Software Package Document eXchange (SPDX™) Tools

Version 2.1

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Please send your comments and suggestions for this document to:
spdx-tech@fossbazzar.org

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Preface

INTENDED AUDIENCE
This manual is designed to help users become familiar with the tools available for viewing SPDX documents and for converting RDF formatted SPDX documents into spreadsheet format and converting spreadsheets with formatted SPDX content into SPDX documents.

CONTENTS OVERVIEW
Section 1: Introduction—Provides a brief overview of the SPDX standards organization and the SPDX specification.
Section 2: Creating SPDX Content—Describes how to create SPDX documents
Section 3: Open Source Tools for SPDX Creation
Section 4: Using SPDX Tools—Describes how to use the SPDX tools.
Section 5: Notices—Copyright and license information

RELATED DOCUMENTS
The following related documents are available:

- The working version of the SPDX Specification is available here:
- The current list of SPDX standard licenses is available here:
  - [http://spdx.org/licenses/](http://spdx.org/licenses/)
- RDF vocabulary (an OWL ontology) for expressing SPDX as RDF is available here:

The following online resources provide more information about the SPDX Group and how you can participate:

- [http://spdx.org/](http://spdx.org/)
1 INTRODUCTION

The Software Package Data Exchange (SPDX™) specification “is a standard format for communicating the components, licenses and copyrights associated with a software package. An SPDX file is associated with a particular software package and contains information about that package in the SPDX format.”

You can learn more about the SPDX Group and the SPDX specification here:

- [http://spdx.org/](http://spdx.org/)

2 CREATING SPDX CONTENT

The SPDX Specification supports two formats: RDF/XML and Tag/Value. There are a number of ways that SPDX Documents can be created.

- **Tools**: Open source and commercial tools are available to create SPDX Documents in the RDF/XML format.
- **Spreadsheet**: For convenience, the tools can take spreadsheet data as input and can create spreadsheet output from an RDF/XML SPDX Document.
- **Write your own**: You may also choose to write your own tooling to produce an SPDX Document per the specification.
- **Manual**: You can edit an existing SPDX Document to reflect the appropriate information for a different package.

2.1 Populating a Spreadsheet with SPDX Content

Today, many organizations use spreadsheets to share license data about software packages between different teams in the organization. For this reason, the SPDX Group has provided a spreadsheet template with specific sheet and column names reflecting SPDX Document properties.

The spreadsheet template is provided for convenience and the format is not supported by the specification. The spreadsheet template is available for download here:

- [http://spdx.org/tools](http://spdx.org/tools)

If you wish to translate spreadsheet data into an SPDX RDF document, you can use the SPDX Translator tool. The Translator tool requires the input spreadsheet be in a very specific format. For translation, the spreadsheet must have the following sheets:

- **Origins**
  - States the SPDX specification version used for this document
  - Captures information on how the meta data was generated and when.
- **Package Info**
  - Captures information about the package such as name, download location, license, copyright, and verification data.
- **Extracted Lic Info**
  
  o Captures information for any detected or declared licenses that are not included in the SPDX standard license set.

```
  * All rights reserved.
  *
  * Redistribution and use in source and binary forms, with or without
  * modification, are permitted provided that the following conditions
  * are met:
  * 1. Redistributions of source code must retain the above copyright
  *    notice, this list of conditions and the following disclaimer.
  * 2. Redistributions in binary form must reproduce the above copyright
  *    notice, this list of conditions and the following disclaimer in the
  *    documentation and/or other materials provided with the distribution.
  * 3. The name of the author may not be used to endorse or promote products
  *    derived from this software without specific prior written permission.
  *
  * THIS SOFTWARE IS PROVIDED BY THE AUTHOR "AS IS" AND ANY EXPRESS OR
  * IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES
  * OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED.
  * IN NO EVENT SHALL THE AUTHOR BE LIABLE FOR ANY DIRECT, INDIRECT,
  * INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT
  * NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE,
  * DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY
  * THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT
  * (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF
  * THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
```

<table>
<thead>
<tr>
<th>License Name</th>
<th>Cross Reference URLs</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>CyberThreads License</td>
<td><a href="http://people.apache.org/~ardycn%E0%B8%B7%E0%B8%AD%E0%B8%99LE/ICENSE">http://people.apache.org/~ardycnือนLE/ICENSE</a>, <a href="http://justsample.url.com">http://justsample.url.com</a></td>
<td>This is the CyberThreads License</td>
</tr>
</tbody>
</table>
• Per File Info
  o Captures per-file license and copyright text (if any), verification data, and, optionally, indication that a file has been derived from a specific project.

