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Understanding and Managing the Dependency in SBOM with the New Feature of SW360

Toshiba Corporation
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2023.02.05

Who is presenting?

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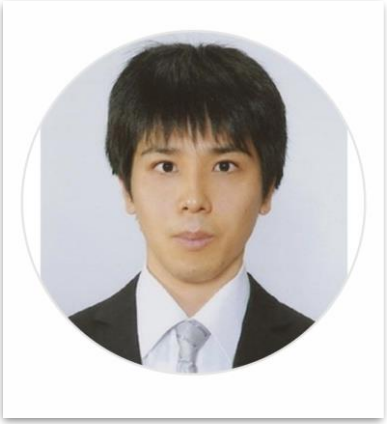
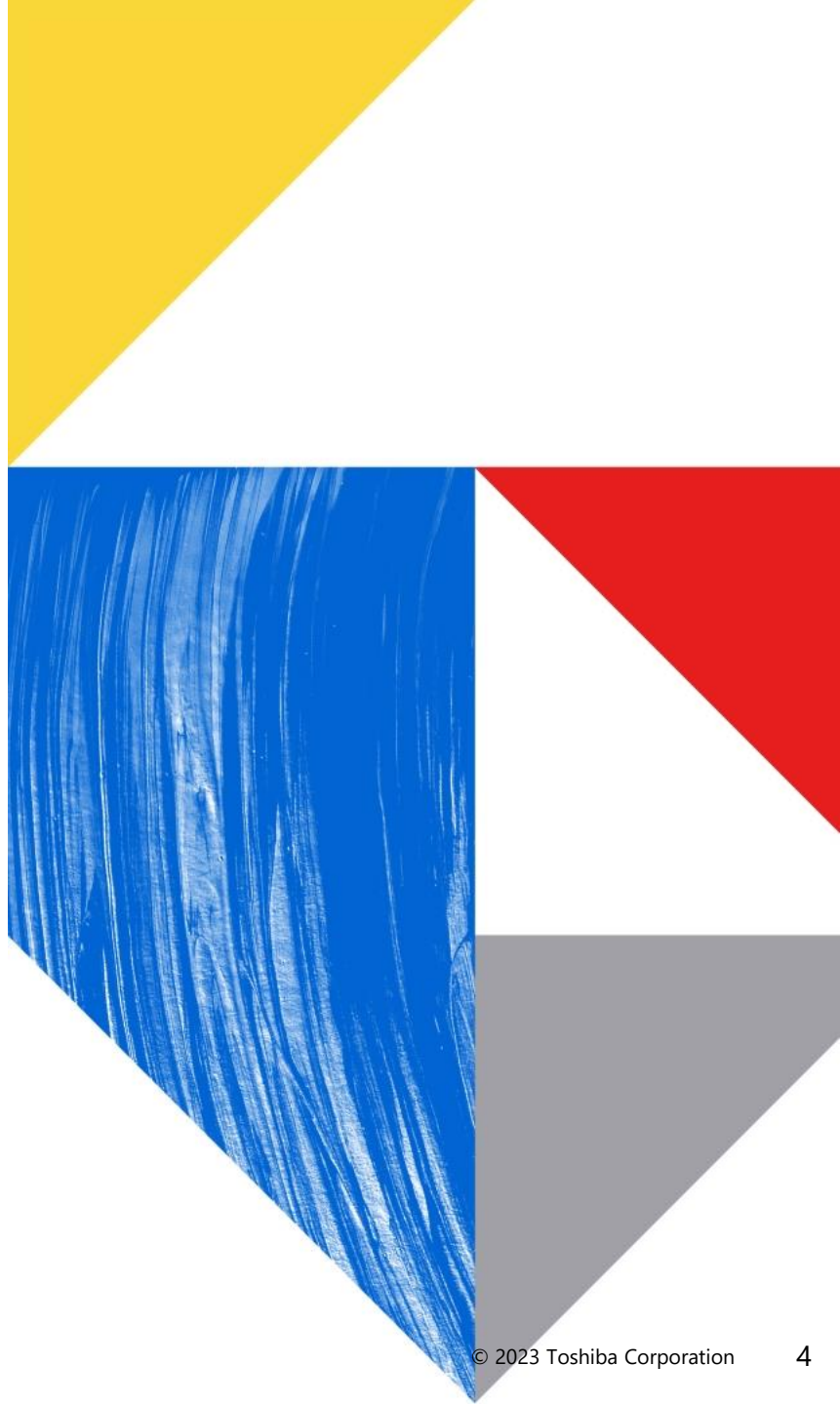


- Researches open source compliance, management process, and these tools.
- One of the co-leader of the Eclipse SW360 project.

Contents

01

What is SW360?



What is SW360?

SW360 is an open-source software project licensed under the EPL-2.0 that provides both a web application and a repository to collect, organize and make available information about software components. It establishes a central hub for software components in an organization.

https://www.eclipse.org/sw360/about/

SW360 allows for

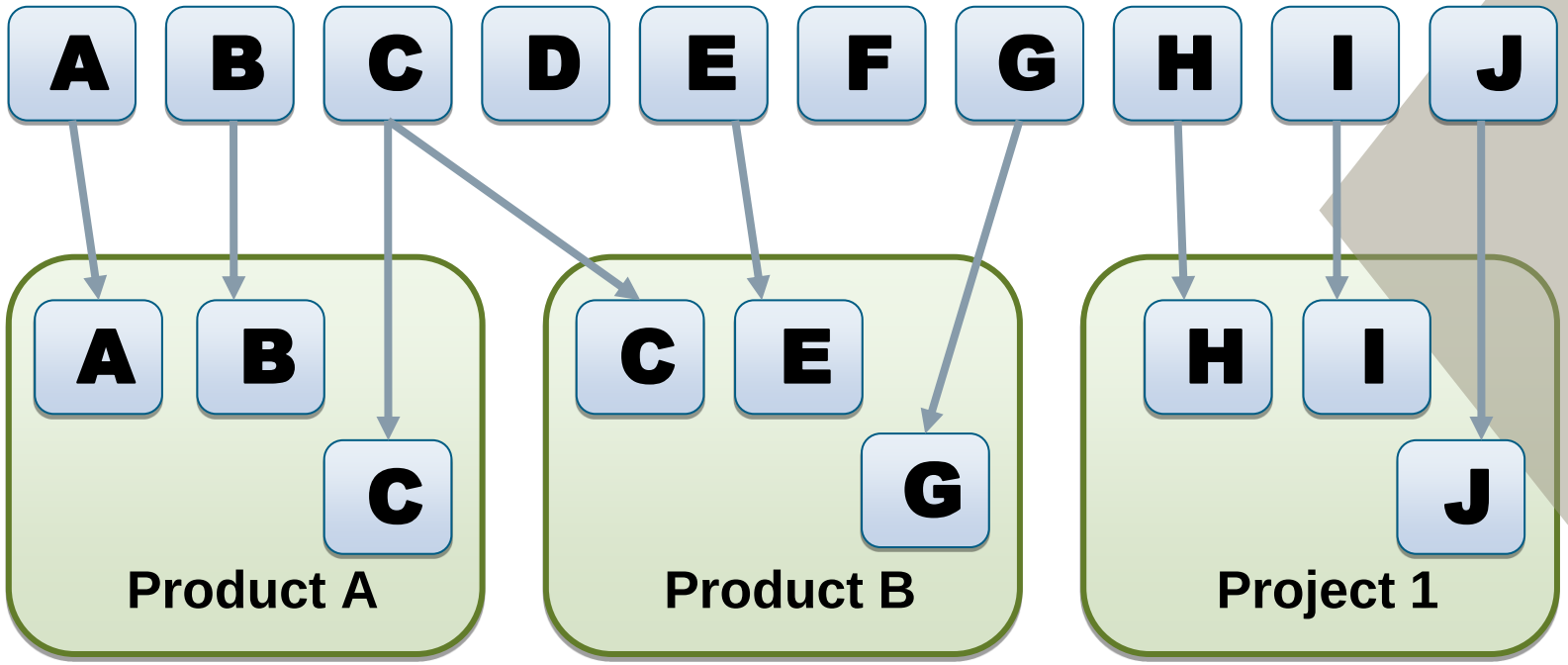
- tracking components used by a project/product,
- assessing security vulnerabilities,
- maintaining license obligations,
- enforcing policies, and
- generating legal documents.

Overview

SW360 is a 3rd party software component catalogue

Assigns 3rd party and own components

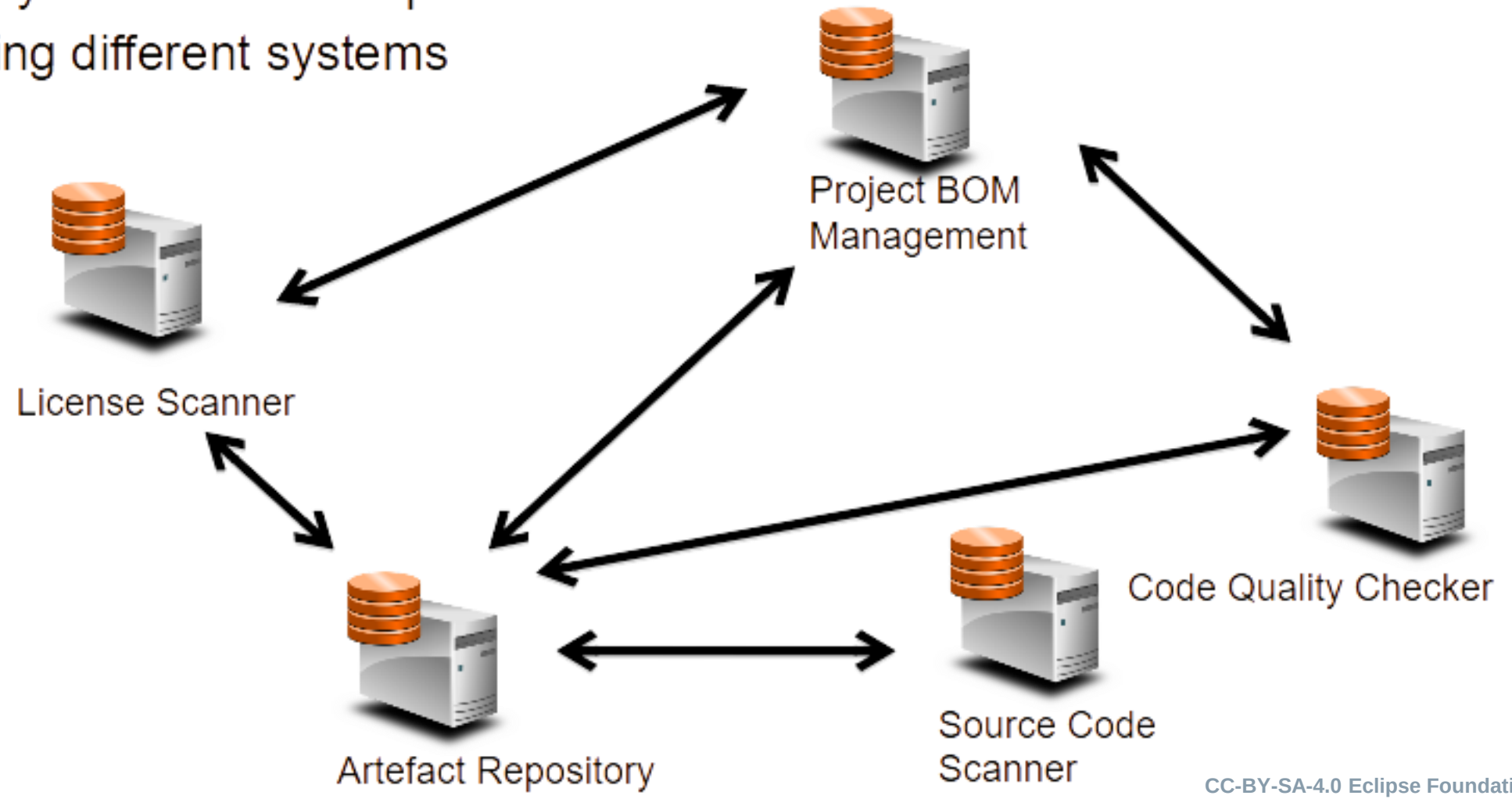
to products or projects



- **Goals and Benefits**
- Reuse information about components
- Coordinate product documentation process
- Supports OSS license clearing

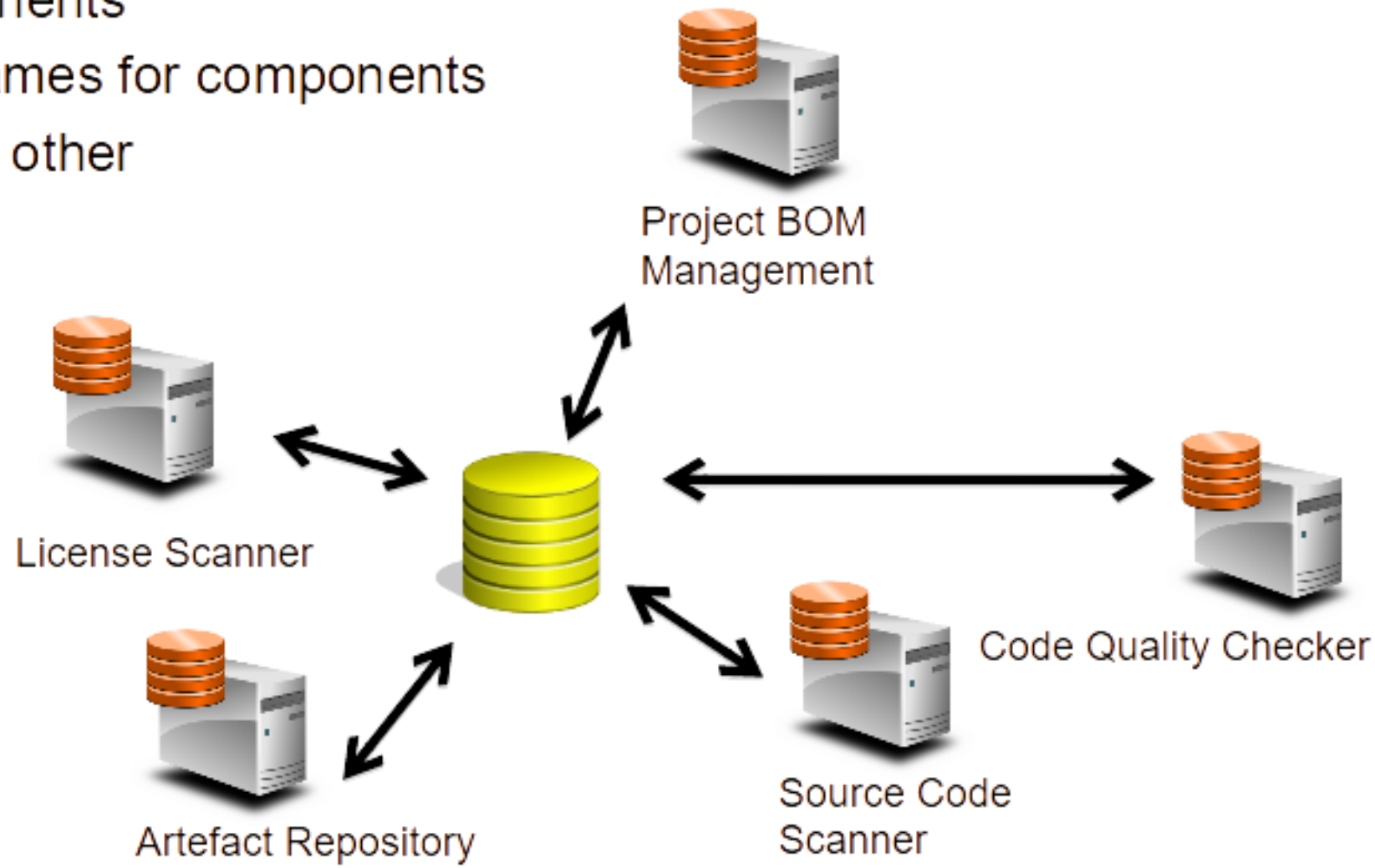
Handling of Software Components

- IT today talks about components
- Involving different systems



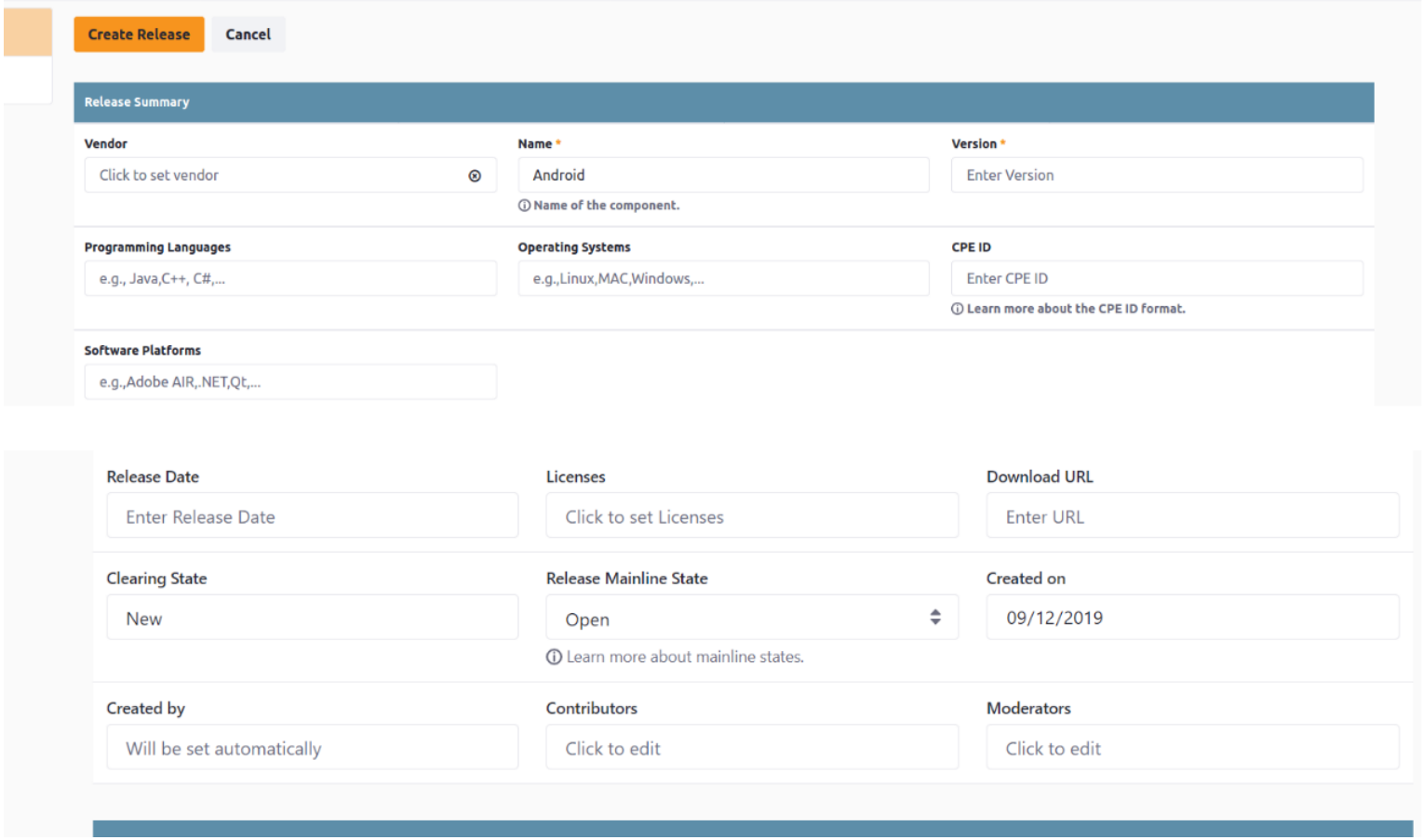
Solution: Centralise mappings

- "Phonebook for Components"
- Central database for names for components
- Systems to talk to each other
- Like person directory for IT systems in company already



