

A Smart Way to Manage OSS Compliance with Yocto+SPDX

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Lei Maohui, Fujitsu

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- Working for Fujitsu from 2011
- 4 years experience in Yocto related development
- In-House Embedded Linux Distributor of Fujitsu
- Our Distribution includes LTSI Kernel and is built with Yocto Project
- Our Distribution is used for
 - IVI
 - Server System Controller
 - Storage System
 - Network Equipment
 - Printer
 - etc.

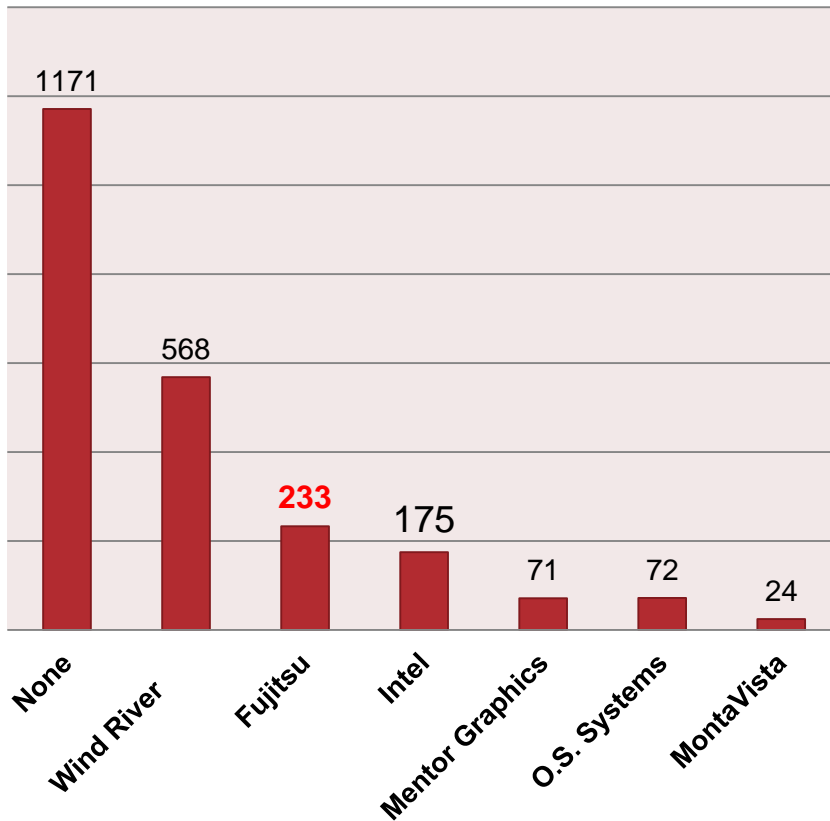


Our contributions to Yocto community

■ Data comes from meta-openembedded.git (2015-01-01 ~ 2016-10-30)

Top changeset contributors by employer

■ commits



	Developer	Changesets
1	Martin Jansa	278 (9.9%)
2	Derek Straka	270 (9.7%)
3	Andreas Müller	264 (9.4%)
4	Armin Kuster	103 (3.7%)
5	Li Xin (Fujitsu)	100 (3.6%)
6	Jackie Huang	93 (3.3%)
7	Roy Li	85 (3.0%)
8	Yi Zhao	76 (2.7%)
9	Alexander Kanavin	74 (2.6%)
10	Kai Kang	64 (2.3%)
11	Fabio Berton	56 (2.0%)
12	Khem Raj	55 (2.0%)
13	Andre McCurdy	47 (1.7%)
15	Bian Naimeng (Fujitsu)	38 (1.4%)
16	Chen Qi	34 (1.2%)
17	Maohui Lei (Fujitsu)	33 (1.2%)

Developers with the most changesets

Introduction of SPDX

- In your company
- What is SPDX
- Who are working for SPDX
- The status of SPDX specification
- SPDX file

Yocto+SPDX

- What is Yocto
- Current state
- Current problems of Yocto+SPDX

Our contributions to Yocto+SPDX

- Aim to make Yocto+SPDX support SPDX 1.2
- Aim to make Yocto+SPDX support SPDX 2.0
- Discuss the Yocto+SPDX in SPDX General Meetin