• Reviewers
  o Optional. Captures information from any review of the SPDX Document, such as reviewer, review date and comment.

2.2 Populating a RDF-formatted SPDX Document

A SPDX Document can also be created and shared in RDF/XML format as shown below.

```xml
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF xmlns="..." xmlns:spdx="...">
  <spdx:SPDXDoc rdf:about="http://example.com/an-ip-analysis">
    <spdx:analysedPackage>
      <spdx:Package rdf:about="http://zlib.net/zlib-1.2.5.tar.gz">
        <spdx:packageName>
          openlogic-zlib-1.2.5-all-src-1.zip</spdx:packageName>
        <spdx:shortDesc>
          zlib 1.2.5 Source</spdx:shortDesc>
      </spdx:Package>
    </spdx:analysedPackage>
    <spdx:DeclaredLicense rdf:resource="http://spdx.org/licenses/BSL-1.0"/>
  </spdx:SPDXDoc>
</rdf:RDF>
```

Open source and commercial tools are available to create an RDF-formatted SPDX document. Detailed information about the tools and how to use them is covered in Section 3 of this document.
2.3 Populating a Tag/Value-formatted SPDX Document

You can create an SPDX tag/value format document, as shown below:

```plaintext
...
PackageName: zlib-1.2.5
PackageFileName: openlogic-zlib-1.2.5-all-src.1.zip
PackageDownloadLocation: http://zlib.net/zlib-1.2.5.tar.gz
LicenseDeclared: BSL-1.0
Summary: zlib 1.2.5 Source
...
```

Comments can be added to the file with a hash symbol ‘#’ as the first character in a line.

2.4 Writing your own Tools

If you are using Java, you may want to look at the open source implementation of the SPDX RDF tools. They contain an implementation of the SPDX object model using Jena to parse and render the RDF documents.

3 OPEN SOURCE TOOLS FOR SPDX CREATION

3.1 SPDX Workgroup Tool

The SPDX Group has developed some tools to assist with viewing and managing SPDX documents. The tools are intended to:

- Reduce the effort of creating, consuming and validating SPDX Documents
- Provide a translation from the technical document (e.g. RDF/XML or tag-value format) and a more readable format
- Provide a mechanism for validating SPDX documents
- Enable contributions and review of the tool implementation by the broader technical community through open source licensing

See Section 4 Using the SPDX Workgroup Tool for downloading and usage information.

The following commands can be used to create, translate, or validate SPDX documents.

3.1.1 SPDX Viewer

The SPDX Viewer is a command line driven Java application that formats a valid SPDX RDF
document into a text file for easier viewing. The SPDX Viewer application validates the SPDX document during formatting and provides Warning messages when parsing issues are encountered. An attempt will be made to create the text file even if validation errors are encountered.

<table>
<thead>
<tr>
<th>SPDX Document for <a href="http://www.spdx.org/tools/SPDXTools">http://www.spdx.org/tools/SPDXTools</a></th>
<th>3.1.2 SPDX Translator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version: SPDX-2.0   Created: 2018-09-08T06:00:00Z</td>
<td>The SPDX Translator is a command line driven Java application that provides two types of translation. Specifically, the Translator:</td>
</tr>
<tr>
<td>Created by:</td>
<td>- Converts a spreadsheet containing SPDX information into a valid SPDX/RDF file</td>
</tr>
<tr>
<td></td>
<td>- Converts a valid SPDX/RDF file into a spreadsheet</td>
</tr>
<tr>
<td></td>
<td>The SPDX Translator requires the input spreadsheet be in a very specific format. The SPDX Translator validates the input and provides Warning messages when parsing issues are encountered.</td>
</tr>
</tbody>
</table>

Package Name: SPDX Translator

SPDX Translator utility

Additional Information: Version 1.0 of the SPDX Translator application

File Name: spdxtranslator-1.0.zip

SHA1: 5ea08c641b8032e151c5e7f153c35bab7

Description: This utility translates and SPDX RDF XML document to a spreadsheet, translates a spreadsheet to an SPDX RDF XML document and translates an SPDX RDF document to an SPDX RDF XML document.