Example of SW360's registration Items for Software component

- Component Name
- Categories
- Component Type
- Languages
- Software Platforms
- Operating System
- Vendors
- Main Licenses
- Programming Languages
- Operating Systems
- CPE ID
- Software Platforms
- Release Date
- Download URL



WIP: Support for SPDX (GUI, Import, Export…)

- https://github.com/eclipse/sw360/pull/1682
- https://github.com/eclipse/sw360/pull/1503

Support for Cyclone DX is on Roadmap

- https://github.com/eclipse/sw360/issues/1548#issuecomment-1146919177

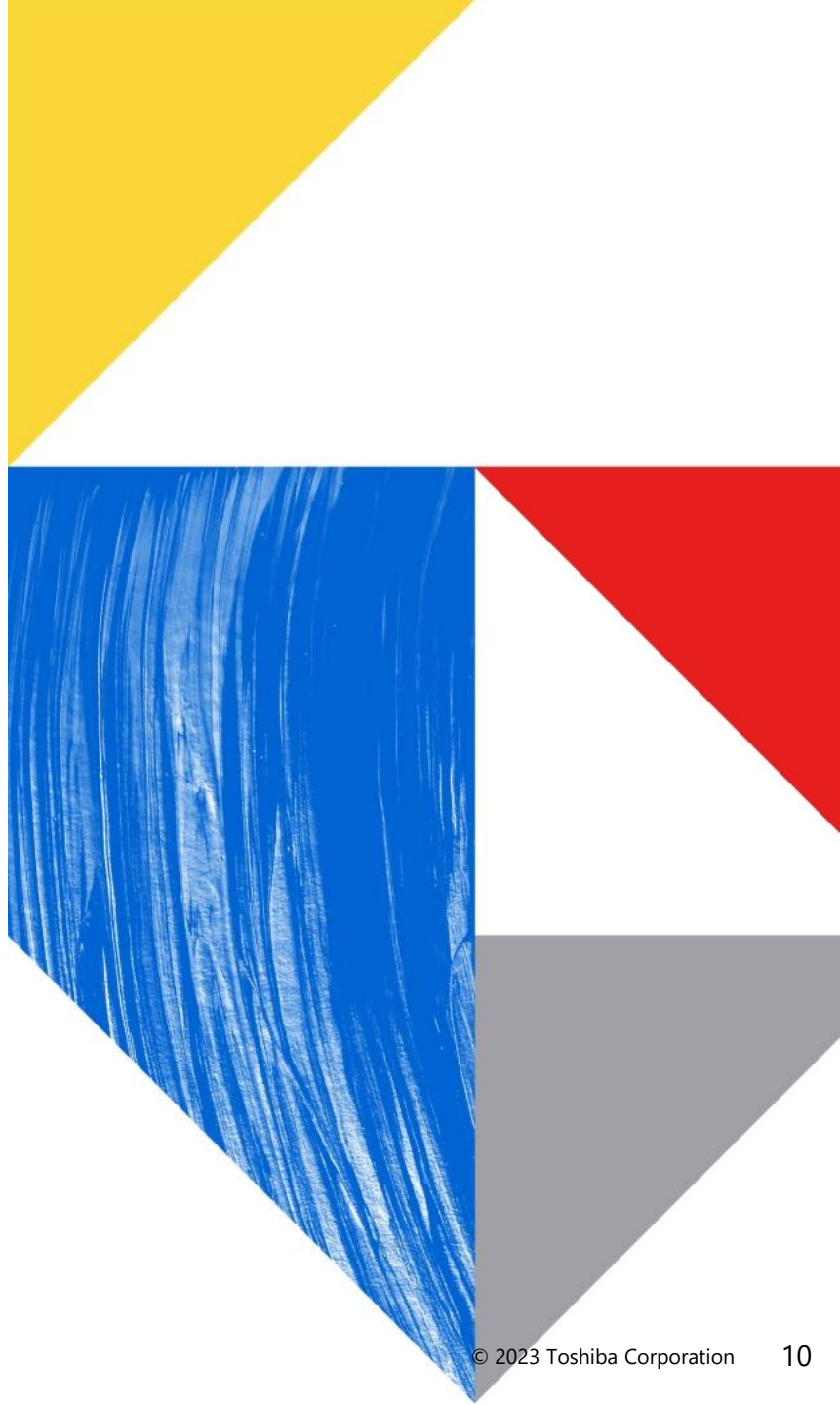
4 language GUI

- **English, Vietnamese**
- **Japanese, New: Chinese**
  - fix(language): Fix the properties file and add some other needed files for Chinese language support by shi9qiu · Pull Request #1820 · eclipse/sw360 (github.com)

02

Background;

Software Dependency

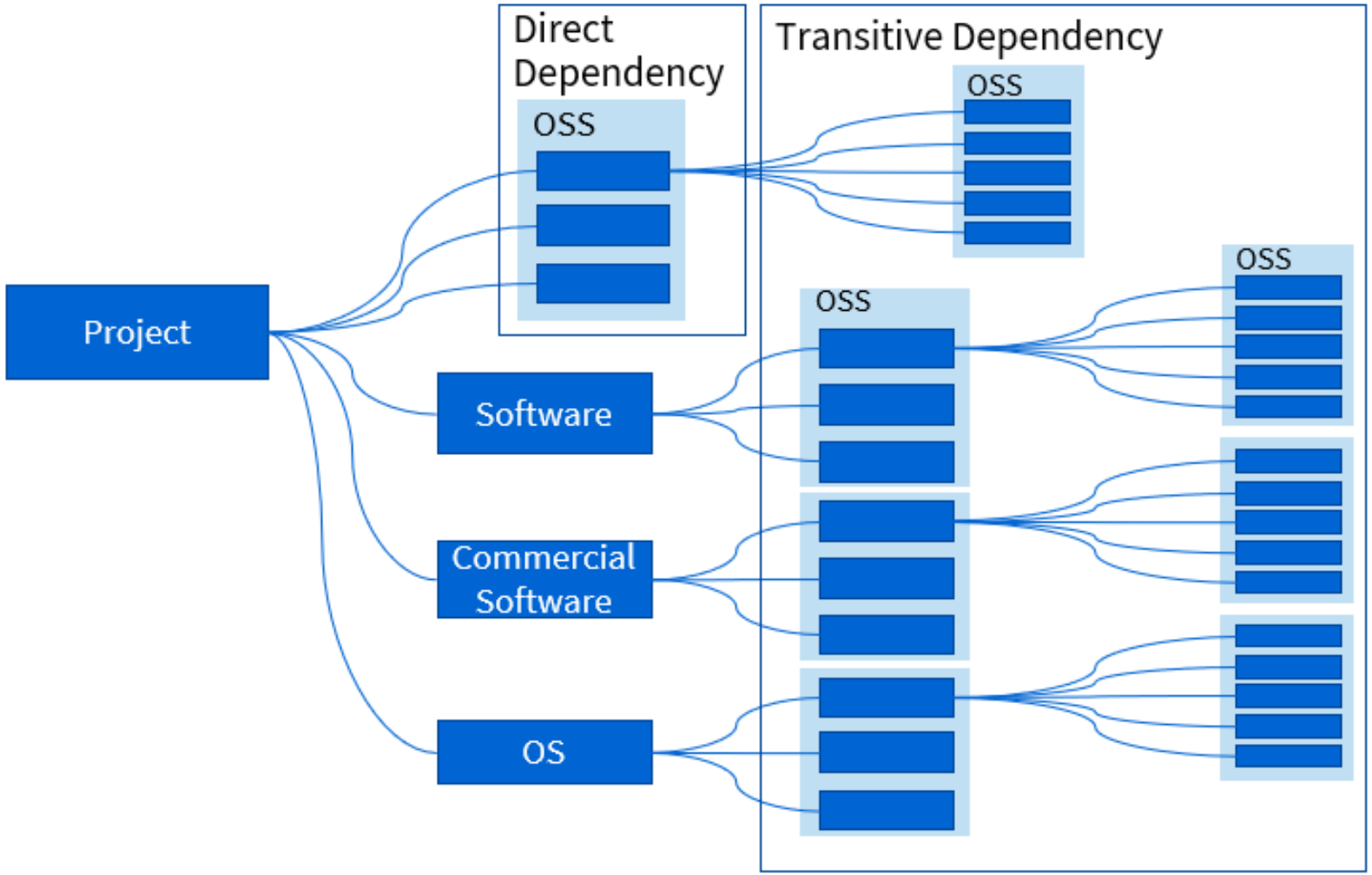


In nutshell; Why Dependency management is important

- Software dependency information is huge and complex
- It needs to be properly managed to comply with license obligations and to manage vulnerabilities.

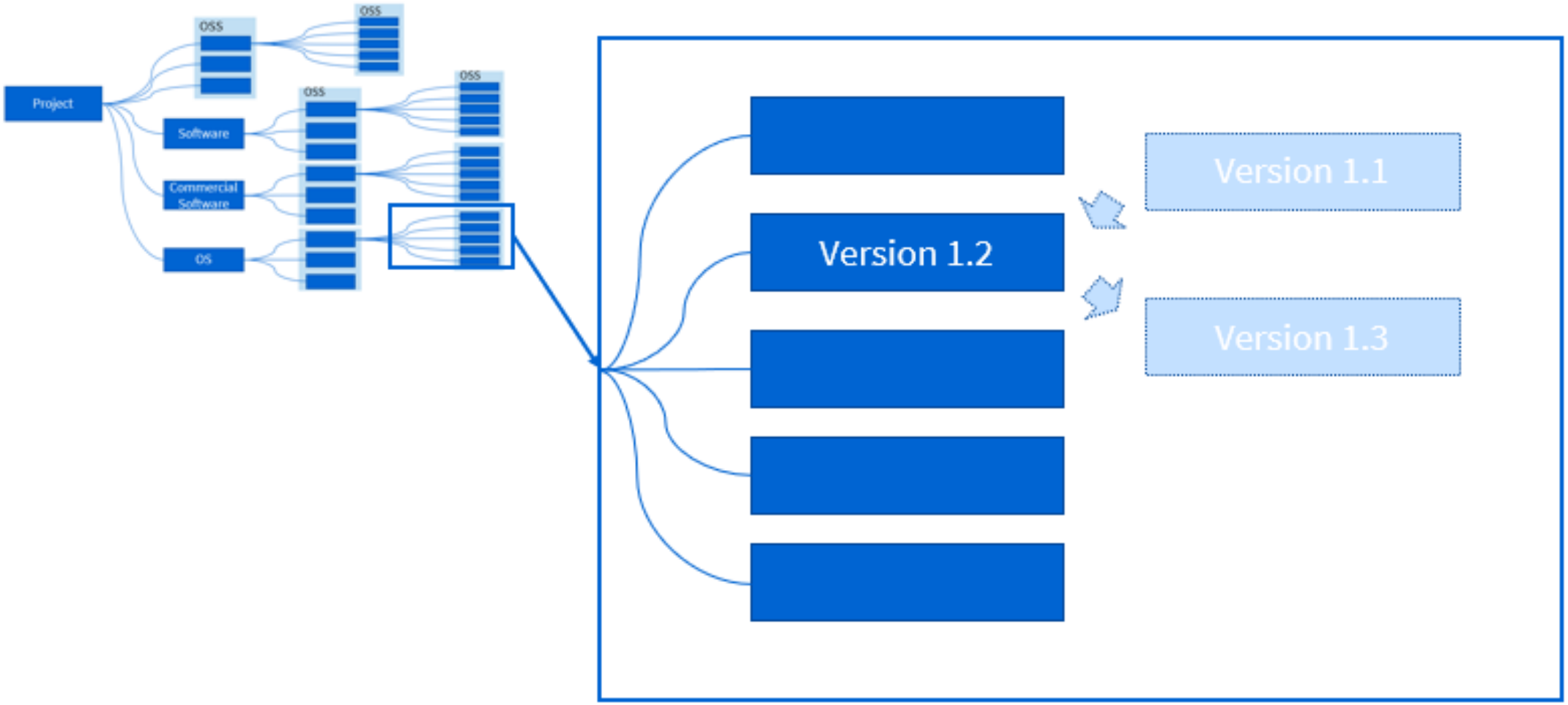
Background About Software Dependency

The software dependency of a project refers to third-party open source software that this project depend on. Software dependencies can be direct or transitive.



Softwares in Dependency update version

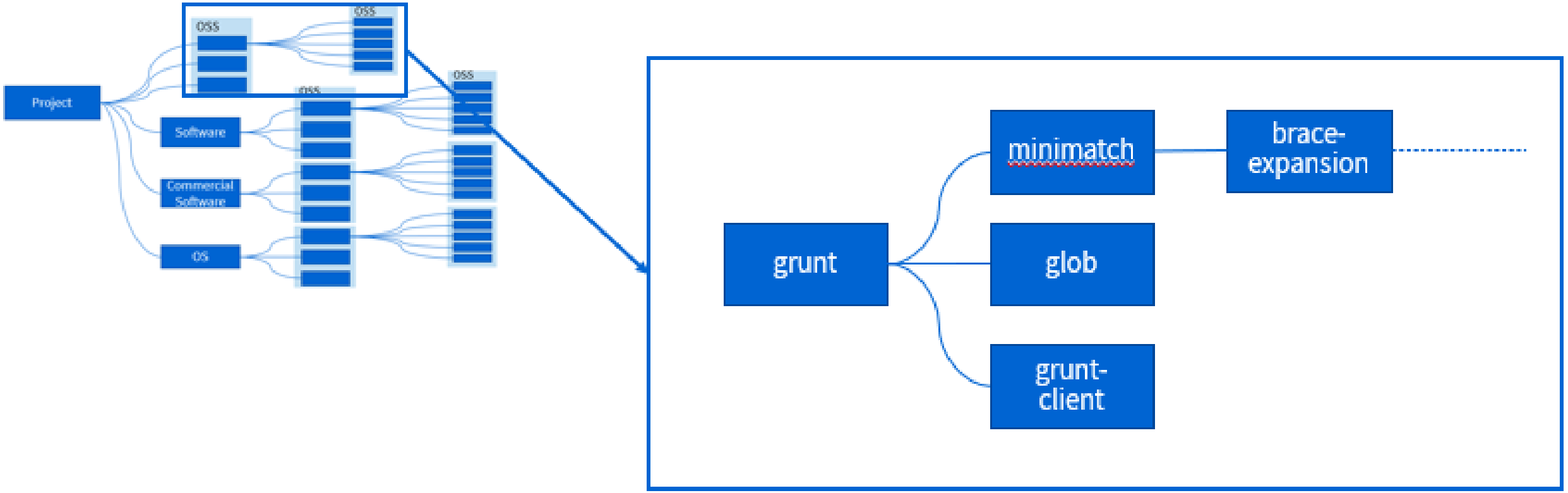
Dependency graph is continually changing because of version updates, the different build time and build options, etc.



