보안취약점 관리를 위한 Advanced Tip

24.11.12 석지영



보안취약점 데이터베이스

보안취약점 데이터베이스 수집

- 일 1회 NVD (NATIONAL VULNERABILITY DATABASE) 에서 제공되는 NVD Rest API (https://nvd.nist.gov/developers/vulnerabilities)를 통해 json 데이터 취득하여, Database에 저장
 - 최초 1회 API로 전체 NVD Data 취득하여 저장하며, 이후 최근 한 달전 단위로 변경된 데이터 취득하여 업데이트
- Vulnerability Score는 기본적으로 CVSS v3 Base Score를 기준으로 표기하며,
 CVSS v3 Score가 없는 경우 CVSS v2 Base Score를 대신해서 표기

보안취약점 데이터베이스와 OSS 매칭

- NVD CPE 데이터에서 product, version 값을 각각 OSS name(또는 nickname), OSS version 과 매 칭하여 보안취약점 검출
 - CPE (common Platform Enumeration)란 운영 체제 및 소프트웨어 애플리케이션 식별하는 방법으로 다음과 같이 구성됨
 - cpe:2.3: part : vendor : product : version : update : edition : language : sw_edition : target_sw : target_hw : other

斯CVE-2022-22978 Detail

Current Description

In spring security versions prior to 5.4.11+, 5.5.7+, 5.6.4+ and older unsupported versions, RegexRequestMatcher can easily be misconfigured to be bypassed on some servlet containers. Applications using RegexRequestMatcher with `.` in the regular expression are possibly vulnerable to an authorization bypass.

◆View Analysis Description

| NVD enrichment efforts reference publicly available information to associate vector strings. CVSS information contributed by other sources is also displaye CVSS 3.x Severity and Vector Strings: NIST: NVD Base Score: 9.8 CRITICAL Vector: CVSS:3.1/AV:N/AC:L/PR:N/UI:N/S:U/C:H/I:H/A:H | Metrics | CVSS Version 4.0 | CVSS Version 3.x | CVSS Version 2.0 | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------------|--------------------------|---------------------------|-----------------------------------------------------------------|
| | IVD enrichment efi | forts reference publicly | available information to | associate vector strings. | CVSS information contributed by other sources is also displayed |
| Nection CVCC-2 1/AVAN/AC-L/DD-AV/LIAN/C-LI/C-LI/LIANAL | CVSS 3.x Seve | erity and Vector Str | ings: | | |
| | NIST: | NVD | Rasa Scarot, a a cons | Vocto | CVSS:3.1/AV:N/AC:L/PR:N/UI:N/S:U/C:H/I:H/A:H |

Known Affected Software Configurations Switch to CPE 2.2



보안취약점 데이터베이스와 OSS 매칭

• 예시 (CVE-2022-22978)

Configuration 1 (hide)

| 賽 cpe:2.3:a:vmware:spring_security:*:*:*:*:*:*:* | Up to (excluding) | |
|--------------------------------------------------------------------|-------------------|-------------------|
| Show Matching CPE(s).▼ | 5.5.7 | |
| * cpe:2.3:a:vmware:spring_security:*:*:*:*:*:*:* | From (including) | Up to (excluding) |
| Hide Matching CPE(s)_▲ | 5.6.0 | 5.6.4 |
| cpe:2.3:a:vmware:spring_security:5.6.0:*:*:*:*:* | | |
| cpe:2.3:a:vmware:spring_security:5.6.1:*:*:*:*:* | | |
| cpe:2.3:a:vmware:spring_security:5.6.2:*:*:*:*:* | | |
| cpe:2.3:a:vmware:spring_security:5.6.3:*:*:*:*:* | | |
| | | |

Configuration 2 (hide)

| 賽 cpe:2.3:a:oracle:financial_services_crime_and_compliance_management_studio:8.0.8.2.0:*:*:*:*:*:*: | |
|-----------------------------------------------------------------------------------------------------|--|
| Hide Matching CPE(s) ▲ | |

- cpe:2.3:a:oracle:financial_services_crime_and_compliance_management_studio:8.0.8.2.0:*:*:*:*:*:*
- ★ cpe:2.3:a:oracle:financial_services_crime_and_compliance_management_studio:8.0.8.3.0:*:*:*:*:*:*
 Hide Matching CPE(s) ▲
 - cpe:2.3:a:oracle:financial_services_crime_and_compliance_management_studio:8.0.8.3.0:*.**.**.**.*

Configuration 3 (<u>hide</u>)

¥ cpe:2.3:a:netapp:active_iq_unified_manager:-:*:*:*:linux:*:*

Hide Matching CPE(s) ▲

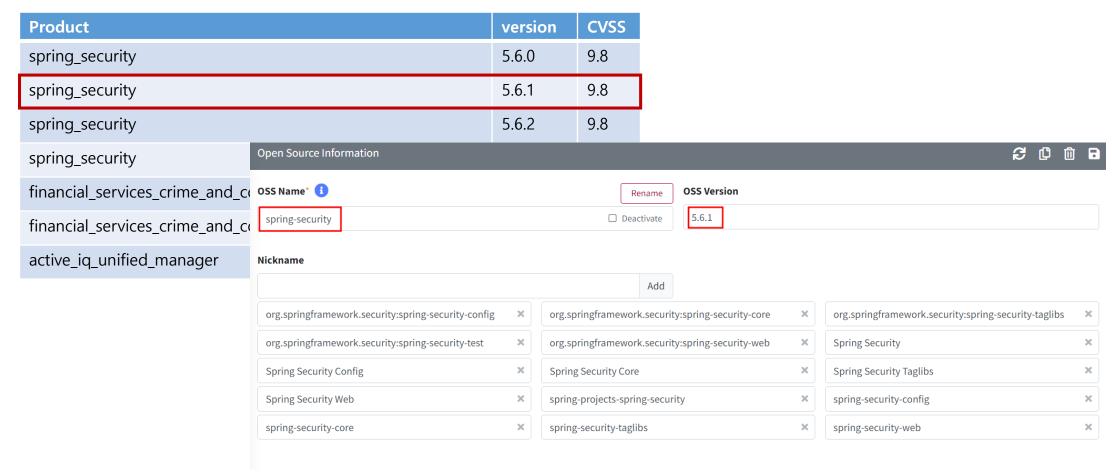
• cpe:2.3:a:netapp:active_iq_unified_manager:-:*:*:*:!linux:*:*