Manager SPDX files by smart

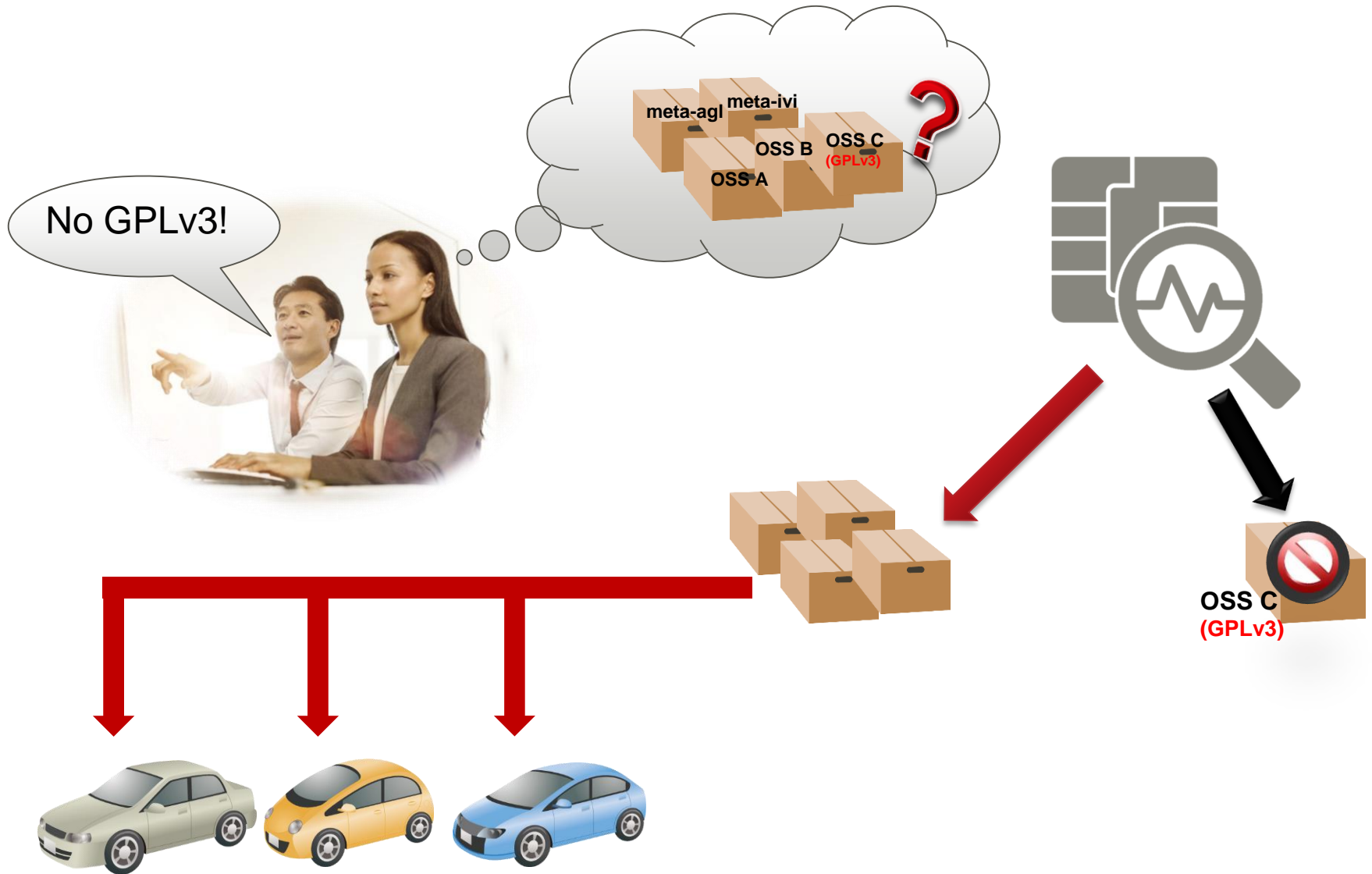
- What is smart
- Smart Package Manager Workflow
- Use of smart
- How to Manager SPDX files by smart

Introduction of SPDX

- In your company
- What is SPDX
- Who are working for SPDX
- The status of SPDX specification
- SPDX file



In your company(1/2)



In your company(2/2)



That Bill of Materials is SPDX which is part of the solution.