Software Dependency become large and complex

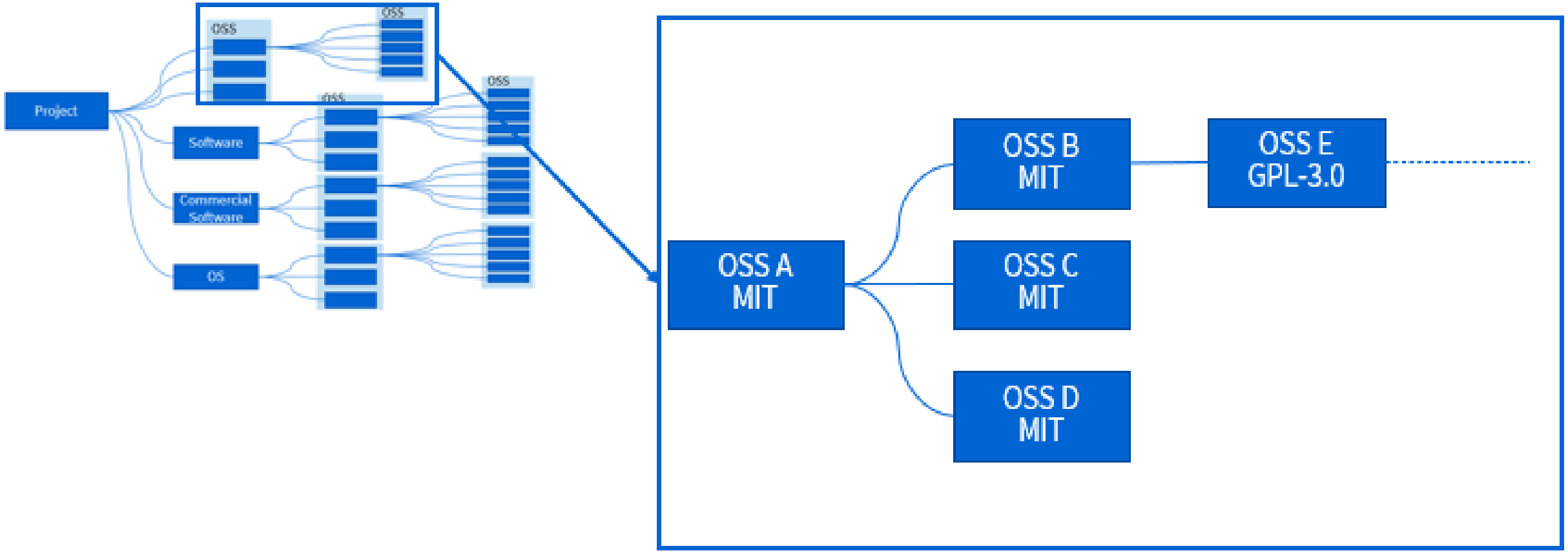
The dependency graph of a large project is very complicated

- E.g. A project depends on a npm package *grunt* is not only depends on *grunt*, but also depends on another 15 packages which are the dependencies of *grunt*. Meanwhile, each of these 15 packages has its own dependencies, constructing a large and complicated dependence graph



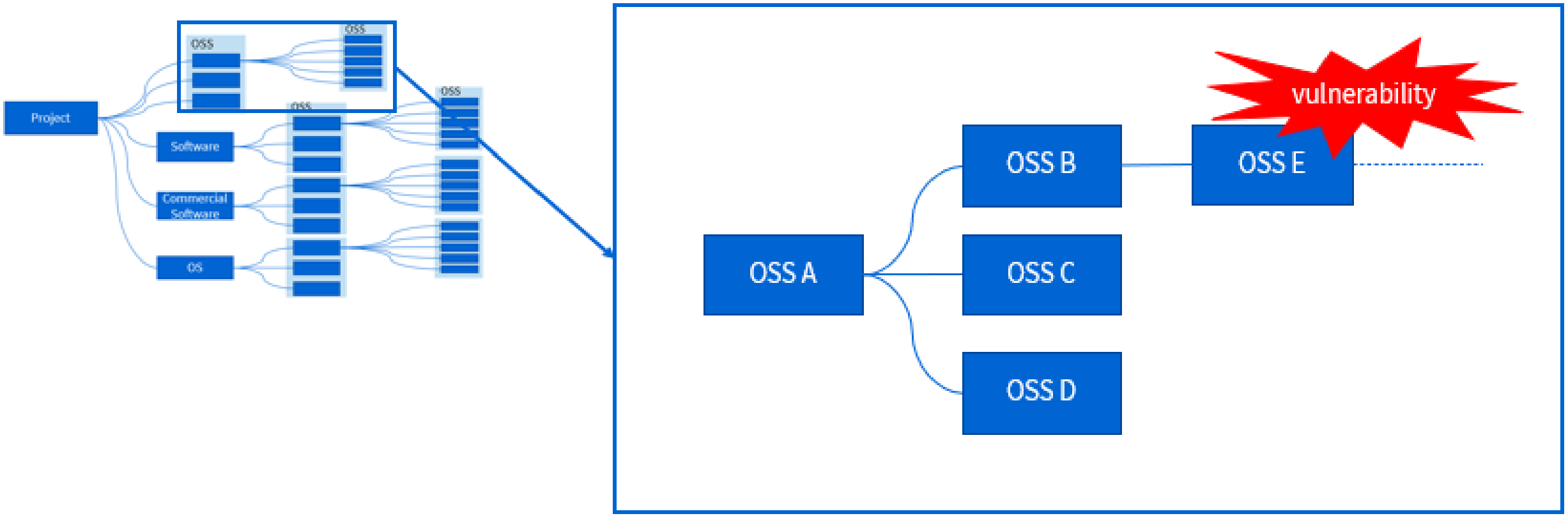
Need to check all licenses in dependency software

Because of the complicated dependency graph, the obligation of the open source license of a dependency may be ignored.



Need to check all vulnerability in dependency software

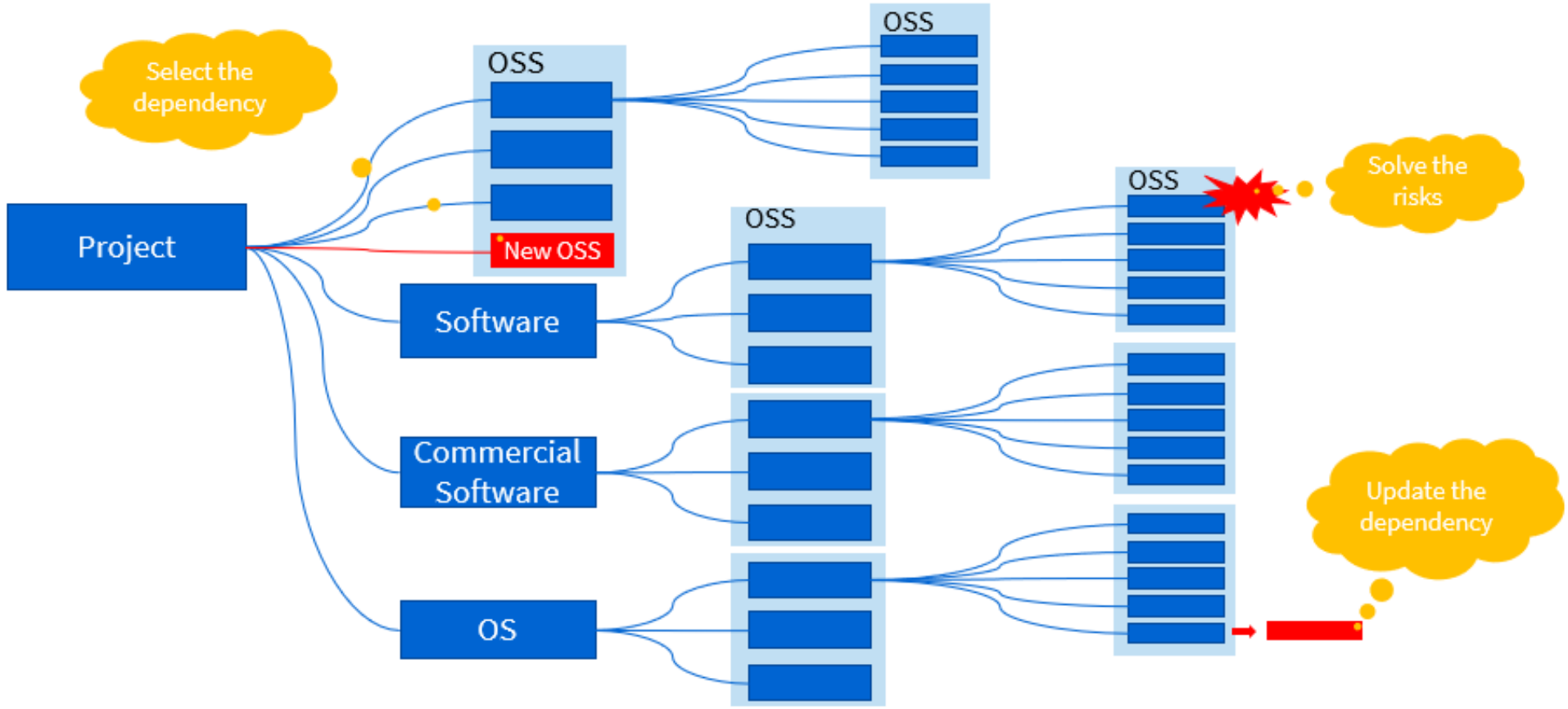
Because of the complicated dependency graph, the vulnerabilities of a dependency may be ignored which will result in the security risk.



Dependency Management

The management activities towards the dependencies of a project

- Selecting the proper dependency
- Updating the outdated dependency
- Solving the risks caused by dependencies



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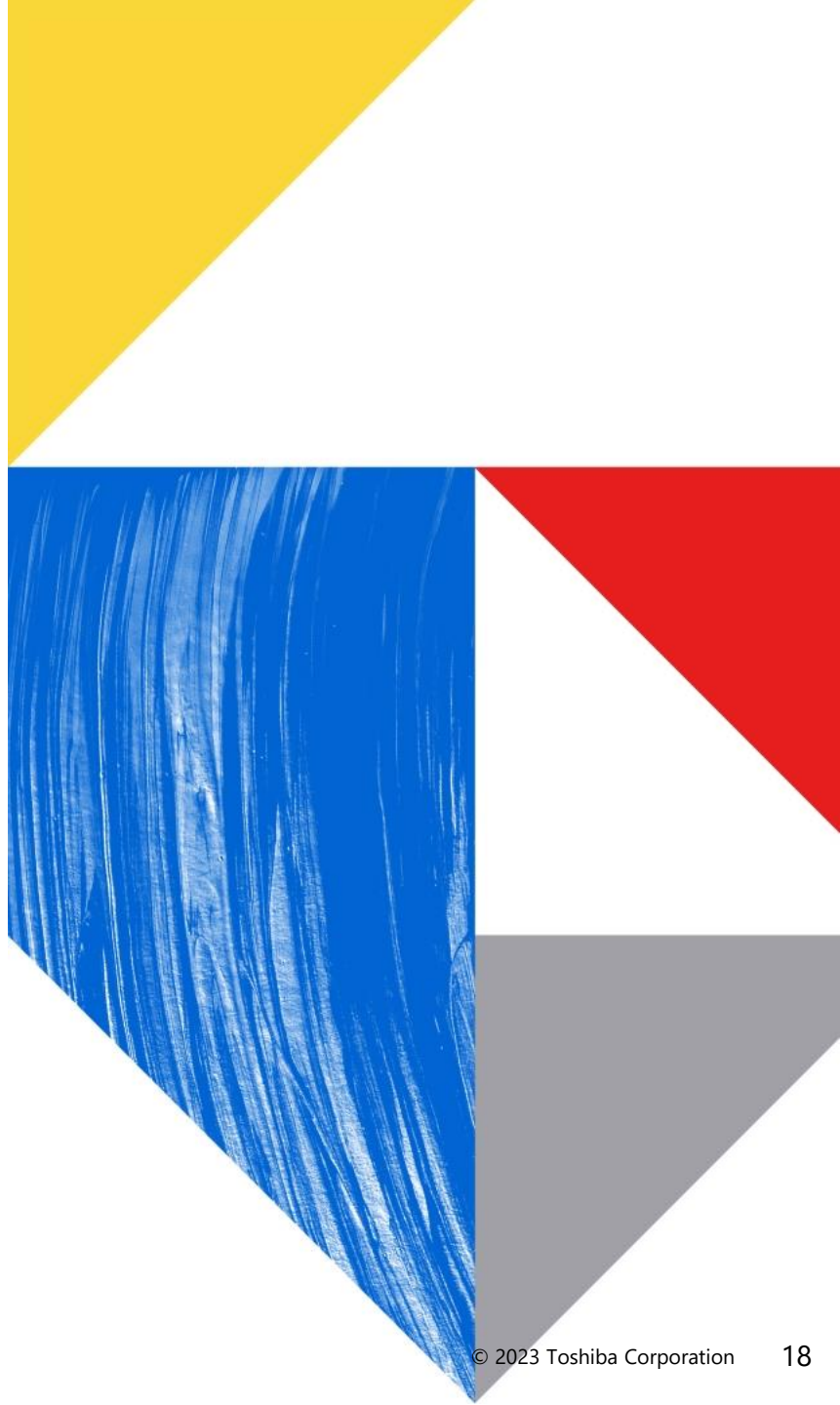
Software Dependency registration issue in SW360



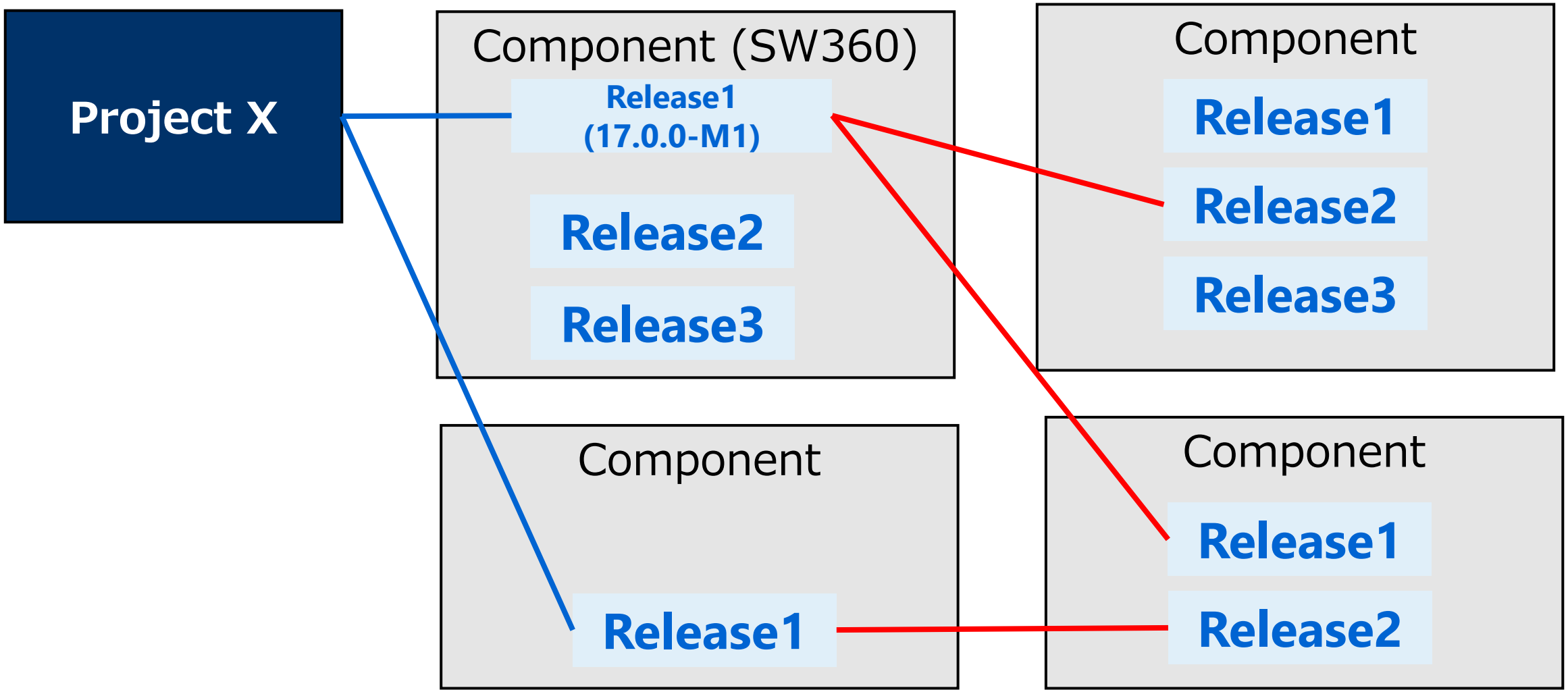
In nutshell; Dependency registration issue in SW360

The issues caused:

- SW360 can register only one software dependency information.
- Different dependencies cannot be registered for different projects.