<보안취약점 데이터베이스>

| Product | version | CVSS |
|-----------------------------------------------------------|-----------|------|
| spring_security | 5.6.0 | 9.8 |
| spring_security | 5.6.1 | 9.8 |
| spring_security | 5.6.2 | 9.8 |
| spring_security | 5.6.3 | 9.8 |
| financial_services_crime_and_compliance_management_studio | 8.0.8.2.0 | 9.8 |
| financial_services_crime_and_compliance_management_studio | 8.0.8.3.0 | 9.8 |
| active_iq_unified_manager | - | 9.8 |

보안취약점 데이터베이스와 OSS 매칭

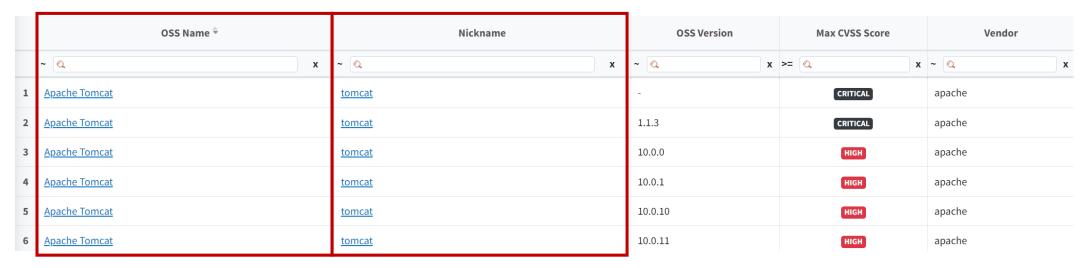
• 예시 (CVE-2022-22978)



보안취약점 조회

Vulnerability List

- NVD 데이터 기준 수집된 보안취약점 검색 가능
 - FOSSLight Hub OSS DB에 등록되지 않았더라도 product명으로 검색 가능



보안취약점이 검출된 OSS Nairokename으로 보안취약점 검출된 경우에 한하여, 또는 Product name (해당 p검습된대성된e은SSEN없는 경우) 을 표시

OSS List

• FOSSLight Hub에 저장된 OSS 검색을 통해 해당 OSS에 매칭된 취약점 확인 가능함

| ID | OSS Name | OSS Version | License Name | Notice | Source | Vulnera bility [‡] |
|-------|-----------------------------|-------------|--------------|--------|--------|--------------------------------|
| 11589 | [Nick] <u>xstream</u> | 1.4.9 | BSD-3-Clause | ~ | | CRITICAL |
| 3192 | commons | | Apache-2.0 | ~ | | CRITICAL |
| 45023 | [Nick] <u>spark</u> | 3.3.0 | Apache-2.0 | ~ | | CRITICAL |
| 51907 | [Nick] tiff | 4.5.1 | libtiff | ~ | | нібн |
| 32581 | [Nick] <u>Apache Tomcat</u> | 9.0.41 | Apache-2.0 | ~ | | нібн |

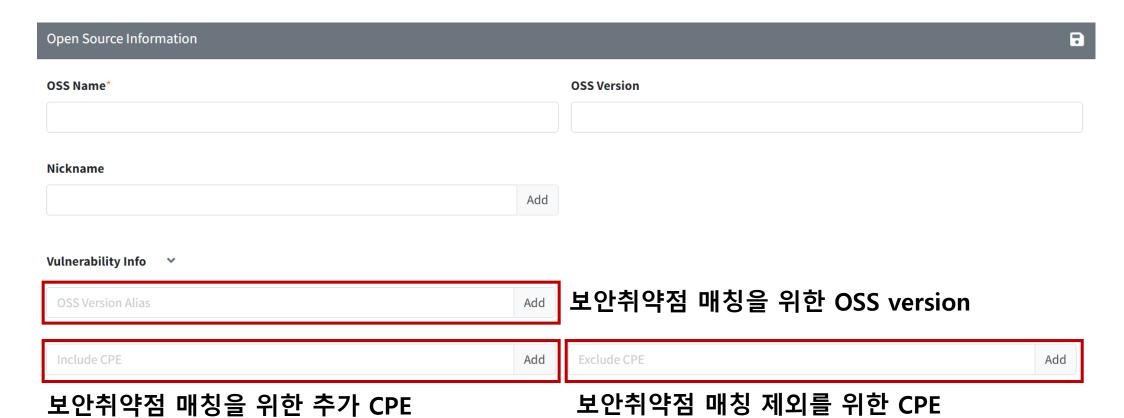
• OSS 상세 화면에서 해당 OSS (version)에 매칭된 전체 보안취약점 목록 확인 가능함

