L, 432C
```

# 1. Rule 지정하기 (rules.xml)

```
<?xml version="1.0"?>
<ruleset name="Custom ruleset"
xmlns="http://pmd.sf.net/ruleset/1.0.0"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://pmd.sf.net/ruleset/1.0.0 http://pmd.sf.net/ruleset_xml_schema.xsd"
xsi:noNamespaceSchemaLocation="http://pmd.sf.net/ruleset_xml_schema.xsd">
<description> PMD test </description>
<rule ref="category/java/bestpractices.xml/UnusedLocalVariable" />
</ruleset>
```

```
"../rules.xml" 10L, 432C
```

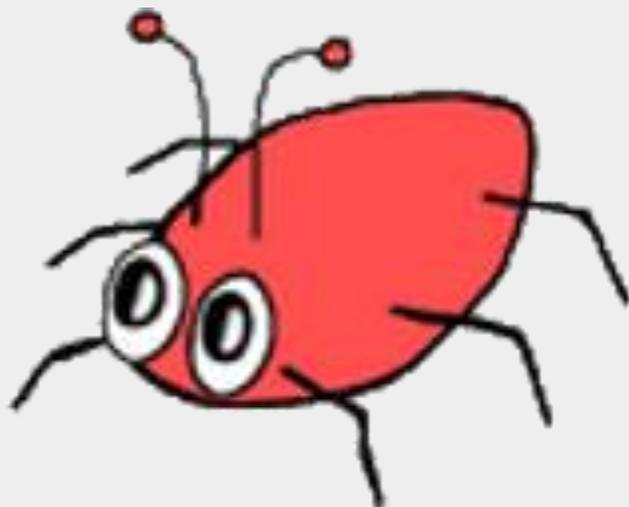
## 2. 소스코드 만들기 (Main.java)

```
public class Main {  
    public static void main(String[] args) {  
        int a;  
  
        System.out.println("a isn't used.");  
    }  
}
```

### 3. 정적분석

```
# pmd -d /root/Test/src/ -R /root/Test/rules.xml -f text >> ../analysis
# vim ../analysis
```

```
This analysis could be faster, please consider using Incremental Analysis: https://pmd.github.io/pmd-6.2.0/pmd userdocs getting started.html#incremental-analysis
/root/Test/src/Main.java:3: Avoid unused local variables such as 'a'.
```



TM

# FindBugs

# FindBugs

- 소스코드에 문제가 될 수 있는 부분을 찾는 Static Analysis
- Compile된 Byte Code 기반으로 Bug의 패턴을 찾아 자동으로 알려줌

# FindBugs

Java 프로그램에서 100여 가지의 **잠재적인 에러 타입**을 찾아주며,

Scariest, Scary, Troubling, Concern 등으로 구분하여 **점수(Rank)**가 주어진다.

# FindBugs

- \*.java파일이 아닌 \*.class 오브젝트 코드를 분석한다.
- Byte Code 기반으로 분석 진행한다.

다양한 Bugs들을 찾아준다.

- ▼  Of Concern (24)
  - ▼  Normal confidence (15)
    - >  May expose internal representation by returning reference to mutable object (5)
    - >  May expose internal representation by incorporating reference to mutable object (2)
    - >  Integral division result cast to double or float (2)
    - >  Method names should start with a lower case letter (1)
    - >  Method may fail to clean up stream or resource on checked exception (1)
    - >  Exception is caught when Exception is not thrown (1)
    - >  Switch statement found where default case is missing (1)
    - >  Unread field (1)
    - >  Unused field (1)
  - ▼  Low confidence (9)
    - >  Class names should start with an upper case letter (2)
    - >  Field names should start with a lower case letter (1)
    - >  Method may fail to close stream on exception (1)
    - >  Exception is caught when Exception is not thrown (1)
    - >  Non-transient non-serializable instance field in serializable class (1)
    - >  Could be refactored into a named static inner class (1)
    - >  Field not initialized in constructor but dereferenced without null check (2)

# IDE : **IntelliJ** with...

- Unit Test : **JUnit** Framework
- Build Tool : **Gradle**
- Static Analysis Tools : **FindBugs, PMD, SonarQube\***

# Configuration Management Tool(with code repository) : **GitHub**

# Issue Management Tool :  
**Redmine**(with Requirement Management Tool : **Redcase**)\*

# Continuous Integration Tool : **Jenkins\***

# Collaboration Messenger : **Slack**

\* Server installation is required.