Data Architecture of SW360

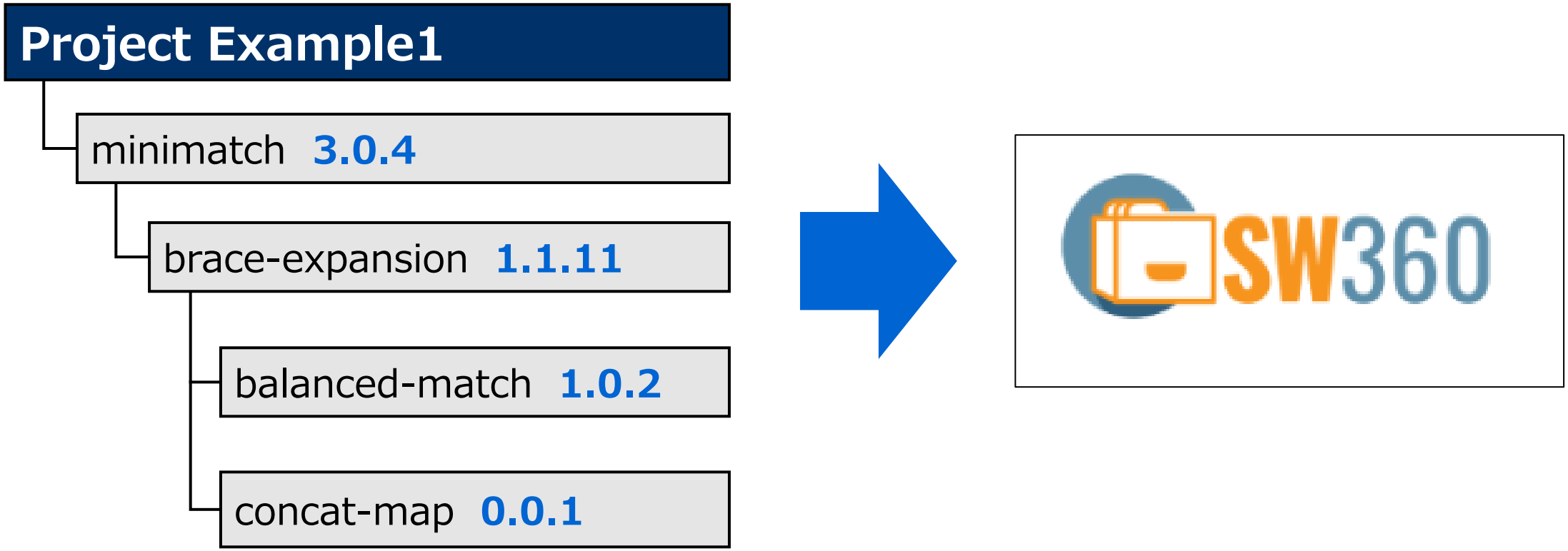
Ex) Component : SW360, Release (≒ version) : sw360-17.0.0-M1



How to manage dependencies in current SW360

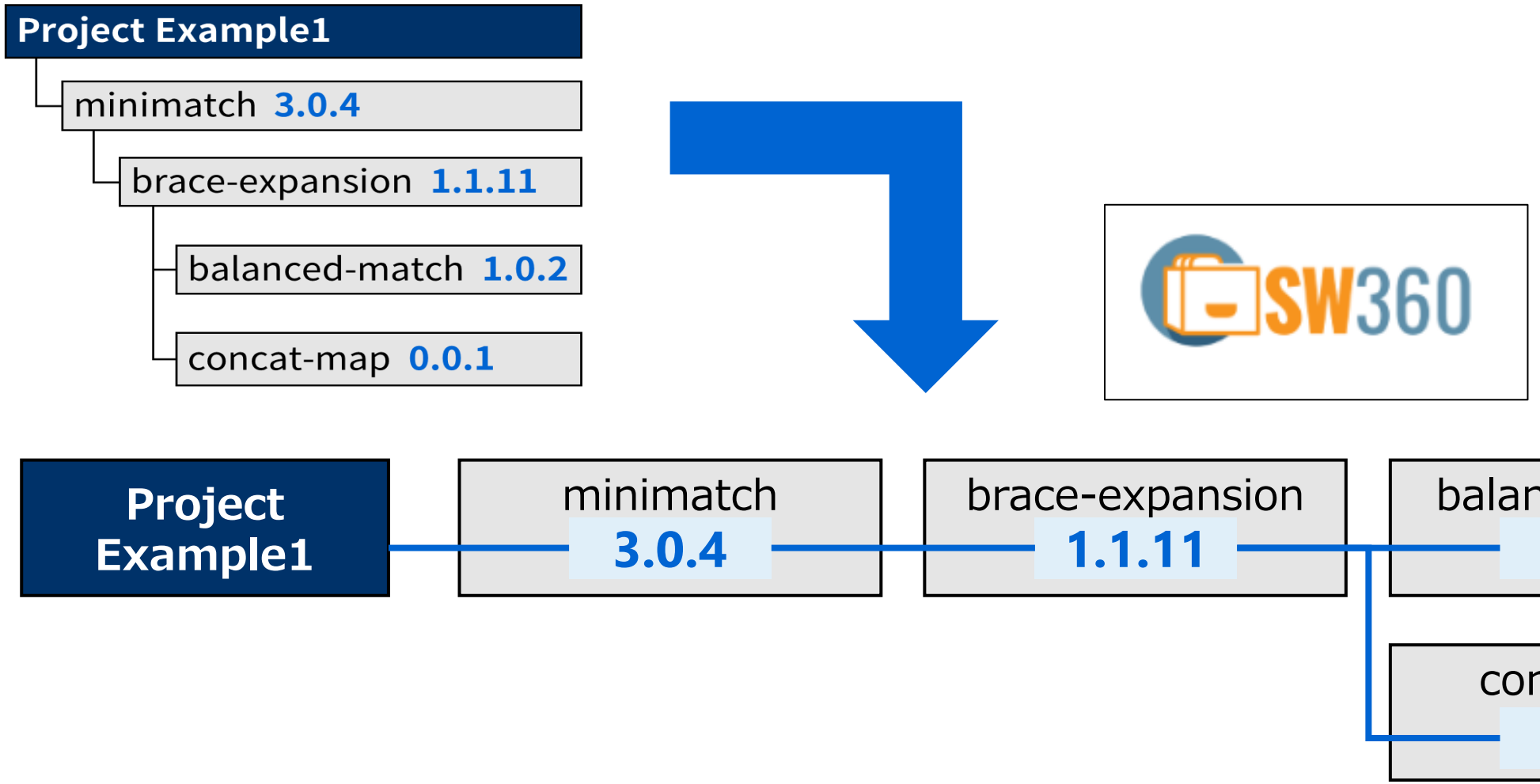
How to manage the dependencies of a project in SW360

- Example: A project “Project Example1” depending on a npm package *minimatch 3.0.4*



Dependencies registration on SW360 architecture

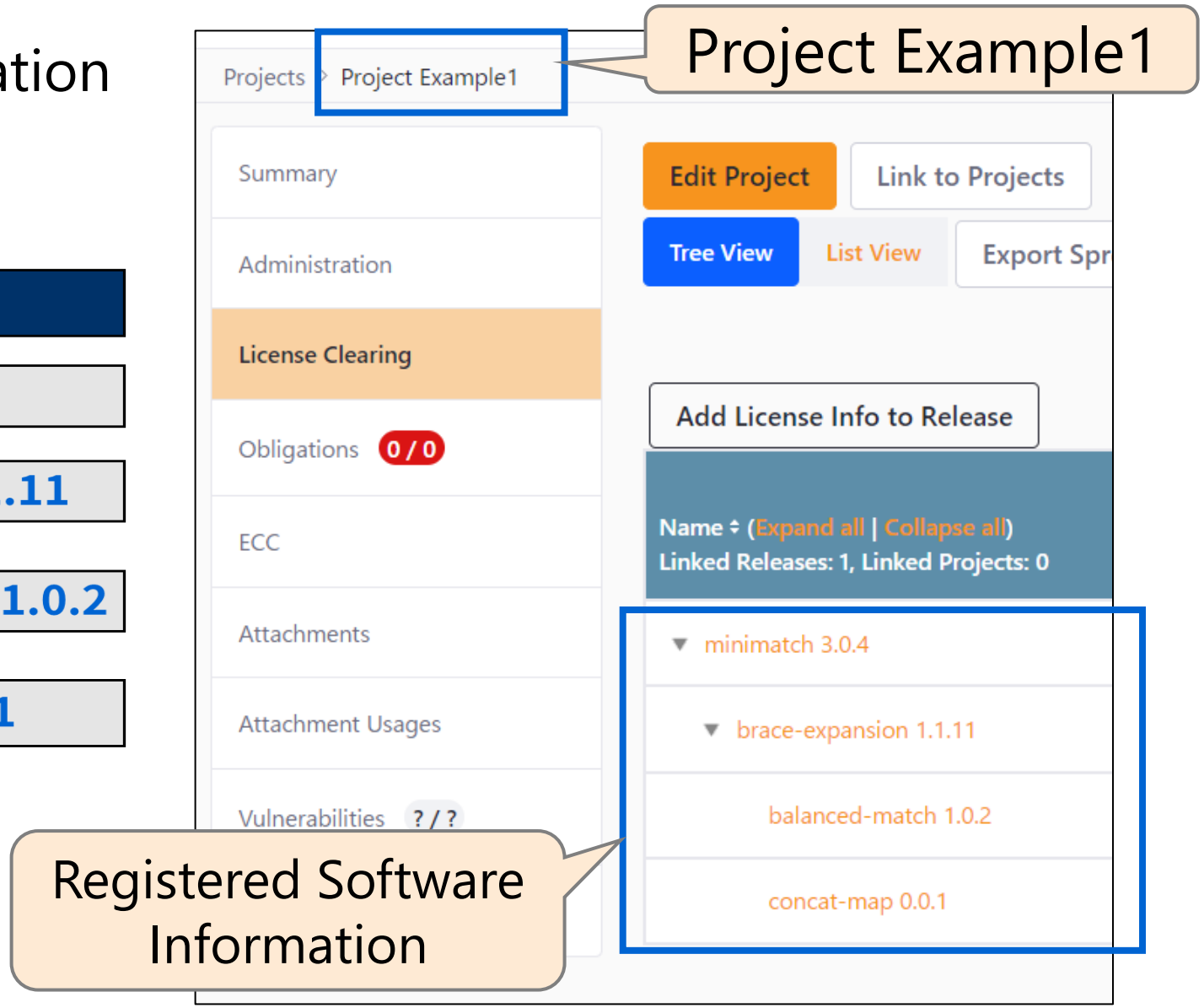
Example1 registered with SW360



SW360's issue about dependencies registration

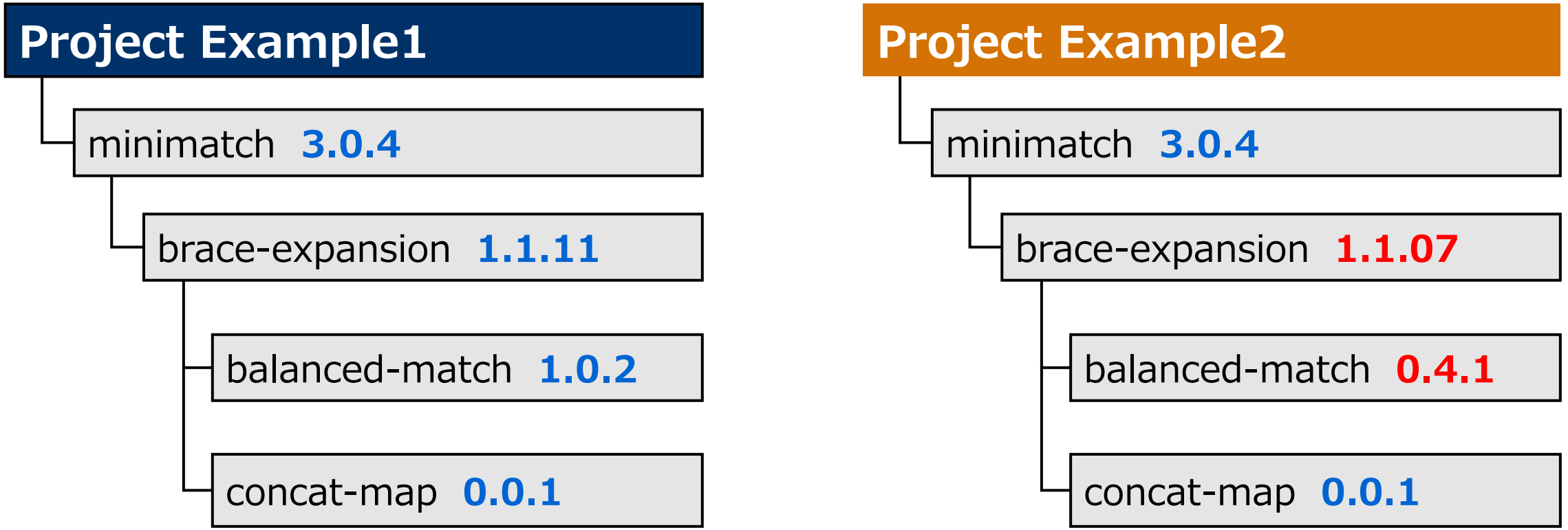
Example SW360 registration

- **Project Example1**
  - minimatch **3.0.4**
    - brace-expansion **1.1.11**
      - balanced-match **1.0.2**
      - concat-map **0.0.1**



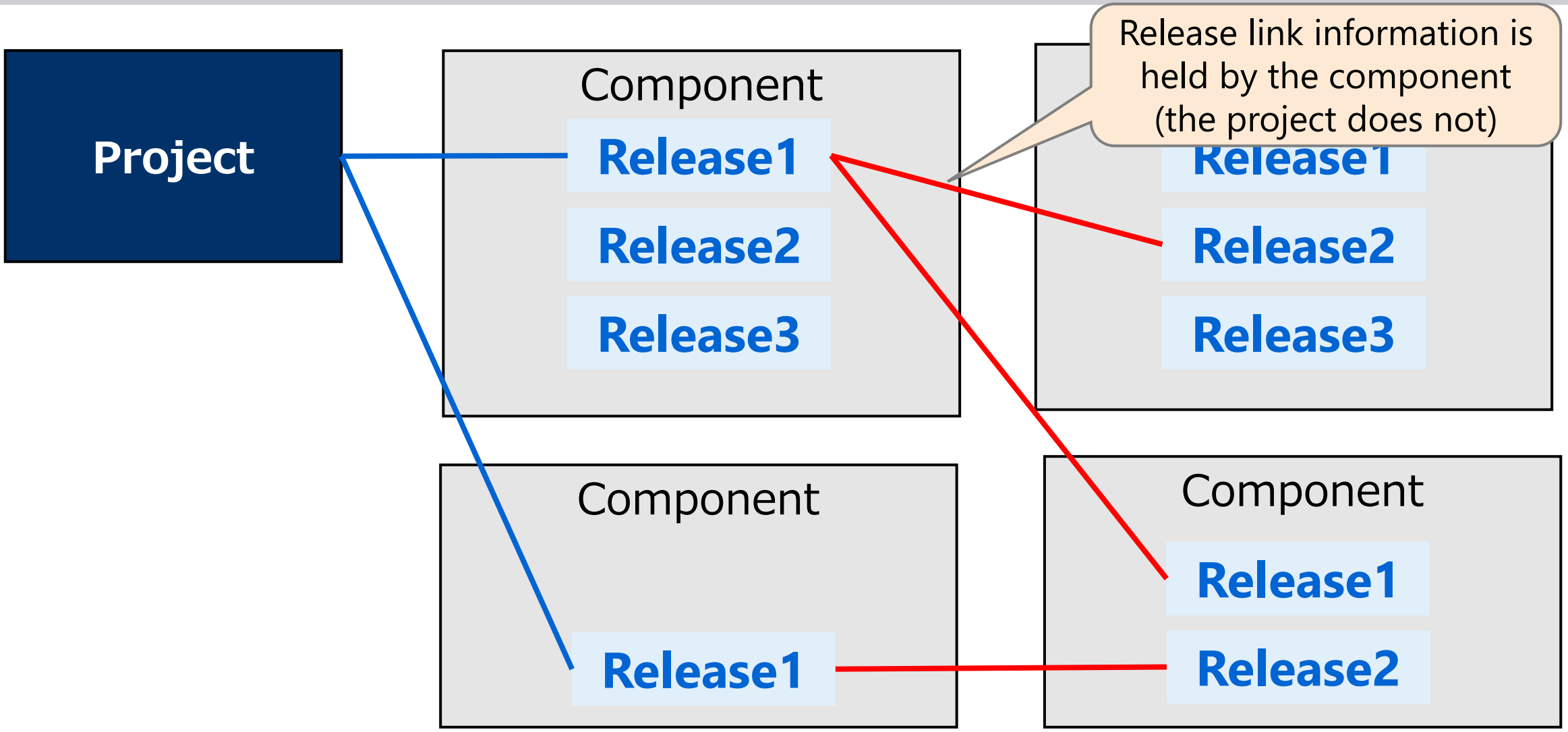
Use case : Register 2 projects dependencies

Use case : two products using "minimatch 3.0.4”



The same "minimatch 3.0.4" is used,
but the dependent OSS versions are different.