Vulnerability +More

| CVE ID 🖴 | NVD Score ↑↓ | Published Date |
|----------------|--------------|---------------------|
| CVE-2023-44487 | нідн | 2024-08-14 19:57:18 |
| CVE-2023-46589 | нідн | 2024-07-12 16:11:18 |
| CVE-2021-42340 | нібн | 2023-11-07 03:39:09 |
| CVE-2021-41079 | нідн | 2023-11-07 03:38:49 |
| CVE-2021-25122 | нісн | 2023-11-07 03:31:23 |

OSS 보안취약점 매칭 관리

OSS별 CPE 관리



- vendor:product
- cpe:2.3:a:vendor:product:*:*:*:*:language:*:*

보안취약점 매칭 version 예시

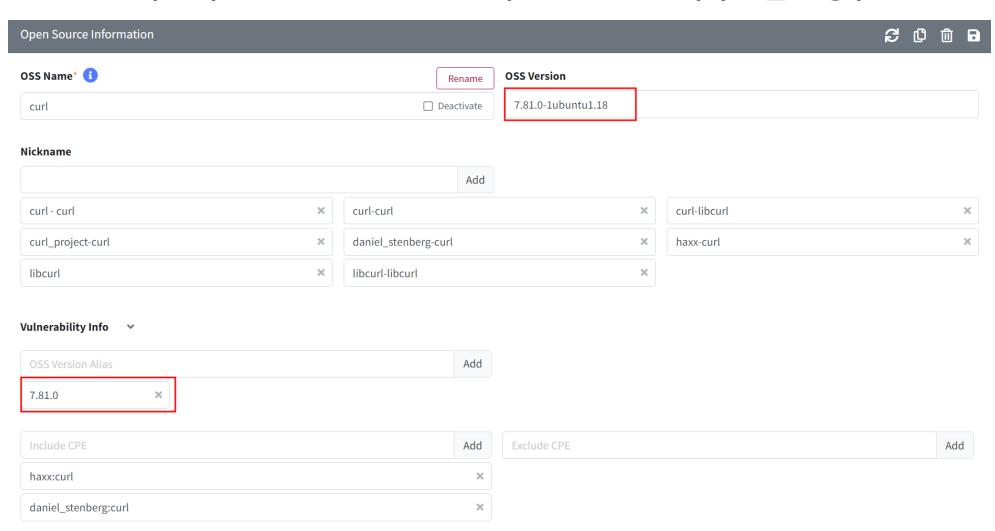
- CVE-2022-32207
 - product: curl, version: 7.81.0

Configuration 1 (<u>hide</u>)

| ₩ cpe:2.3:a:haxx:curl:*:*:*:*:*:* | From (including) | Up to (excluding) |
|--------------------------------------------------------|------------------|-------------------|
| Hide Matching CPE(s)_▲ | 7.69.0 | 7.84.0 |
| • cpe:2.3:a:haxx:curl:7.69.0:*:*:*:*:* | | |
| • cpe:2.3:a:haxx:curl:7.69.1:*:*:*:*:* | | |
| • cpe:2.3:a:haxx:curl:7.70.0:*:*:*:*:* | | |
| • cpe:2.3:a:haxx:curl:7.71.0:*:*:*:*:* | | |
| • cpe:2.3:a:haxx:curl:7.71.1:*:*:*:*:* | | |
| • cpe:2.3:a:haxx:curl:7.72.0:*:*:*:*:* | | |
| • cpe:2.3:a:haxx:curl:7.73.0:*:*:*:*:* | | |
| • cpe:2.3:a:haxx:curl:7.74.0:*:*:*:*:* | | |
| • cpe:2.3:a:haxx:curl:7.75.0:*:*:*:*:* | | |
| • cpe:2.3:a:haxx:curl:7.76.0:*:*:*:*:* | | |
| • cpe:2.3:a:haxx:curl:7.76.1:*:*:*:*:* | | |
| • cpe:2.3:a:haxx:curl:7.77.0:*:*:*:*:* | | |
| • cpe:2.3:a:haxx:curl:7.78.0:*:*:*:*:* | | |
| • cpe:2.3:a:haxx:curl:7.79.0:*:*:*:*:* | | |
| • cpe:2.3:a:haxx:curl:7.79.1:*:*:*:*:* | | |
| • cpe:2.3:a:haxx:curl:7.80.0:*:*:*:*:* | | |
| • cpe:2.3:a:haxx:curl 7.81.0:*:*:*:*:* | | |
| cpe:2.3:a:haxx:curl:7.82.0:*:*:*:*:* | | |
| • cpe:2.3:a:haxx:curl:7.83.0:*:*:*:*:* | | |
| • cpe:2.3:a:haxx:curl:7.83.1:*:*:*:*:* | | |

보안취약점 매칭 version 예시

• Ubuntu 배포 버전 7.81.0-1ubuntu1.1.8 버전으로 OSS 관리하고 싶은 경우



Include CPE 예시

CVE-2021-3121 (https://github.com/gogo/protobuf/)

```
# cpe:2.3:a:golang:protobuf:*:*:*:*:*

Show Matching CPE(s)▼

1.3.2
```

CVE-2021-22570 (https://github.com/protocolbuffers/protobuf)