Declared Copyright: Copyright 2009, 2010 Source Auditor Inc.

| License: LicenseRef-3 AND LicenseRef-2 AND LicenseRef-1 AND LicenseRef-0 AND LicenseRef-3 AND LicenseRef-2 |
|--------------------------------------------------------|------------------------|
| License concl.: LicenseRef-4 AND Apache-2 AND LicenseRef-1 AND LicenseRef-0 AND LicenseRef-3 AND LicenseRef-2 |
A spreadsheet template with the specific column names and order is available for download here:

- http://spdx.org/tools

When entering license information into the spreadsheet, follow these syntax rules:

- For a standard license, use the short form license ID
- For a non-standard license, use the LicenseRef-N ID as described in the Specification. The same LicenseRef-N must also be present in the “Non Standard Licenses” sheet.
- For a disjunctive license set, enclose the set in parentheses and separate each license reference by “OR” (e.g. Apache-2 OR LicenseRef-2)
- For a conjunctive license set, enclosed the set in parentheses and separate each license reference by “AND” (e.g. Apache-2 AND LicenseRef-2)
  - Note: A disjunctive or conjunctive license set can include a reference to another license set (e.g. Apache-2 OR (LicenseRef-1 AND LicenseRef-2))
- For columns where there are multiple license references allowed (License Info from Files and License Info in File), the license references are separated by comma’s (e.g. Apache-2, LicenseRef-1, Apache-1, LicenseRef-2).

### 3.2 FOSSOLOGY+SPDX

The FOSSology+SPDX project is built using the FOSSology project. The FOSSology project focuses on the design and development of a software-scanning tool for identifying licenses and copyrights within select software (http://www.fossology.org). Our goal of integrating the FOSSology output with the SPDX standard is to provide an end-to-end open source solution for producing SPDX documents from scanned software packages. The project and was created and is hosted at the University of Nebraska at Omaha.

Existing modules include creating an SPDX file in TAG format, licenses/copyrights information in NOTICE format, and ATTRIBUTION files. Package level license information from select software will be listed in NOTICE file. From the ATTRIBUTION file, file level license information is listed out grouped by licenses type. FOSSology+SPDX enables the generation of manual, high definition SPDX files, including package and file level information.

FOSSology+SPDX is licensed under Apache License 2.0 (Apache-2.0).

**You can get access to the Public Instance here:**
https://fossologyspdx.ist.unomaha.edu/

**Access source code at GitHub:**
https://github.com/spdx-tools/fossology-spdx

**For more information:**
3.3 YOCTO+SPDX

The Yocto+SPDX project is built to integrated SPDX generation into the Yocto build process. The Yocto Project is an open source collaboration project that provides templates, tools and methods to help create custom Linux-based systems for embedded products regardless of the hardware architecture (http://www.yoctoproject.org). The goal of integrating the Yocto build process with the SPDX standard is to integrate automated SPDX generation in upstream open source projects. The project and was created and is hosted at the University of Nebraska at Omaha.

Existing features include file level caching to manage package scanning overhead, and the output of TAG format SPDX documents. Yocto+SPDX enables the generation of automated, low definition SPDX files, including package and file level information.

Yocto+SPDX is licensed under BSD 2-clause "Simplified" License (BSD-2-Clause)

Access source code at Git/Poky:
http://git.yoctoproject.org/cgit/cgit.cgi/poky/commit/?id=a0904066865c9792033d6c87c270966113b6ae66

For more information:
https://sites.google.com/site/fossologyunospdx/spdx-yocto
4 Using the SPDX Workgroup Tool

You can download the SPDX tools here:


The name of the download file is spdx-tools-[version].zip.