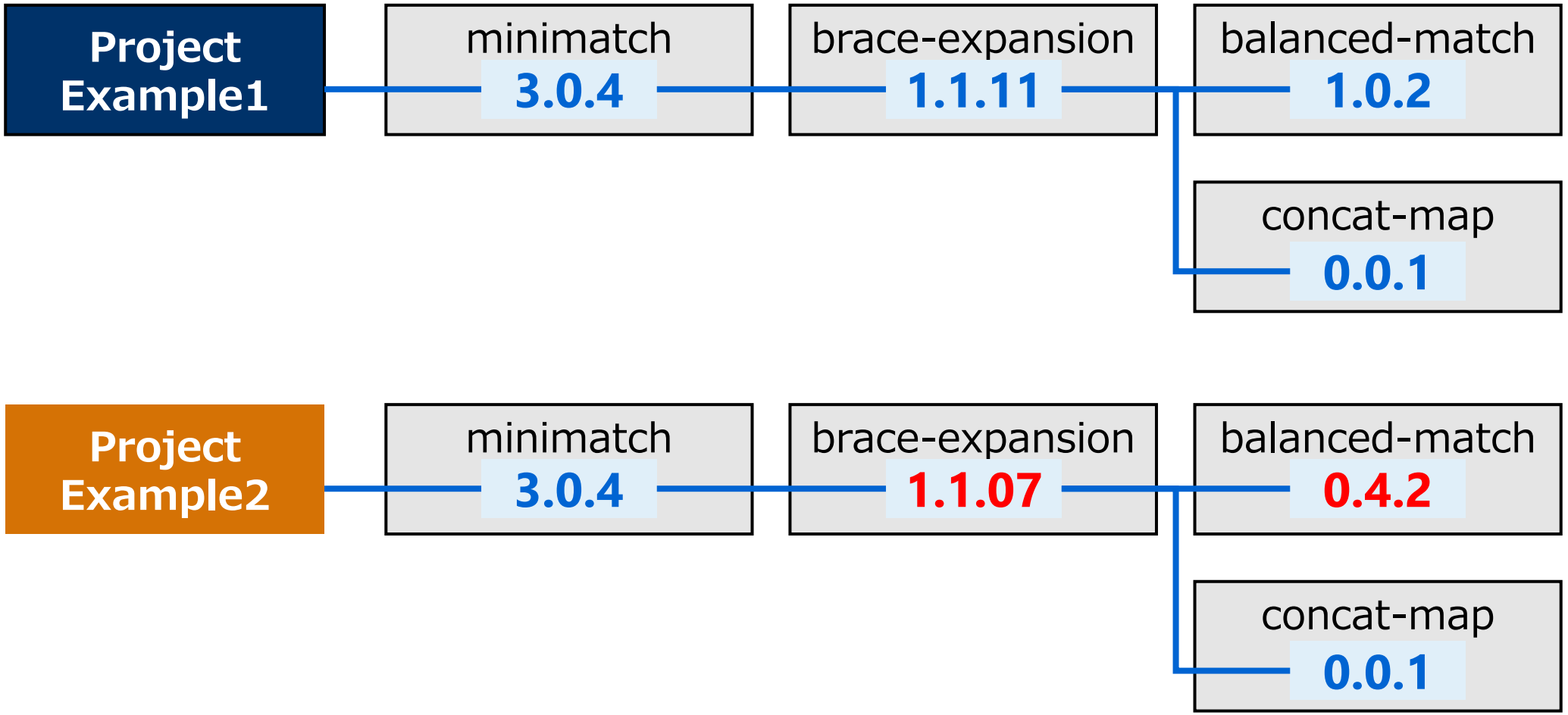
Why Data Architecture of SW360 is bad for dependencies



Cannot register different dependency information for each project

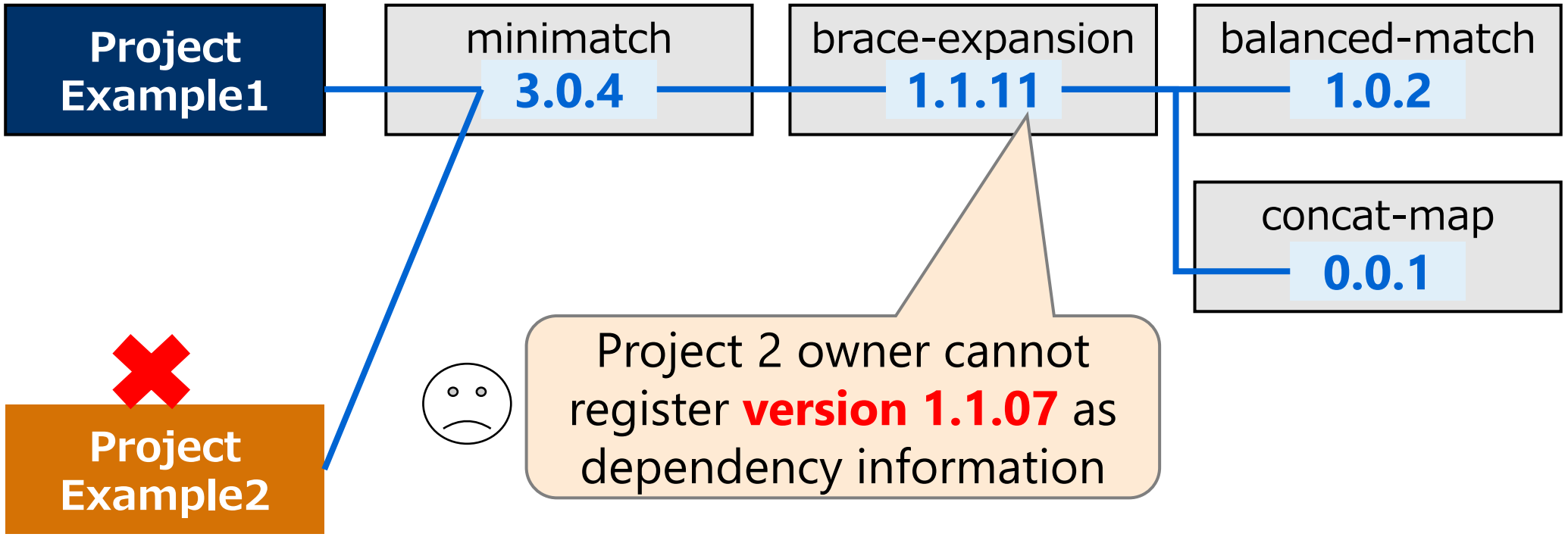
Issue about dependencies registration of 2 projects

What we really need to do: is have a different tree structure for each project.



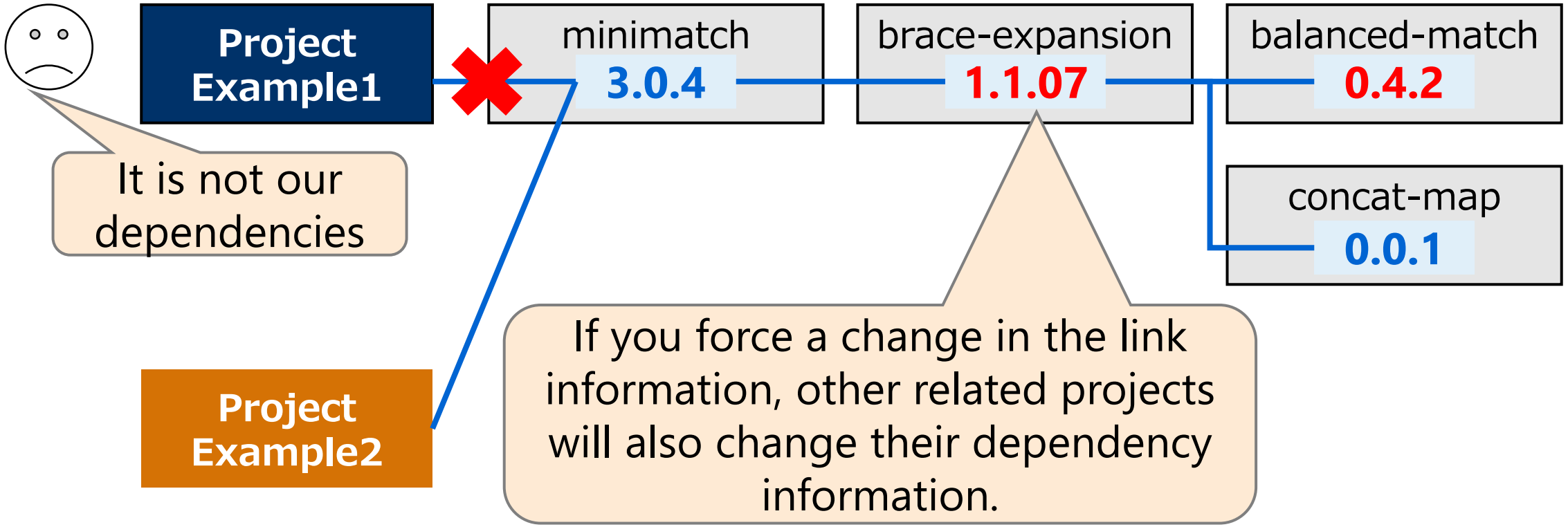
Issue about dependencies registration for new project

Manage the same component dependency information in different projects.



Issue about dependencies registration for existing Project

Manage the same component dependency information in different projects.



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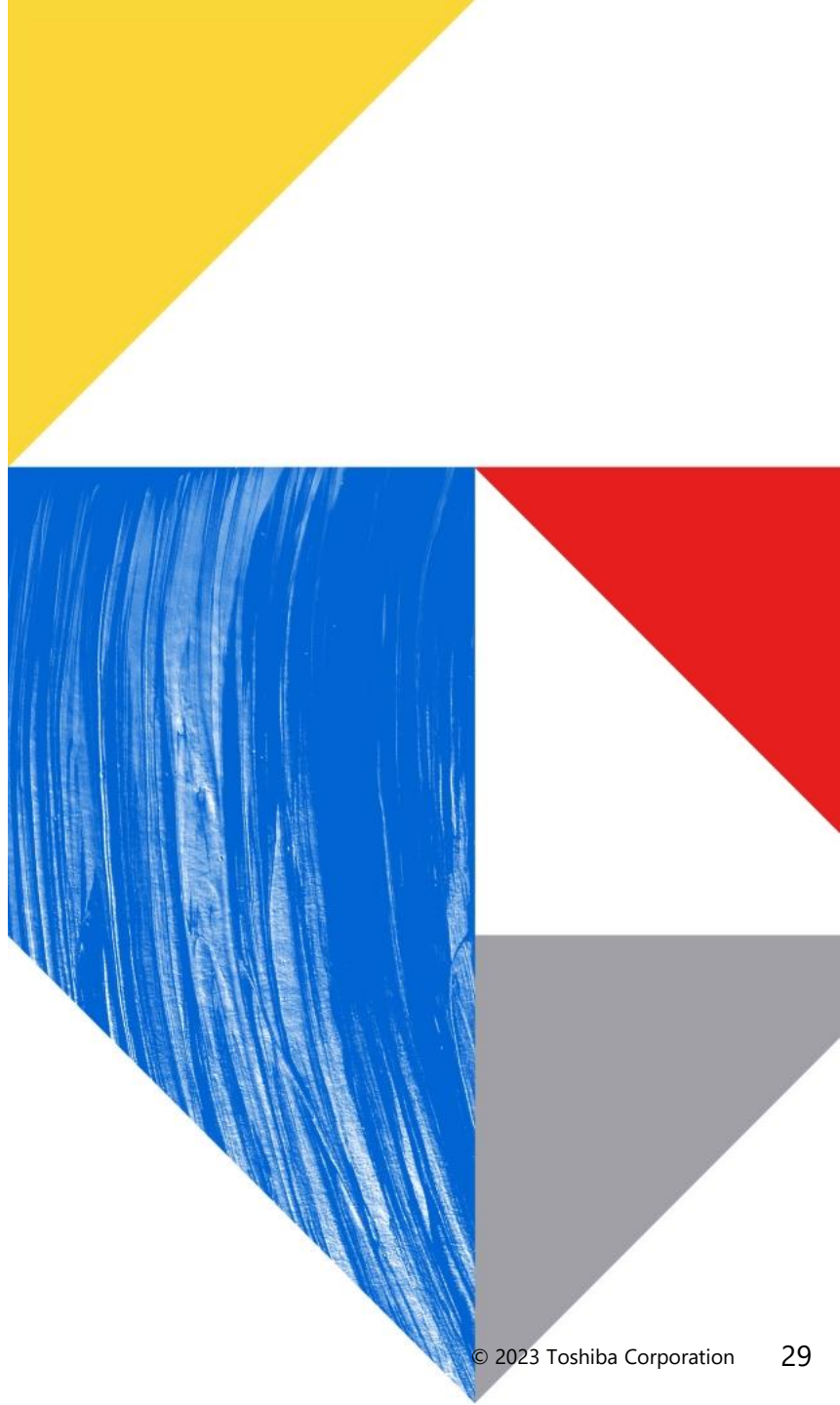
Solving Software Dependency Registration issue in SW360



How to solve Software Dependency registration Problems in SW360

Being able to register different dependency information for each project

By Updating “data architecture” and “GUI”

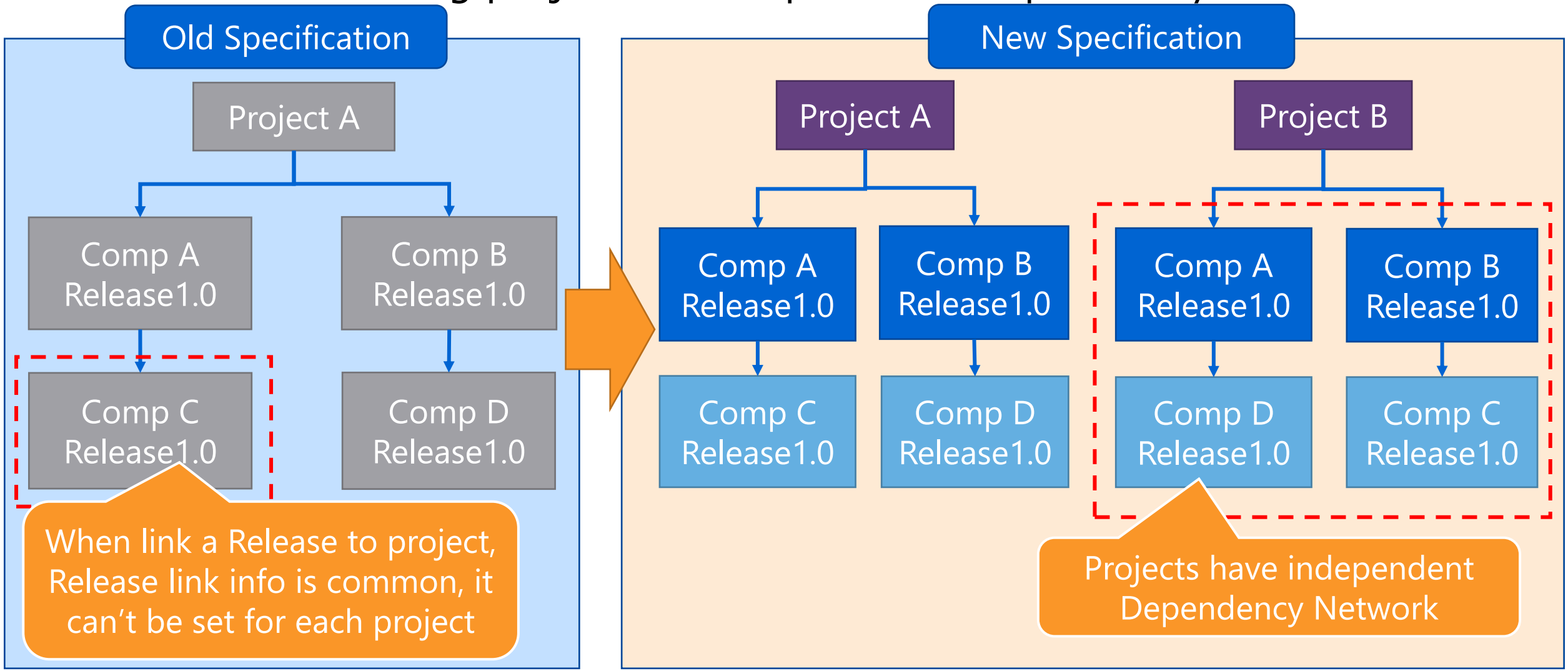
- The code can be found in the SW360 branch managed by Toshiba
  https://github.com/toshiba/sw360/tree/release/feature_dependency-network-management

- PR will be conducted soon.