Configuration 1 (<u>hide</u>)

```
★ cpe:2.3:a:google:protobuf:*:*:*:*:*

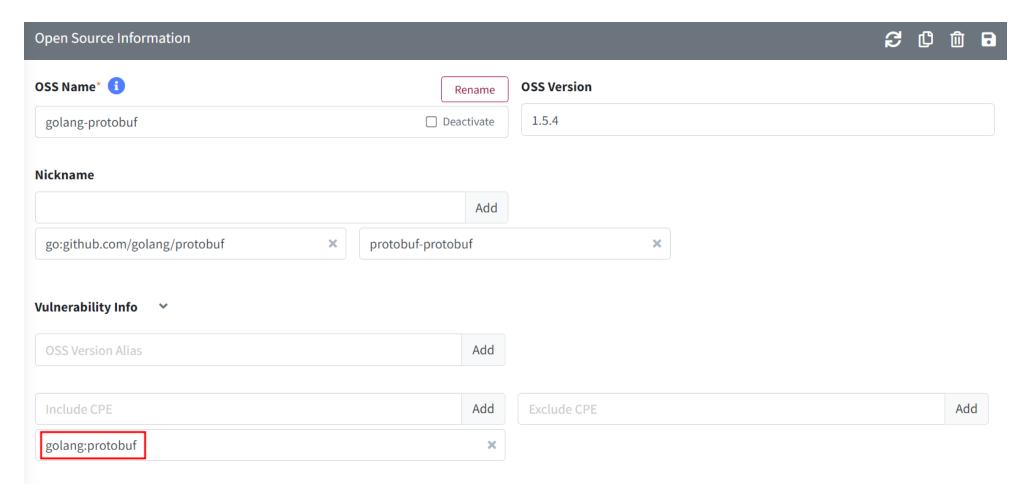
Show Matching CPE(s)

3.15.0
```

- 이슈 case
 - Product명이 protobuf로 동일함
 - 기본적으로 두 CVE 모두 product 명과 일치하는 OSS name(또는 nickname)을 가지는 protobuf OSS와 매칭됨
 - protobuf Download Location : https://github.com/protocolbuffers/protobuf
 - 하지만 CVE-2021-3121는 golang-protobuf OSS와 매칭되어야 함
 - qolang-protobuf Download Location: https://github.com/gogo/protobuf/

Include CPE 예시

Golang-protobuf에 vendor:product (golang:protobuf) 입력함으로써
 protobuf 대신 golang-protobuf와 CVE 매칭되도록 변경 가능



Include CPE 예시 (Full cpe)

- Vendor:product 값만으로 매칭 구별이 어려운 경우가 존재함
- CVE-2015-4411

Configuration 1 (<u>hide</u>)

cpe:2.3:a:mongodb:bson:*:*:*:*truby:

Show Matching CPE(s)▼

Up to (excluding)

3.0.4

• CVE-2020-7610

Configuration 1 (<u>hide</u>)

```
# cpe:2.3:a:mongodb:bson:*:*:*:* node.js *:*

Show Matching CPE(s)▼

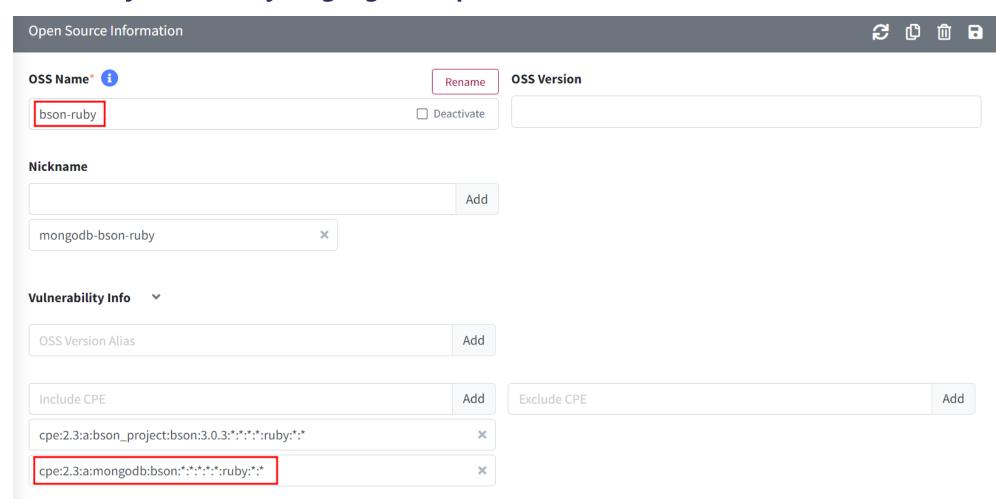
From (including)

1.0.0

1.1.4
```

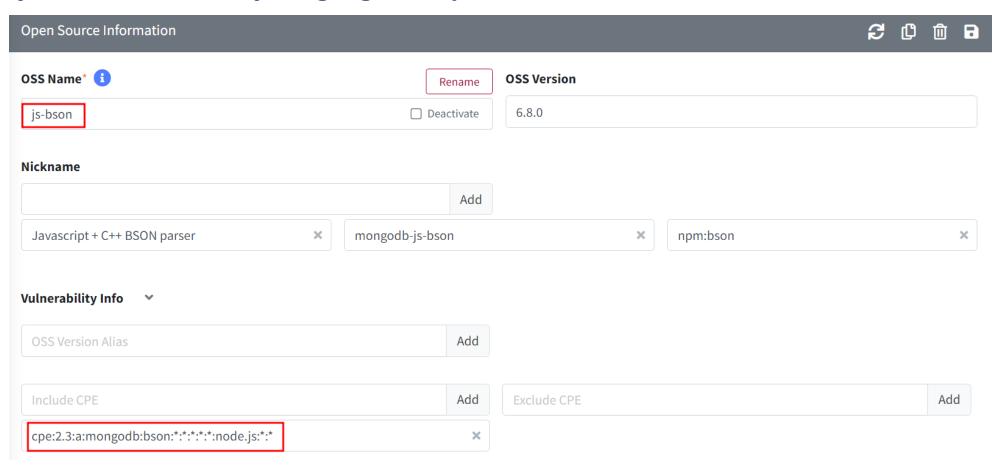
Include CPE 예시 (Full cpe)

bson-ruby OSS에 ruby language full cpe 추가



Include CPE 예시

• js-bson OSS에 node.js language full cpe 추가



Exclude CPE 예시

CVE-2021-37701

Configuration 1 (hide)