Once you’ve downloaded the application, unzip the files in your preferred location.

- Unzip `<filename>` into your preferred location
- Make sure you have JRE version 1.8 or later installed. (JRE version 1.6 or later works with SPDX tools versions 2.1.2 or earlier.)

The SPDX workgroup tool is a command line Java application.

To run the tool, enter the following:

```
java -jar spdx-tools-jar-with-dependencies.jar <function> <parameters>
```

The following table summarizes the SPDX tool functions:

<table>
<thead>
<tr>
<th>Function</th>
<th>Parameters</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TagToSpreadsheet</td>
<td>inputFile outputFile</td>
<td>Convert a tag format input file to a spreadsheet output file</td>
</tr>
<tr>
<td>TagToRDF</td>
<td>inputFile outputFile</td>
<td>Convert a tag format input file to an RDF format output file</td>
</tr>
<tr>
<td>RdfToTag</td>
<td>inputFile outputFile</td>
<td>Convert an RDF format input file to a tag format output file</td>
</tr>
<tr>
<td>RdfToHtml</td>
<td>inputFile outputFile</td>
<td>Convert an RDF format input file to an HTML web page output file</td>
</tr>
<tr>
<td>RdfToSpreadsheet</td>
<td>inputFile outputFile</td>
<td>Convert an RDF format input file to a spreadsheet format output file</td>
</tr>
<tr>
<td>SpreadsheetToRDF</td>
<td>inputFile outputFile</td>
<td>Convert a spreadsheet input file to an RDF format output file</td>
</tr>
<tr>
<td>SpreadsheetToTag</td>
<td>inputFile outputFile</td>
<td>Convert a spreadsheet input file to a tag format output file</td>
</tr>
<tr>
<td>SPDXViewer</td>
<td>inputFile</td>
<td>Display an SPDX document input file (in either tag/value or RDF format)</td>
</tr>
<tr>
<td>CompareMultipleSpdxDocs</td>
<td>output.xls doc1 doc2 ... docN</td>
<td>Compare multiple SPDX documents (in either tag/value or RDF formats) and output to a spreadsheet</td>
</tr>
<tr>
<td>CompareSpdxDocs</td>
<td>doc1 doc2 [output]</td>
<td>Compare two SPDX documents (in either</td>
</tr>
</tbody>
</table>
### GenerateVerificationCode

<table>
<thead>
<tr>
<th>Source Directory</th>
<th>Generate a Verification Code from a directory of files.</th>
</tr>
</thead>
<tbody>
<tr>
<td>skippedFileRegex</td>
<td></td>
</tr>
</tbody>
</table>

#### 4.1 SPDX Viewer

The SPDX Viewer function formats a valid SPDX RDF document into a text file for easier viewing. The SPDX Viewer validates the SPDX document during formatting and provides error messages when parsing issues are encountered.

Execute the `spdx-tools-jar-with-dependencies.jar` with the `SPDXViewer` function and a single text parameter of a file path for the SPDX RDF document. For example, on Windows:

- `cd` to the directory with the SPDX Tools application and run the tool which the following command
- `java –jar spdx-tools-jar-with-dependencies.jar SPDXViewer examples\SPDXRdfExample.rdf`

#### 4.2 SPDX Translate Functions

The SPDX Translate functions provides four types of translation. Specifically:

- **SpreadsheetToRDF**: converts a spreadsheet containing SPDX information into a valid SPDX/RDF file
- **RdfToSpreadsheet**: converts a valid SPDX/RDF file into a spreadsheet
- **TagToRDF**: converts a valid SPDX Tag format file into a valid SPDX/RDF file
- **RdfToTag**: converts a valid SPDX/RDF file into a valid SPDX Tag format file
- **RdfToHtml**: converts a valid SPDX/RDF file into an HTML file
- **TagToSpreadsheet**: converts a valid SPDX Tag format file into a spreadsheet
- **SpreadsheetToTag**: converts a spreadsheet containing SPDX information into a valid SPDX Tag format file