Change the data architecture for dependencies registration in SW360

A new feature for dependency management in SW360

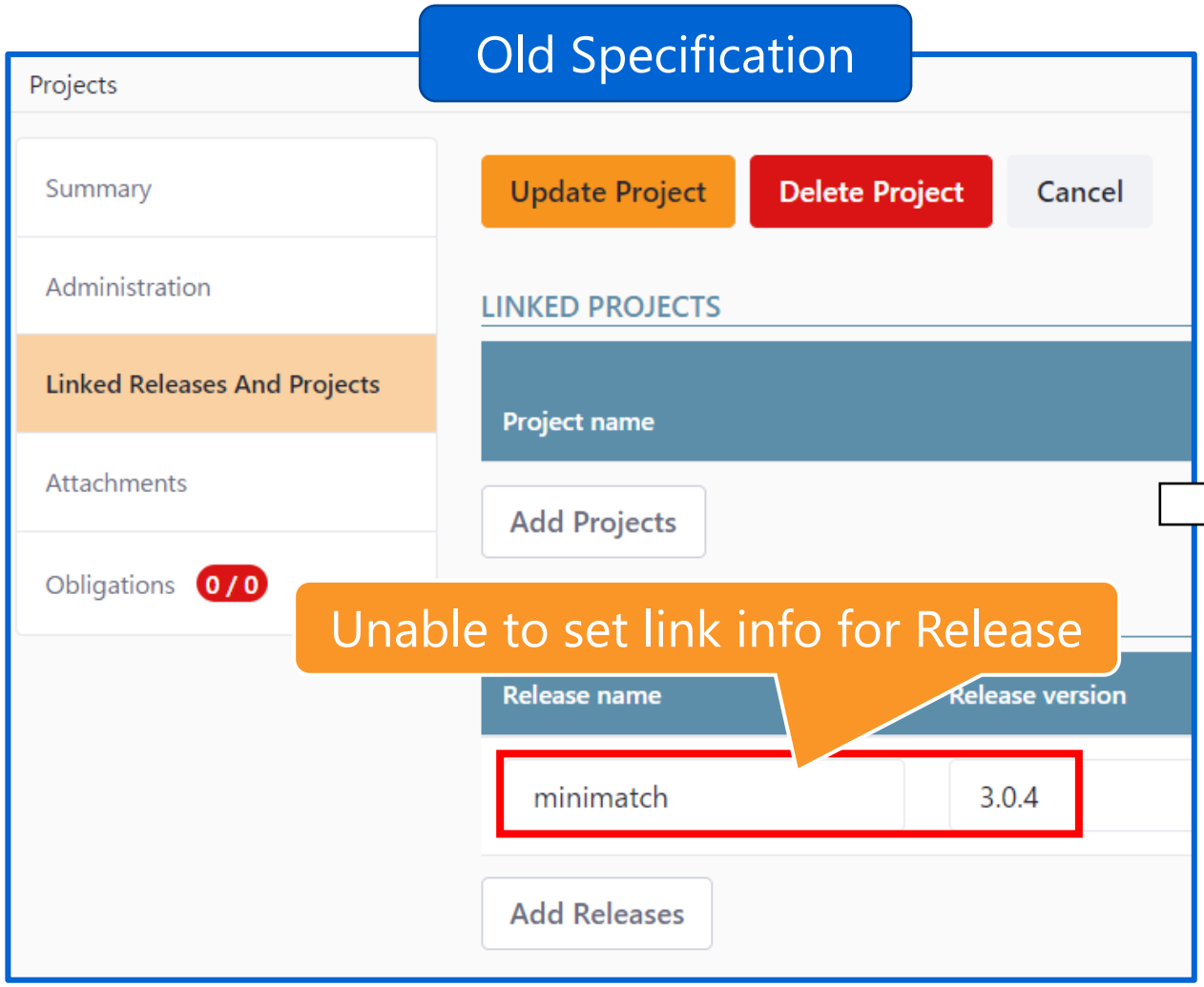
- Feature allowing project to set up its own dependency network

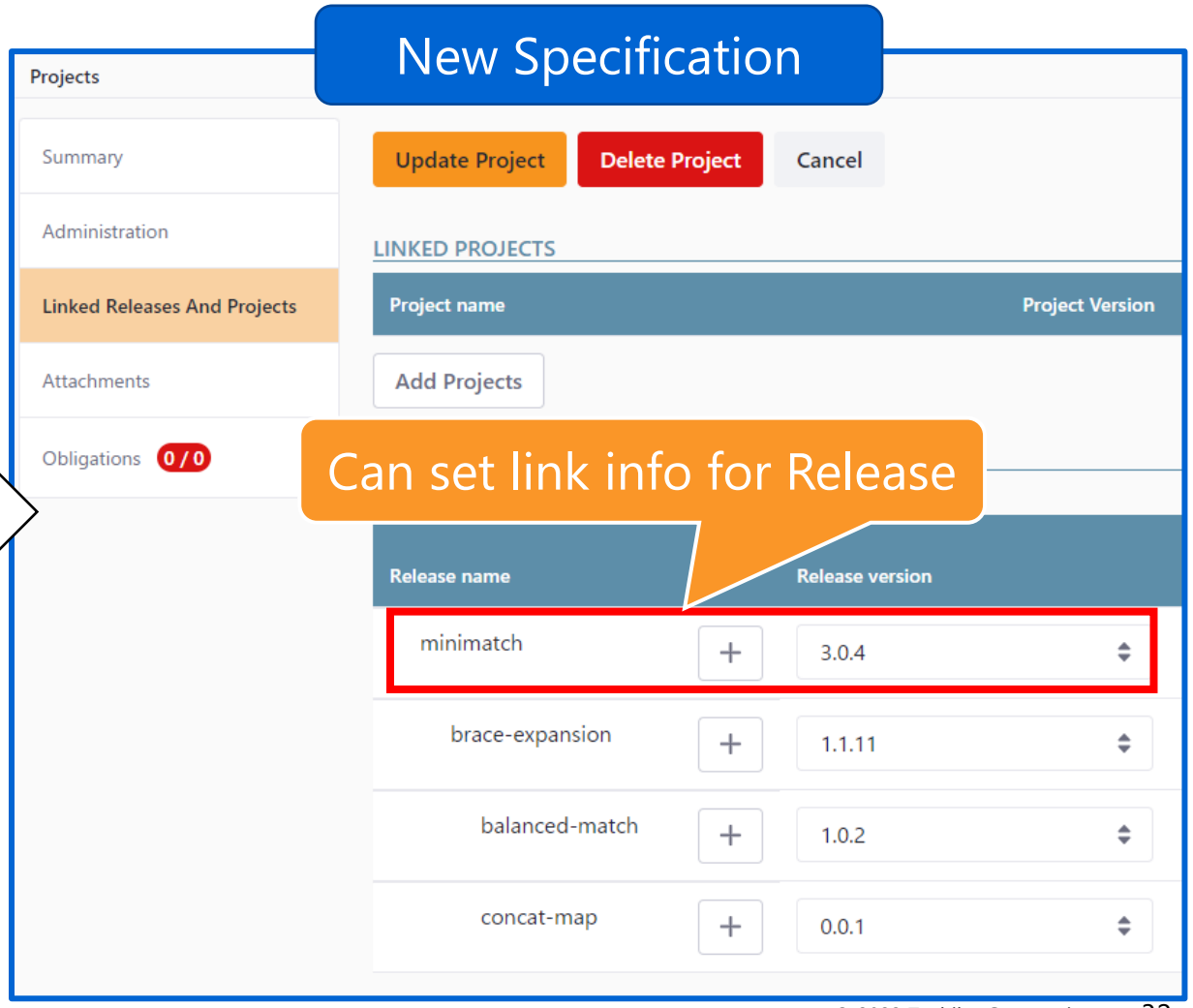


Change the GUI for dependencies registration in SW360

A new feature for dependency management in SW360

- Feature allowing project to set up its own dependency network

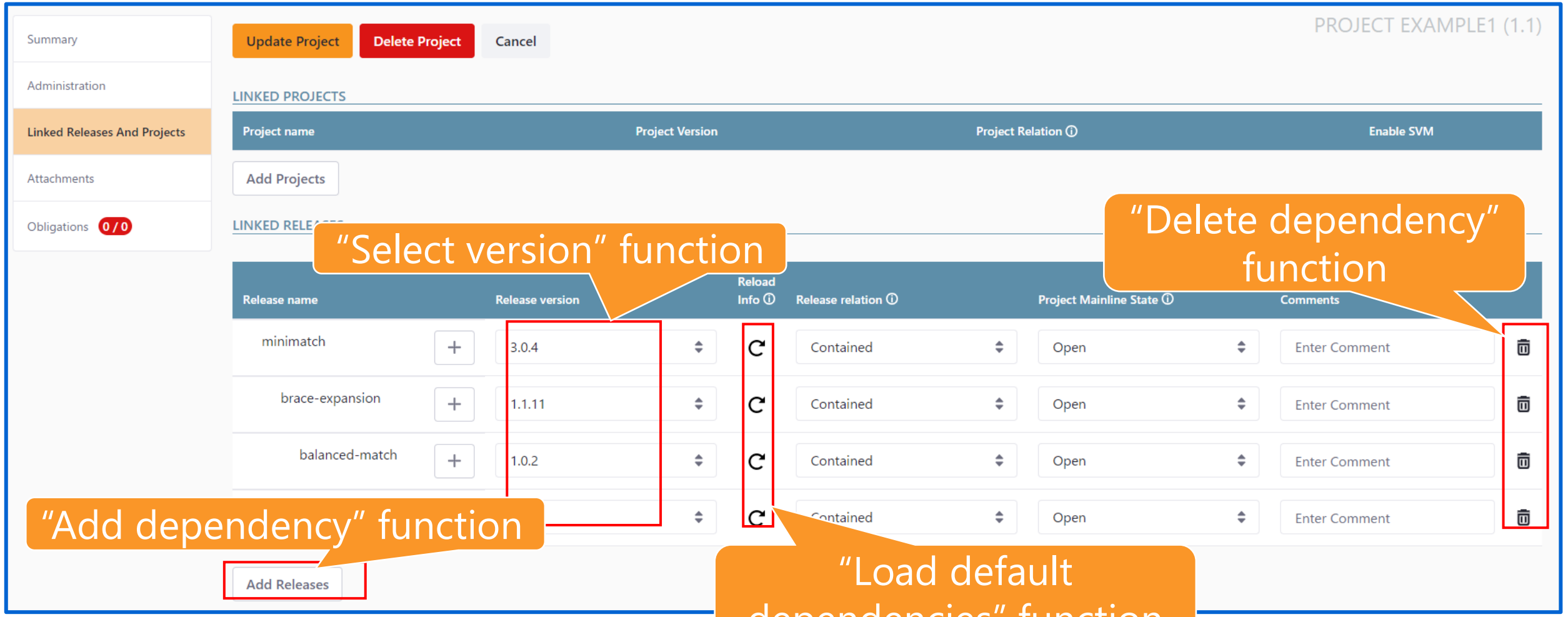




New GUI for dependencies : Registration dependencies page

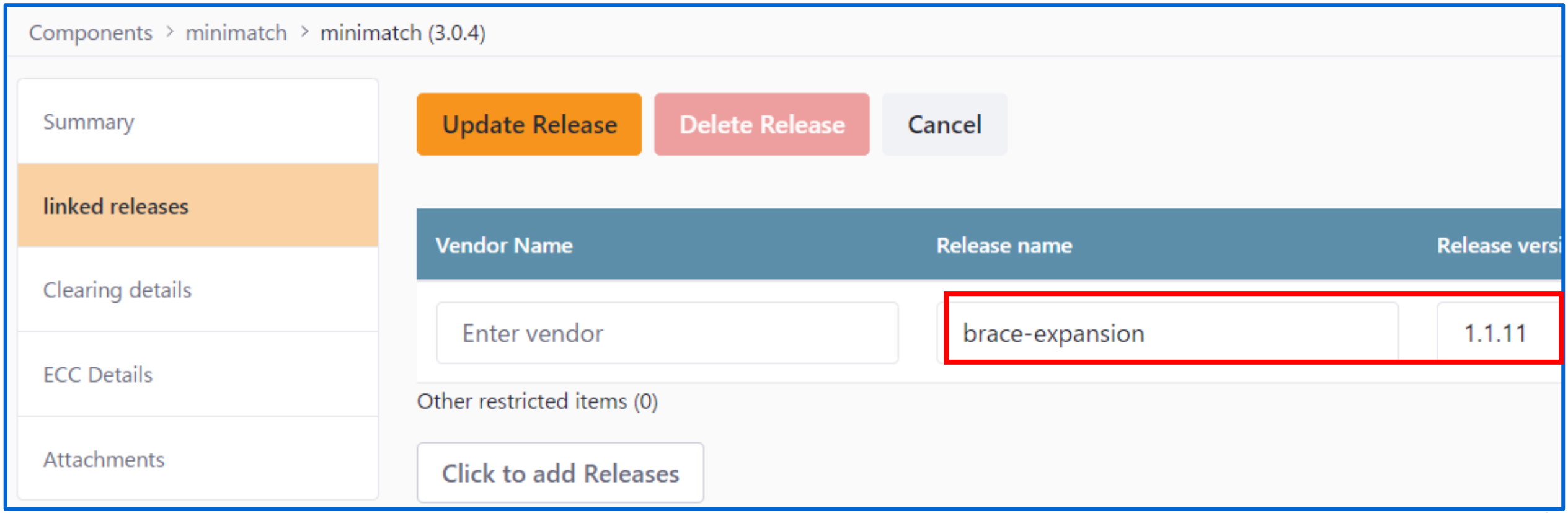
The functions of this new feature

- The Linked Releases And Projects tag (Edit page)



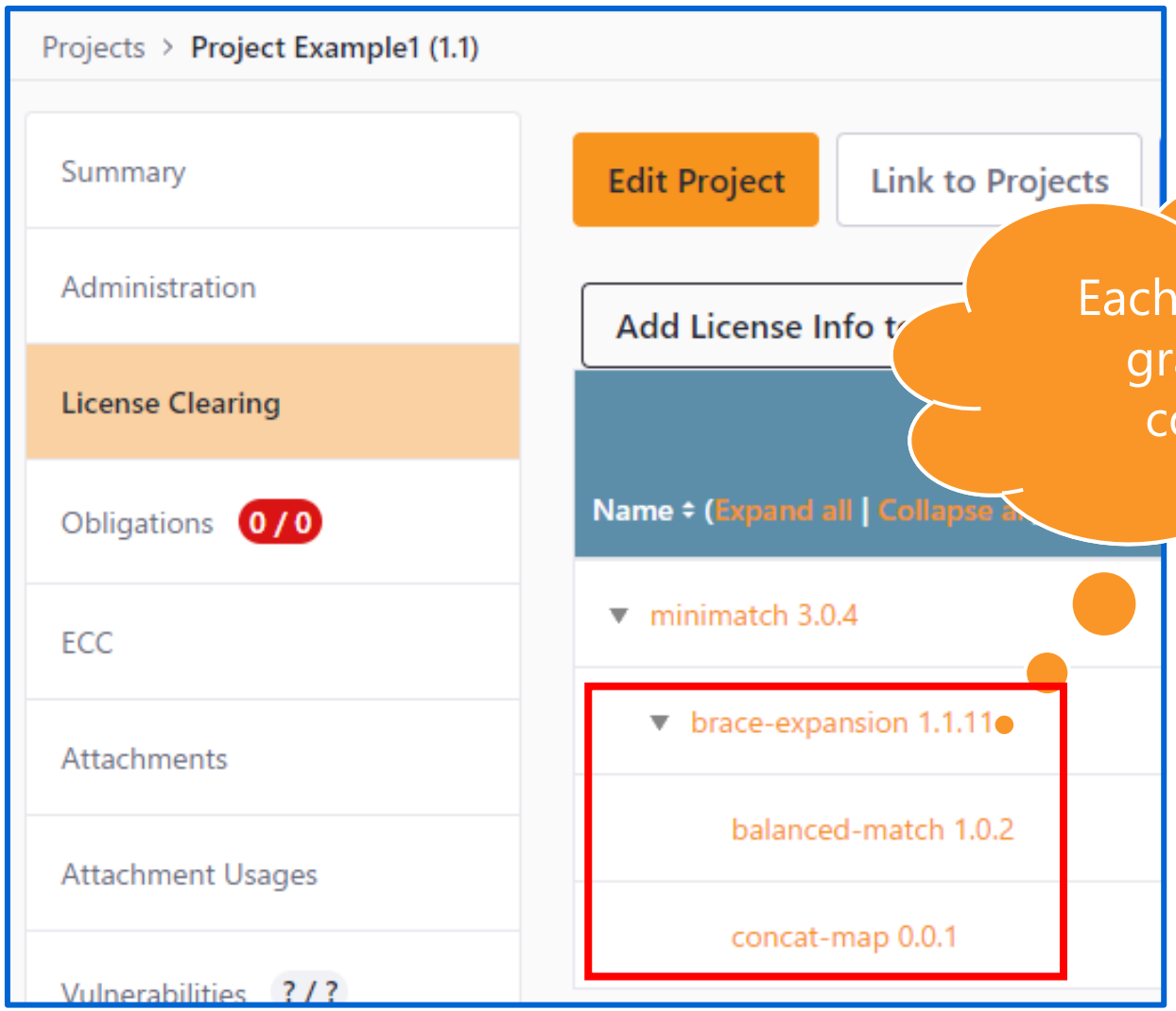
New GUI for dependencies: Registration Component page