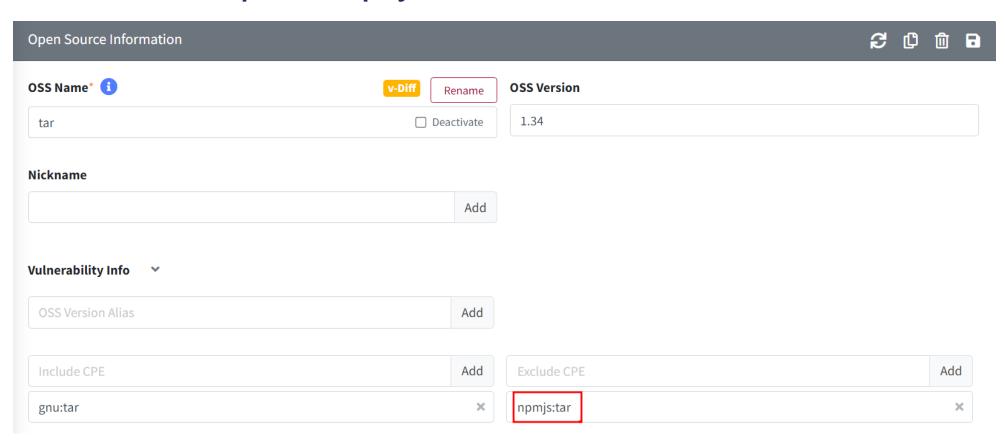
| 賽 cpe:2.3:a:npmjs:tar:*:*:*:*:node.js:*:* | Up to (excluding) | |
|-------------------------------------------|-------------------|-------------------|
| Show Matching CPE(s)▼ | 4.4.16 | |
| ▼ cpe:2.3:a:npmjs:tar:*:*:*:*:node.js:*:* | From (including) | Up to (excluding) |
| Show Matching CPE(s)▼ | 5.0.0 | 5.0.8 |
| ● cpe:2.3:a:npmjs:tar:*:*:*:*:node.js:*:* | From (including) | Up to (excluding) |
| Show Matching CPE(s)▼ | 6.0.0 | 6.1.7 |

• 이슈 case

- 기본적으로 product명이 tar이므로 product 명과 일치하는 OSS name(또는 nickname)을 가지는 tar OSS와 매칭됨
- 하지만 npmjs:tar는 tar와 별개 OSS로 CVE 매칭에서 제외시키고 싶음