To translate a file, Execute the `spdx-tools-jar-with-dependencies.jar` with the translate function name followed by the input file path followed by the output file path. For example, to convert a Spreadsheet to an RDF file on Windows:

- Copy the example spreadsheet file into the same directory with the Translator application
- `cd` to the directory with the SPDX tools application and run the tool which the following command
- `java –jar spdx-tools-jar-with-dependencies.jar SpreadsheetToRDF <spreadsheetfile.xls> <rdfxmlfile.rdf>`
4.3 Comparing Multiple SPDX document

The CompareMultipleSpdxDocs function will compare two or more SPDX documents and output the results to a spreadsheet file.

Execute the spdx-tools-jar-with-dependencies.jar with the CompareMultipleSpdxDocs function followed by the filename of the output spreadsheet file followed by two or more SPDX document file names. The SPDX documents may be in either the Tag/Value or RDF formats. For example, on Windows:

- cd to the directory with the SPDX Tools application and run the tool which the following command
- java -jar spdx-tools-jar-with-dependencies.jar CompareMultipleSpdxDocs examples\SPDXRdfExample.rdf, examples\SPDXRdfExample.spdx

4.4 Comparing Two SPDX documents

The CompareSpdxDocs function will compare two SPDX documents and output the results to the terminal or to an optional output text file.

Execute the spdx-tools-jar-with-dependencies.jar with the CompareSpdxDocs function followed by the two SPDX document file names. The SPDX documents may be in either the Tag/Value or RDF formats. Optionally, an output text filename may be supplied. For example, on Windows:

- cd to the directory with the SPDX Tools application and run the tool which the following command
- java -jar spdx-tools-jar-with-dependencies.jar CompareSpdxDocs examples\SPDXRdfExample.rdf, examples\SPDXRdfExample.spdx

4.5 Generating Verification Codes

The GenerateVerificationCode function will compute and display a verification code for a directory of source files.

Execute the spdx-tools-jar-with-dependencies.jar with the GenerateVerificationCode function followed by the directory name containing the files to be included in the verification code followed by an optional regular expression for skipped files. Any file name matching the regular expression will be excluded from the verification code and added to the skipped file list. For example, on Windows:

- Copy the example RDF file into the same directory with the SPDX Viewer application
- cd to the directory with the SPDX Tools application and run the tool which the following command
- java -jar spdx-tools-jar-with-dependencies.jar GenerateVerificationCode examples ".*\.spdx"
5 Using the SPDX Tools Libraries

The SPDX tools are available as a Java library for programmatic access. The source code can be accessed from the GIT repository located at http://git.spdx.org. The source and binaries can also be downloaded from the Maven central repository search.maven.org under the group ID org.spdx.

6 Contributing to SPDX Workgroup Tool

A GIT repository for SPDX tools can be found at:
- https://github.com/spdx/tools

Contributions and suggestions are welcome. Report any defects or suggest any improvements on the issues list at https://github.com/spdx/tools/issues

You can also contribute to development of the SPDX specification by joining the SPDX group. Click on the Participation link on the SPDX home page at http://spdx.org to get started.
7 Notices


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 */

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The Jena GRDDL Reader is built on top of other sub-systems which we gratefully acknowledge:

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  CyberNeko HTML Parser
  The version used is 0.9.5. It is redistributed, in binary form, under The CyberNeko Software License, Version 1.0.
  BrowserLauncher2
  The version used is 1.0. It is redistributed, in binary form, under the GNU Lesser GENERAL PUBLIC LICENSE. Each source file is copyrighted separately, please download the source code for details.
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  See also the Jena license and its list of subsystems.

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This work was developed as part of the STARS project [1] at the ILRT.
The project was funded by JISC.


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 * are met:
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This package includes Mustache-Java (https://github.com/spullara/mustache.java)
Mustache-Java is licensed under Apache License 2.0

This package includes Google guava-libraries (http://code.google.com/p/guava-libraries/)
guava-libraries are licensed under Apache License 2.0

This package includes ANTLR 3.4 (http://www.antlr.org/) licensed under the following:
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