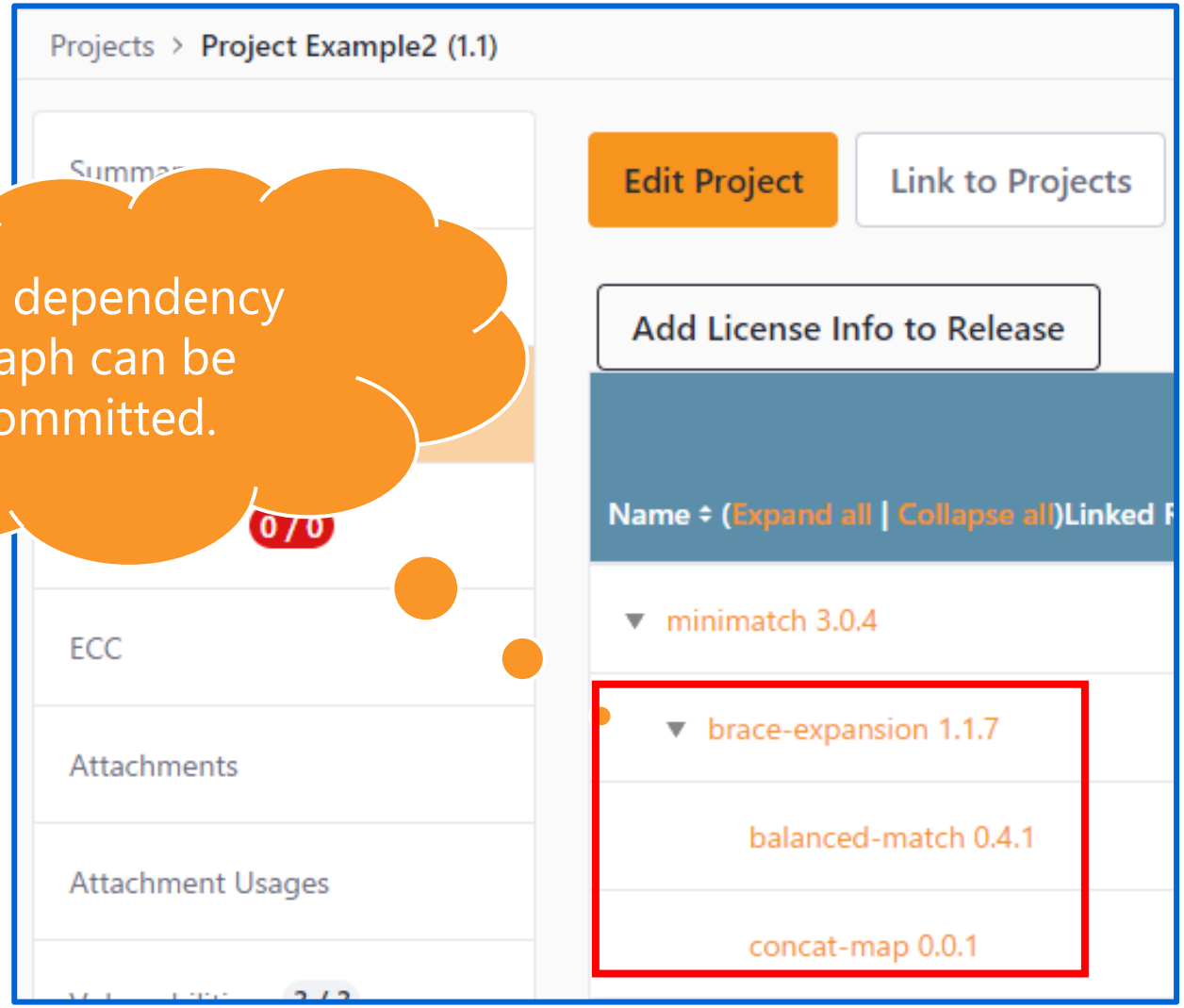
- The “release” page is not changed.
- The dependency information here will be seen as the place storing the “default” information. It will keep the same with the latest information in the ecosystem (maven, npm, etc.)



New GUI for dependencies : View page

GUI: the “License Clearing” tag (View page)

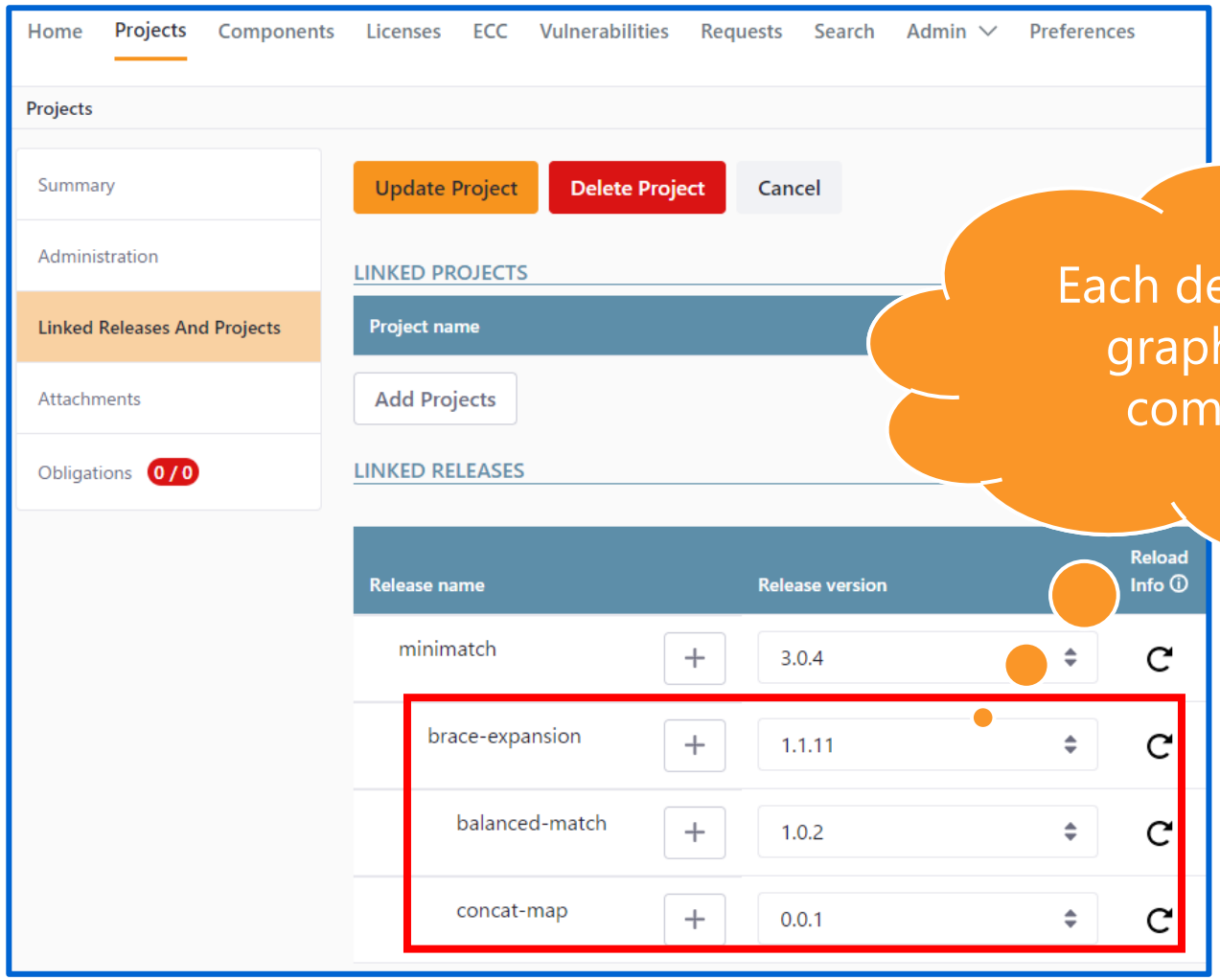




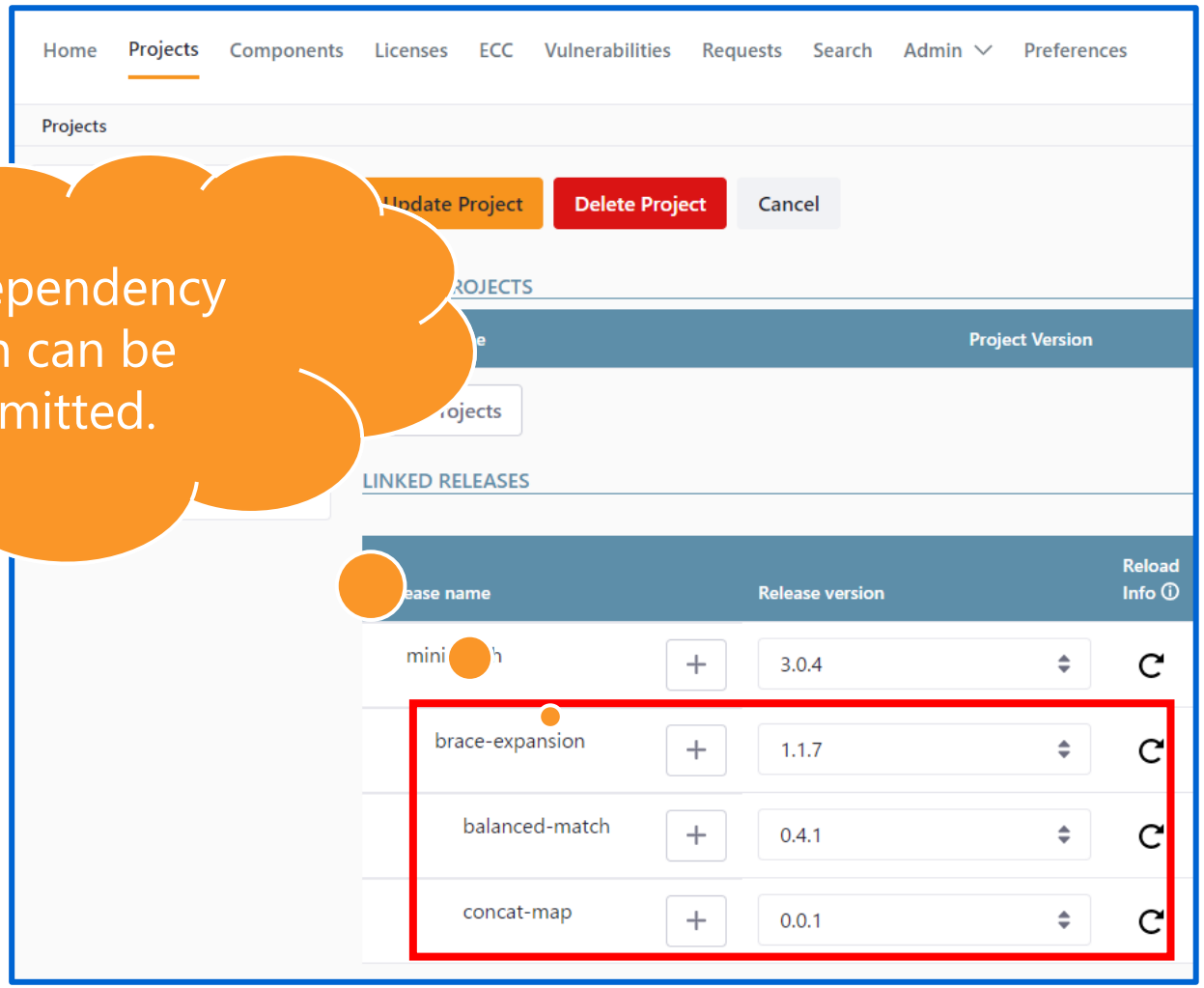
Each dependency graph can be committed.

New GUI for dependencies : Edit page

GUI: the “Linked Releases And Projects” tag (Edit page)

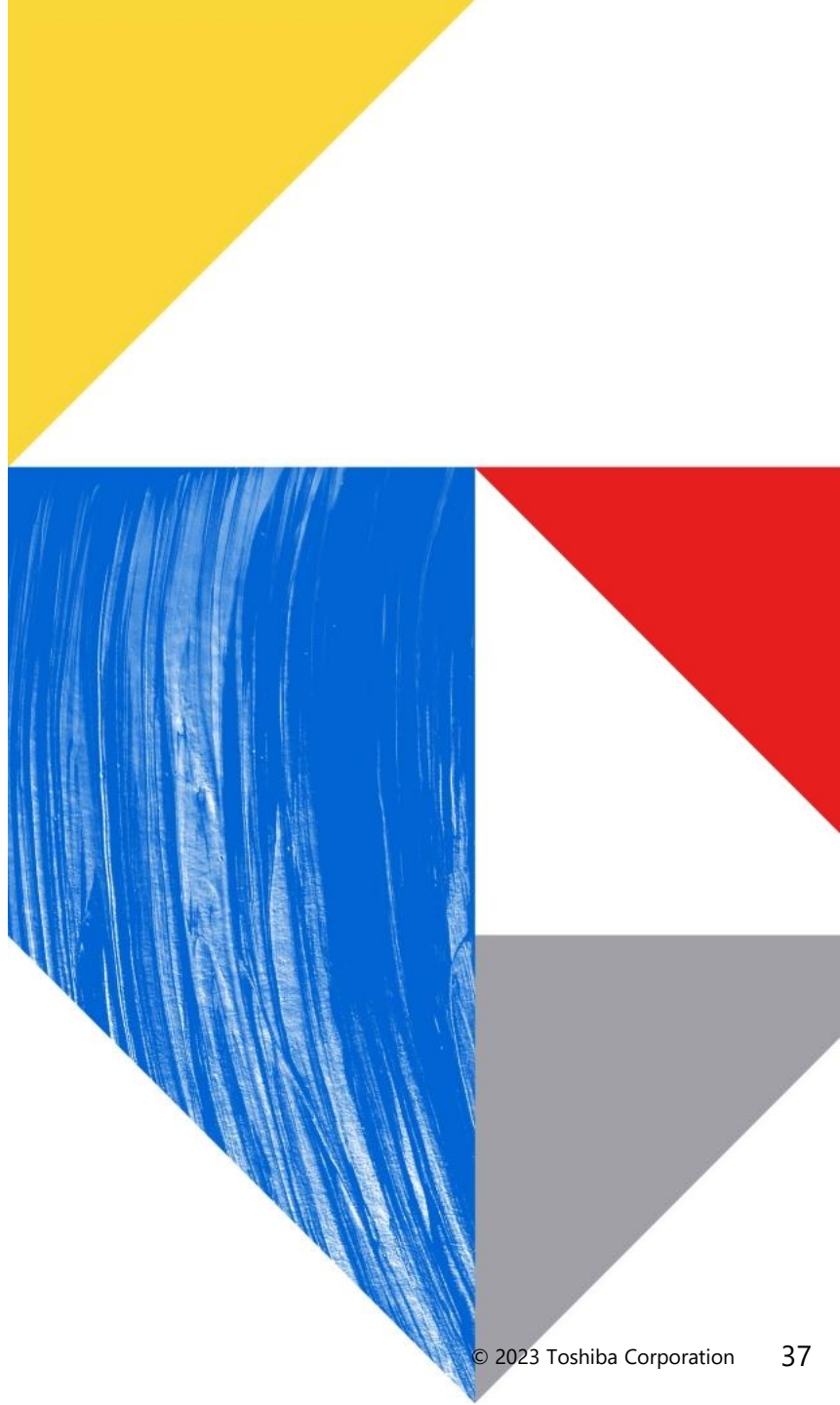


Each dependency graph can be committed.



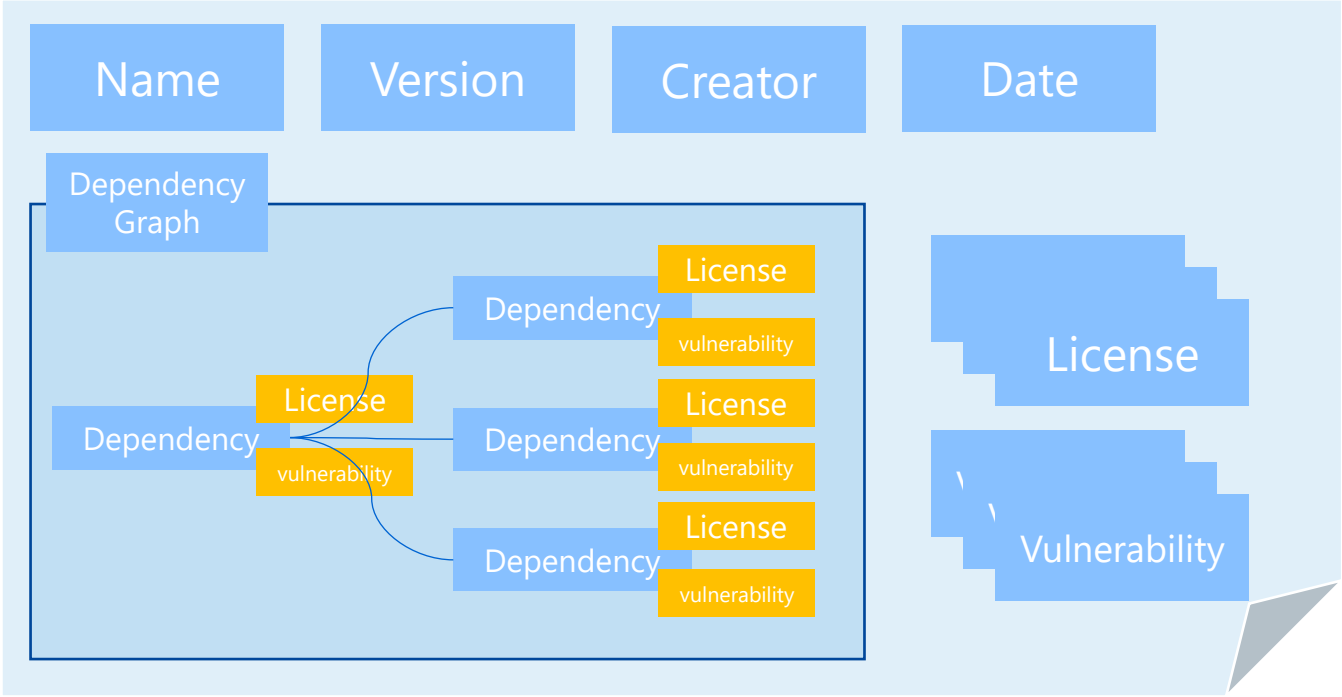
05

SBOM standards format define dependency

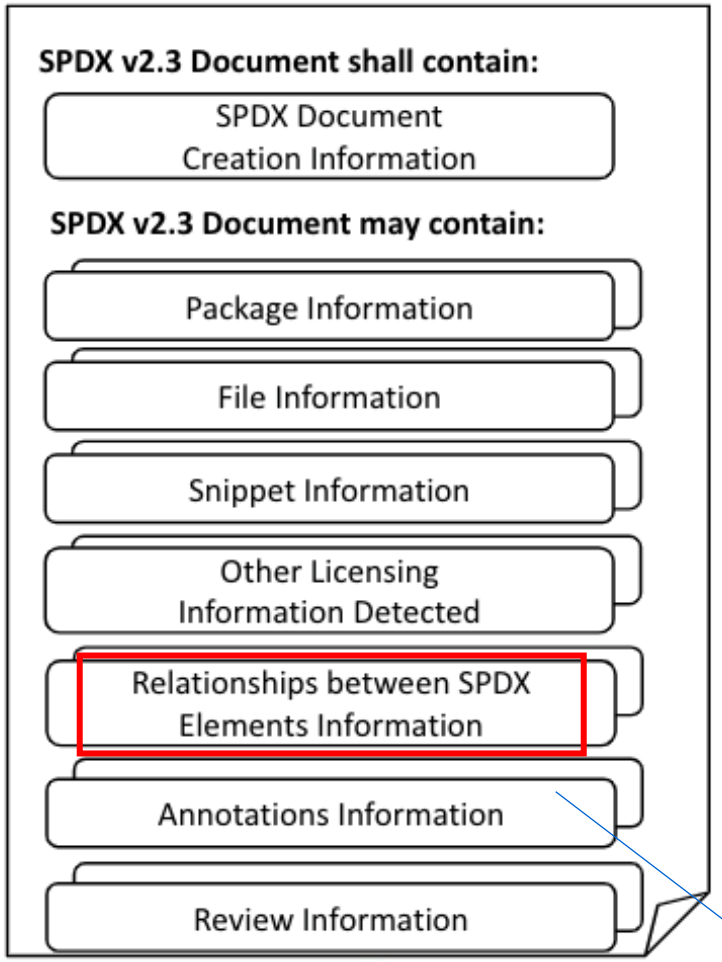


How to use SBOM to manage dependency

- SBOM (Software Bill of Materials)
  - Formats: SPDX and CycloneDX are two widely used formats.
  - Both Formats can describe Software Dependencies



Dependency in SPDX



Example of SPDX elements Relationships

Example: Between two Packages

DEPENDS_ON	Package A depends on the presence of package B in order to build and run
DEPENDENCY_OF	A is explicitly stated as a dependency of B in a machine-readable file. Use when a package manager does not define scopes.