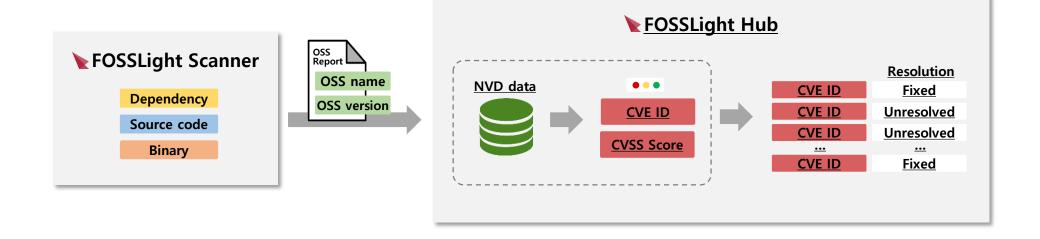
Exclude CPE 예시

• tar OSS에 vendor:product (npmjs:tar) 추가



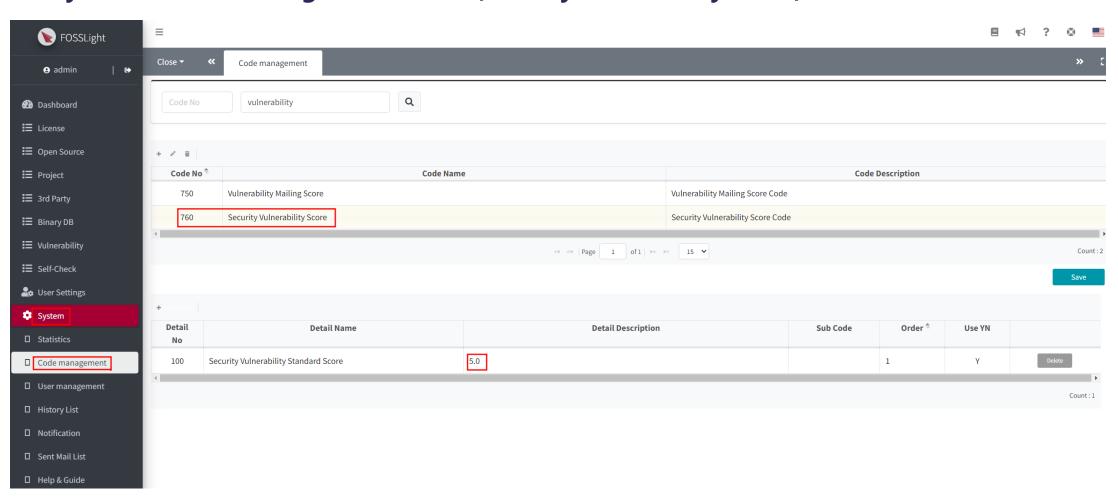
프로젝트 별 보안취약점 관리

제품 보안취약점 수정 여부 관리 기능



Security탭 조치 여부 Score 관리

• System > Code management > 760 (Security Vulnerability Score)에서 변경 가능



Security탭

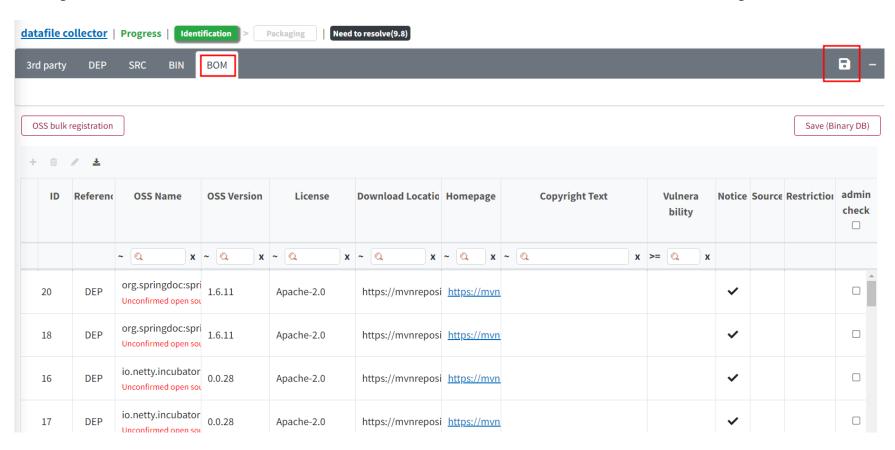
• Project List > Security탭

| ID [©] | Project Name | Status | OSC Process | Download i | Security |
|-----------------|--------------------------|----------|--------------------------------|------------|----------------------|
| 747 | datafile collector | Progress | Identification Packaging | | Need to resolve(9.8) |
| 737 | test sec mail | Request | Identification > Packaging | | Discovered(N/A) |
| 736 | Test empty project (1.0) | Request | Identification > Packaging | | Discovered(N/A) |
| 735 | <u>dep-test (1)</u> | Request | Identification > Packaging | | Discovered(N/A) |
| 734 | <u>qwer (1.0)</u> | Request | Identification > Packaging | | Discovered(N/A) |
| 733 | test prj | Request | Identification > Packaging | | Need to resolve(9.9) |
| 732 | my project coffee | Request | Identification > Packaging | | Need to resolve(9.8) |
| 731 | a123sdfs | Progress | Identification > Packaging | | Need to resolve(7.5) |

- Need to resolve(10.0): Identification단계의 BOM 탭 기준 Security Vulnerability Score 이상 보안취약점이 존재하는 경우
- Discovered(6.5): Identification단계의 BOM 탭 기준 Security Vulnerability Score 이상 보안취약점이 존재하지 않는 경우
- Discovered(N/A): BOM탭이 merge and save되지 않아서 OSS 목록이 취합되지 않았거나 또는 보안취약점이 발견되지 않은 경우
- Resolved (N/A) : Need to resolve탭 기준 Security Vulnerability Score 이상 취약점이 모두 'Fixed' resolution인 경우
- 각 상태 (괄호) 안에서 프로젝트 내 vulnerability max score 확인 가능함

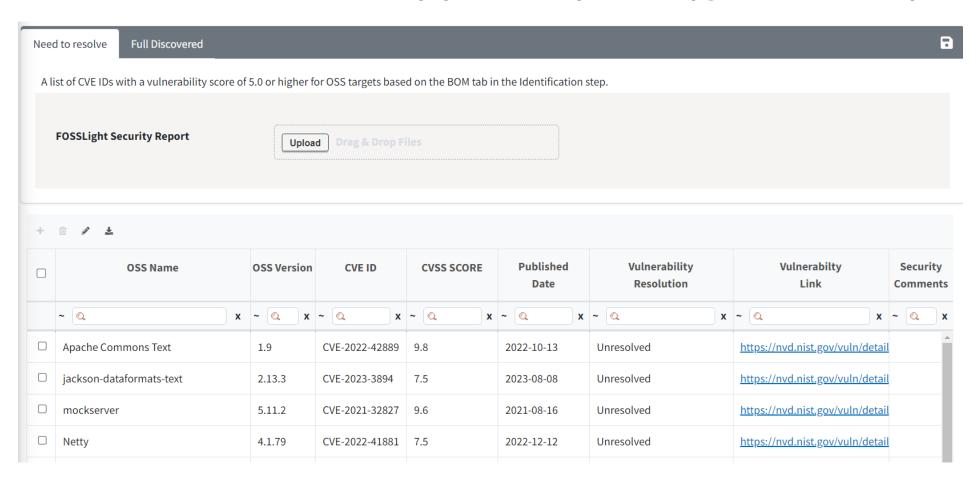
Security탭 > 취약점 취합 기준

Project > Identification > BOM탭 save된 OSS 기준으로 Security탭에 보안취약점 취합



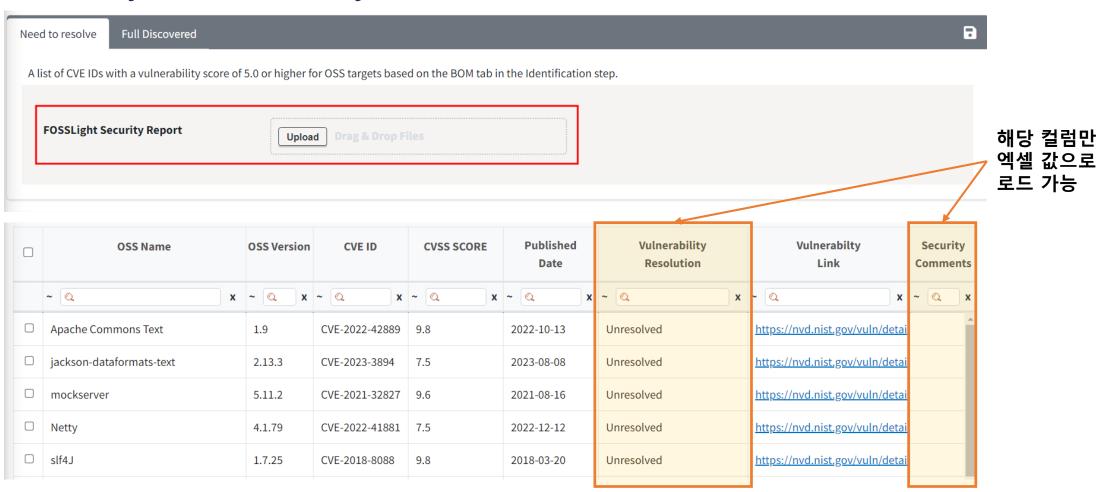
Need to resolve / Full discovered탭 (신규 Update)

- Need to resolve: Security Vulnerability Score 이상인 CVE ID 목록 확인 가능
- Full Discovered : Identification단계의 BOM 탭 기준 OSS 대상으로 검출된 전체 CVE ID 목록



Excel 업로드 기능 (신규 Update)

업로드된 Excel파일 내 OSS name, OSS version, CVE ID값이 동일한 경우, upload한 데이터 중
 Vulnerability resolution, Security Comments 값을 load



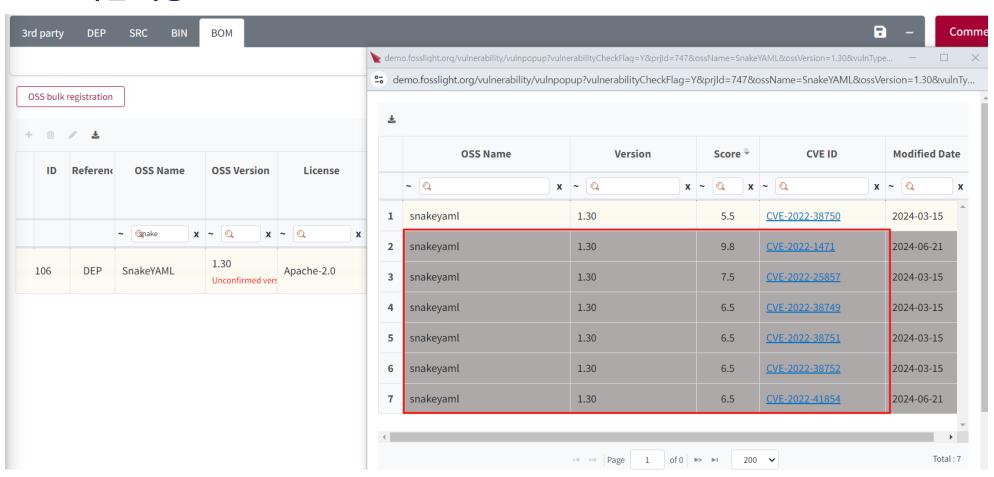
Security탭 조치 여부와 Identification 연동

• Security탭에서 Fixed 처리된 CVE ID에 대해 Identification탭에서 제외하고 vulnerability max score 확인 가능

| OSS Name | OSS Version | CVE ID | CVSS SCORE | Published Date | Vulnerability Resolution |
|-----------|-------------|----------------|------------|-------------------|-----------------------------|
| ~ Q x | ~ (Q x | ~ 🔍 x | ~ 🔍 x | ~ Q x | ~ Q x |
| SnakeYAML | 1.30 | CVE-2022-1471 | 9.8 | 2022-12-01 | Fixed |
| SnakeYAML | 1.30 | CVE-2022-25857 | 7.5 | 2022-08-30 | Fixed |
| SnakeYAML | 1.30 | CVE-2022-38751 | 6.5 | 2022-09-05 | Fixed |
| SnakeYAML | 1.30 | CVE-2022-38749 | 6.5 | 2022-09-05 | Fixed |
| SnakeYAML | 1.30 | CVE-2022-41854 | 6.5 | 2022-11-11 | Fixed |
| SnakeYAML | 1.30 | CVE-2022-38752 | 6.5 | 2022-09-05 | Fixed |
| SnakeYAML | 1.30 | CVE-2022-38750 | 5.5 | 2022-09-05 | Unresolved |