Example : Files relationship

DYNAMIC_LINK	An APPLICATION file 'myapp' dynamically links to BINARY file zlib.so.
STATIC_LINK	An APPLICATION file 'myapp' statically links to BINARY zlib.a.

Represent a relationship
between two different Files, between a Package and a File

* https://spdx.github.io/spdx-spec/v2.3/relationships-between-SPDX-elements/

Dependency in Cyclone DX

CycloneDX provides the ability to describe components and their dependency on other components.

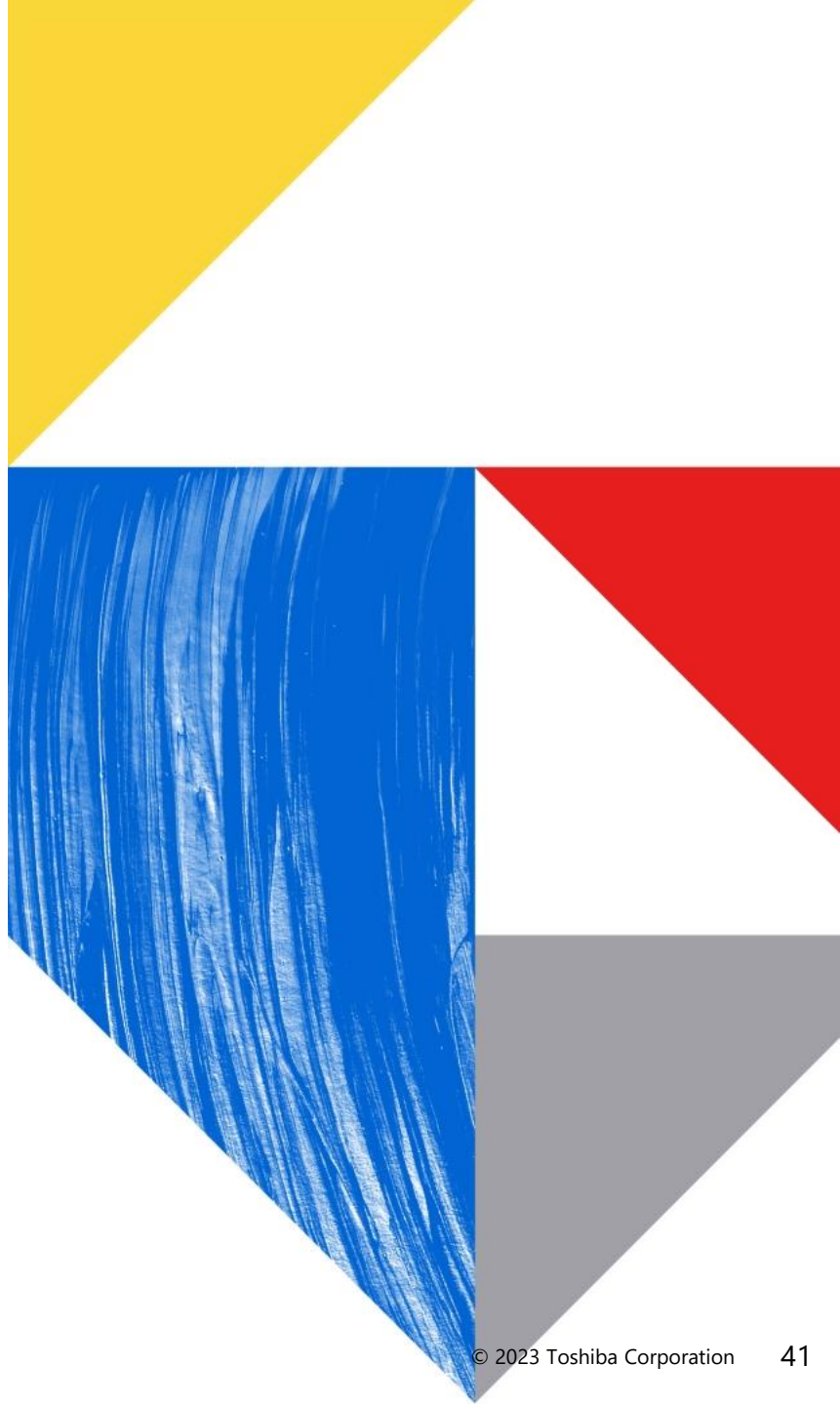
https://cyclonedx.org/use-cases/#dependency-graph

```
],
"dependencies": [
  {
    "ref": "acme-app",
    "dependsOn": [
      "pkg:maven/org.acme/web-framework@1.0.0",
      "pkg:maven/org.acme/persistence@3.1.0"
    ]
```

CycnloeDX uses P-URL to denote dependencies

06

Future Work for SBOM standards

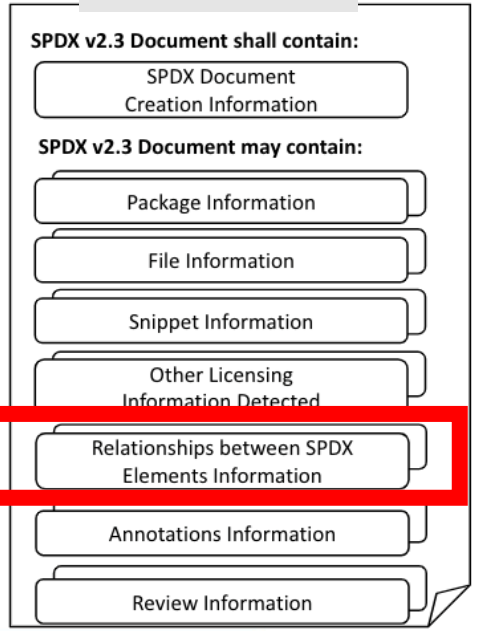


Future Work

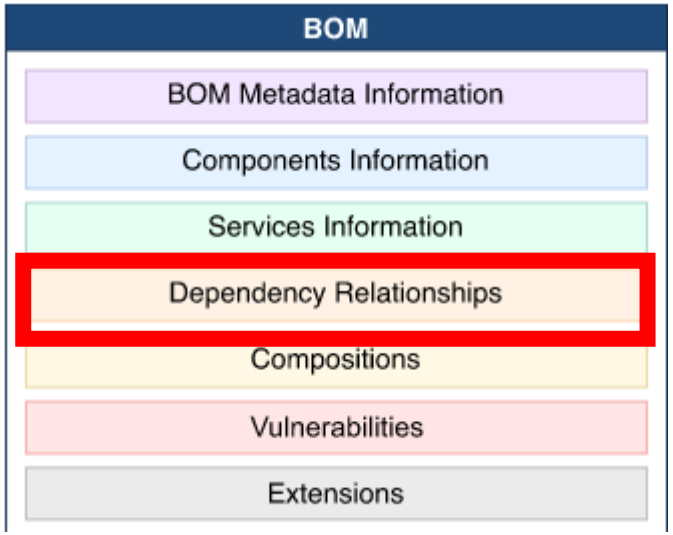
The relationship types defined in SW360 are different from the important SBOM relationship types.

SW360
Unknown
Contained
Referred
Dynamically Linked
Statically linked
Side by side
Standalone
Internal Use
Optional
To be replaced
Code Snippet

SPDX



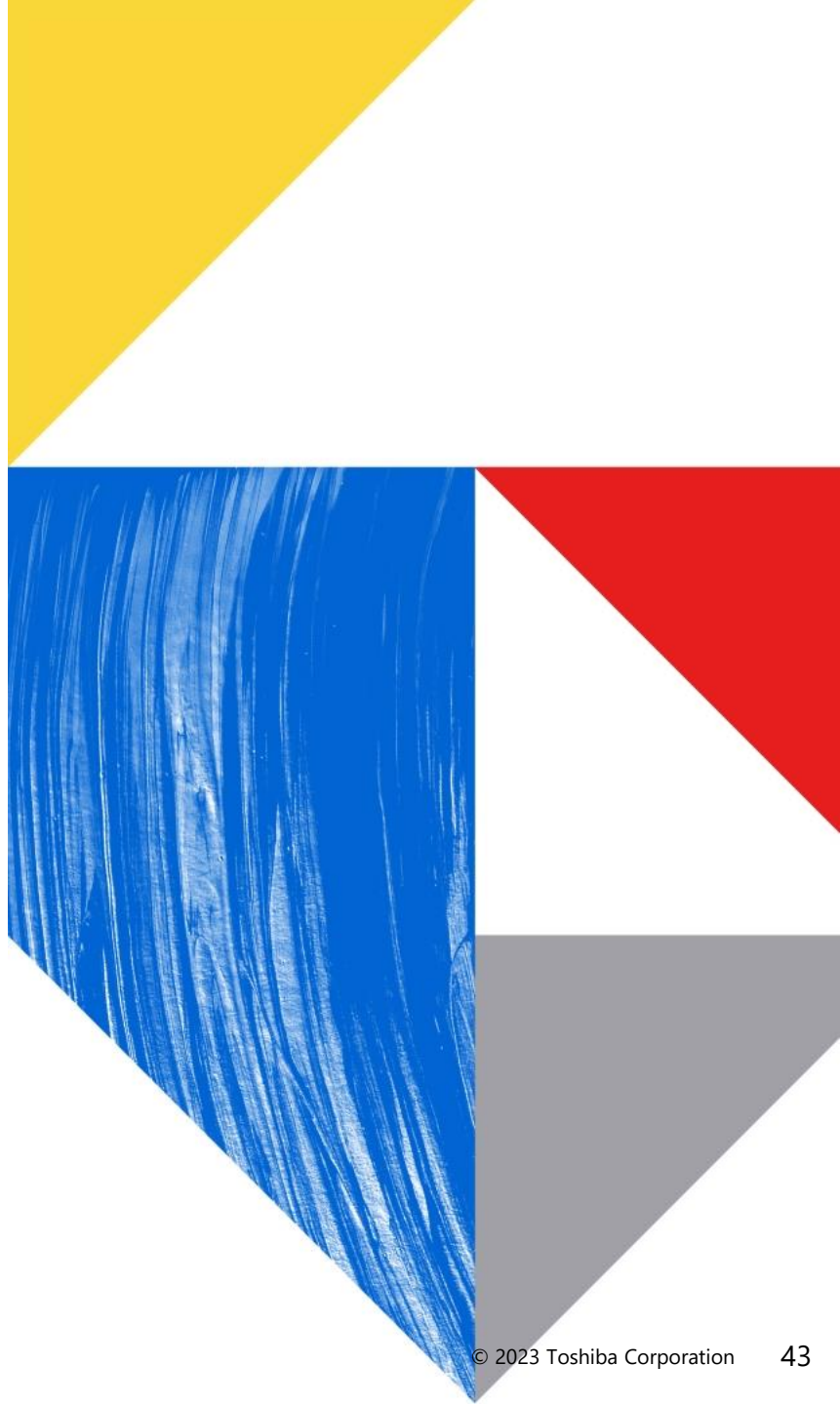
Cyclone DX



The definition of unique SW360 dependencies needs to be changed.

07

Summary

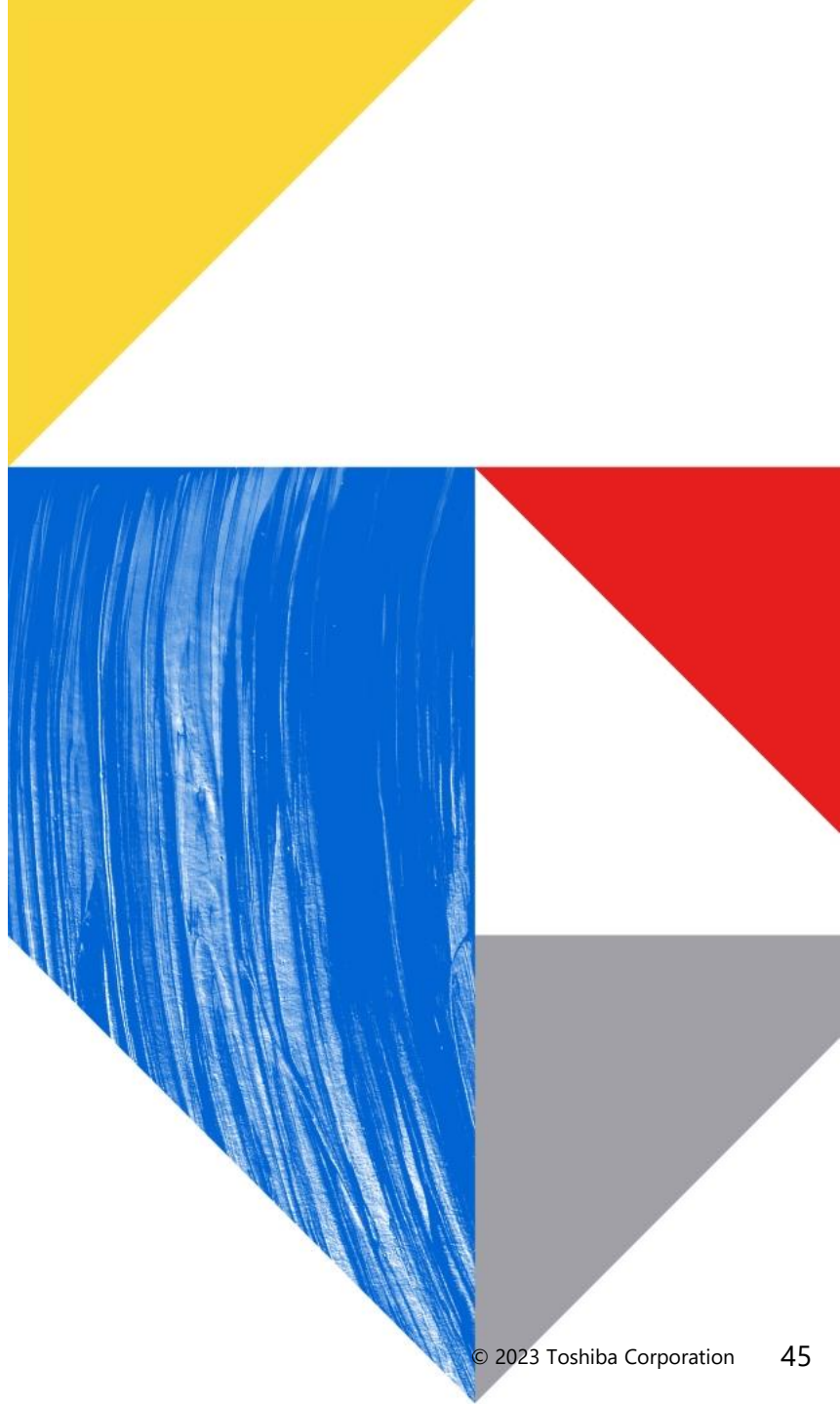


Summary

- SW360 can manage internal software information.
- Registration of dependency is important for license and Security management.
- Registration of dependency information software in SW360 was not flexible.
- We developed a function to register different dependency information for each project to be registered.
- The definition of relevance between software is unique to SW360.
- In the future, it will be adapted to the common SBOM definition.

Appendix

DEMO



Committed to People,
Committed to the Future.

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