Security탭 조치 여부와 Identification 연동

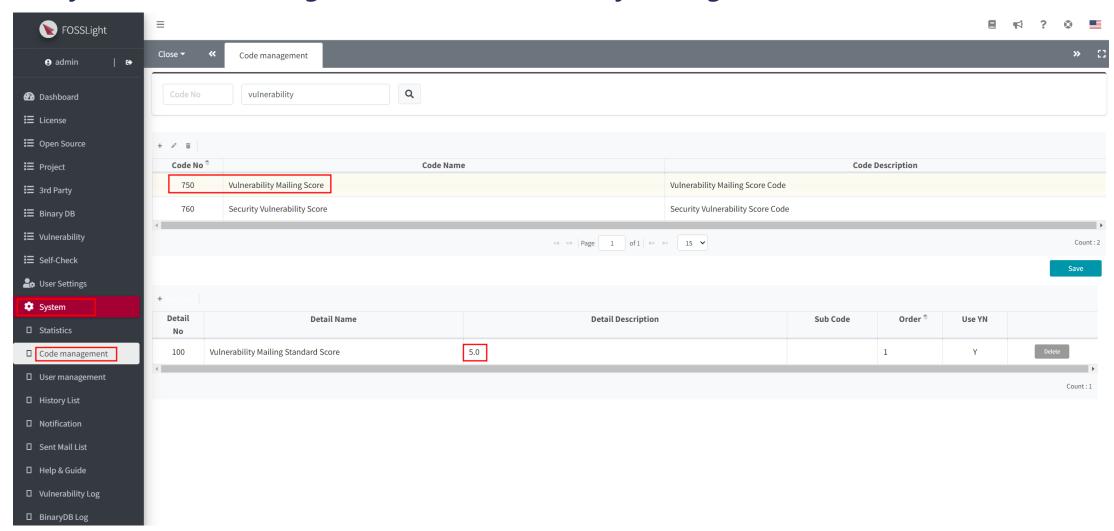
• Security탭에서 Fixed 처리된 CVE ID에 대해 Identification탭에서 제외하고 vulnerability max score 확인 가능



보안취약점 메일링

메일링 기준 Score 관리

• System > Code management > 750 (Vulnerability Mailing Score)에서 변경 가능



보안취약점 실시간 알림

Vulnerability Mailing Score 이상 CVSS Score를 가지는 신규 CVE ID 발견 시,
 해당 CVE ID와 매칭된 OSS가 사용된 프로젝트 담당자에게 'Discovered' 메일 알림

FOSSLight Hub Notification

[OSC] Vulnerability Discovered

« Vulnerability Information »

| OSS ID | OSS Name | OSS Version | CVE ID | Score | Summary | Published Date | Modified Date |
|-----------|-----------------------|----------------|------------------------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------|
| 22869 | json- smart- v2 | 2.2.1 | CVE- 2021- 27568 | 9.1 | An issue was discovered in netplex json-smart-v1 through 2015-10-23 and json-smart-v2 through 2.4. An exception is thrown from a function, but it is not caught, as demonstrated by NumberFormatException. When it is not caught, it may cause programs using the library to crash or expose sensitive information. | 2021-02-23 | 2022-05- 12 |
| 15690 | json- smart- v2 | 2.3 | CVE- 2021- 27568 | 9.1 | An issue was discovered in netplex json-smart-v1 through 2015-10-23 and json-smart-v2 through 2.4. An exception is thrown from a function, but it is not caught, as demonstrated by NumberFormatException. When it is not caught, it may cause programs using the library to crash or expose sensitive information. | 2021-02-23 | 2022-05- 12 |

^{*} This mail was sent by osc.lge.com

보안취약점 실시간 알림

• Vulnerability Mailing Score 이하로 CVE ID의 CVSS Score 변경 시, 해당 CVE ID와 매칭된 OSS가 사용된 프로젝트 담당자에게 'Recalculated' 메일 알림

FOSSLight Hub Notification

[OSC] Vulnerability Recalculated

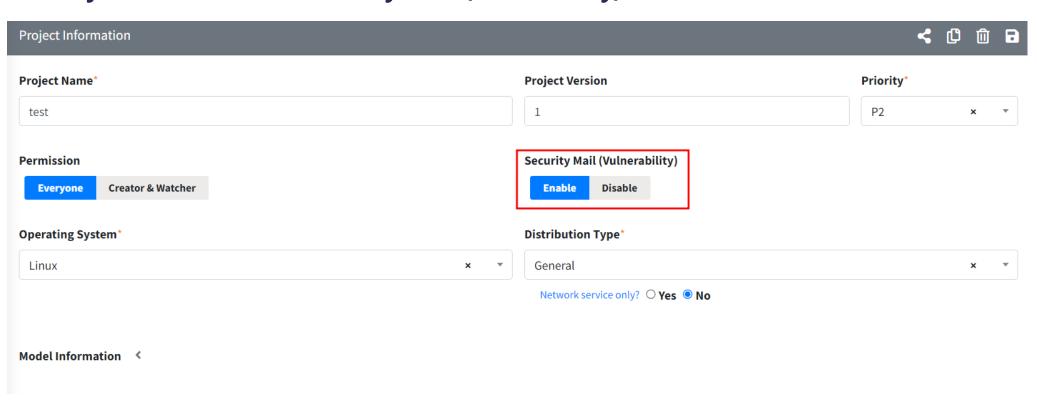
« Vulnerability Information »

| OSS ID | OSS Name | OSS Version | CVE ID | Score | Summary | Published Date | Modified Date |
|--------|---------------------------|-------------|------------------------------|------------|---------|----------------|---------------|
| 83203 | director | | <u>CVE-2010-0128</u> -> NONE | 9.3 -> 0.0 | | | |
| 24445 | <u>python-babel-babel</u> | 2.8.0 | CVE-2021-42771 -> NONE | 7.8 -> 0.0 | | | |

^{*} This mail was sent by http://osc.lge.com

메일링 Enable/Disable 설정

• Project Information > Security Mail (Vulnerability)에서 설정 가능



Γ

감사합니다