- Obtain details from <https://spdx.org/learn>

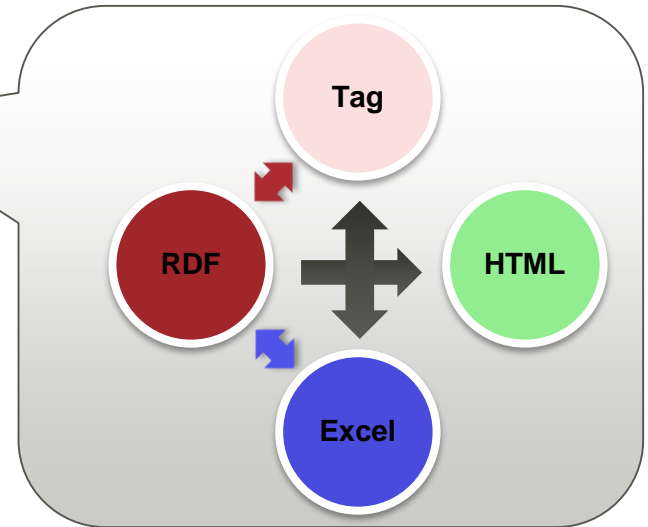
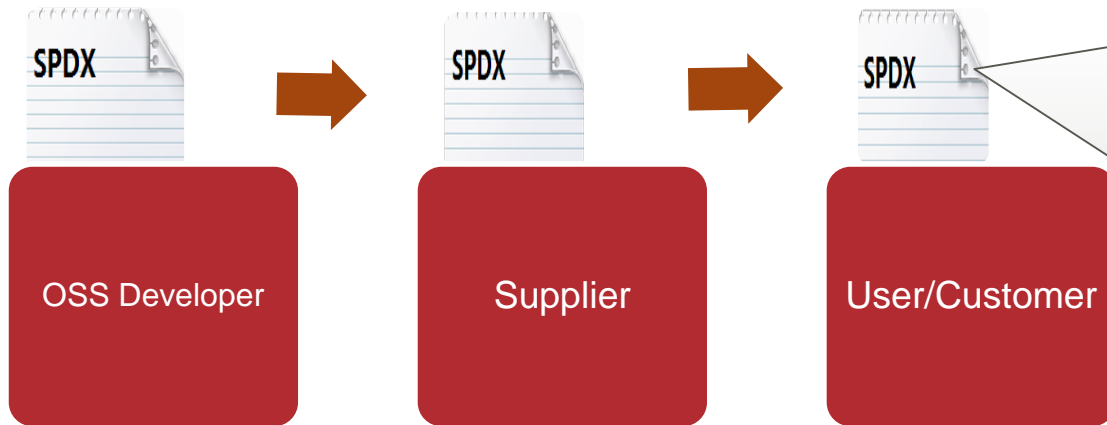


What is SPDX

- The full name of SPDX is **Software Package Data Exchange**, which is a standard format for communicating the components, licenses and copyrights associated with a software package.

Vision of SPDX

- achieve license compliance with minimal cost across the supply chain.



SPDX Integrated Tool

SPDX will be a good solution, if a SPDX implementation can generate SPDX file including license information automatically.

Obtain details from

- <https://spdx.org/tools>



Who are working for SPDX

primary responsibility	Delivered	Recent
<ul style="list-style-type: none"> • Drafts the specification • develops documentation templates, samples and tools. 	<ul style="list-style-type: none"> • SPDX Spec (2.1, 2.0,1.2,1.1,1.0) • Tool (fossology) • Spreadsheet Template 	<ul style="list-style-type: none"> • SPDX Specification 2.1 • Tooling

Primary responsibility

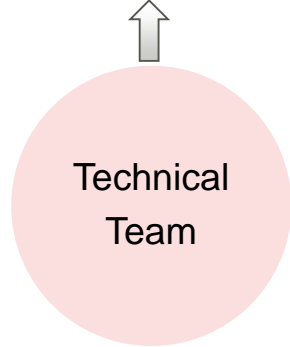
- Supports and provides recommendations to the SPDX working groups regarding licensing issues.
- Maintains the [SPDX License List](#)
- Promotes the SPDX specification to the legal community at-large

Delivered

- License Expression Syntax
- License Inclusion Guidelines (Background)
- Dealing with Public Domain within SPDX Files

Recent

- Joint Call with Tech Team
- License List



Primary responsibility

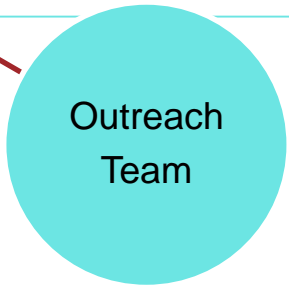
- Launch activities for new versions of the SPDX specification.
- Outreach
- Participation in events;
- The SPDX website

Delivered

- Launch for 1.0 and 1.1
- Process for Adding to License List (Draft)
- SPDX Vision & Mission Discussion Document
- SPDX Vision & Mission Statements (Final Draft)

Recent

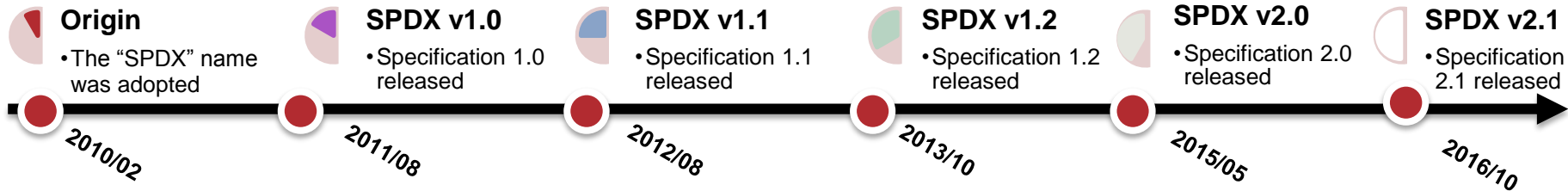
- The SPDX website



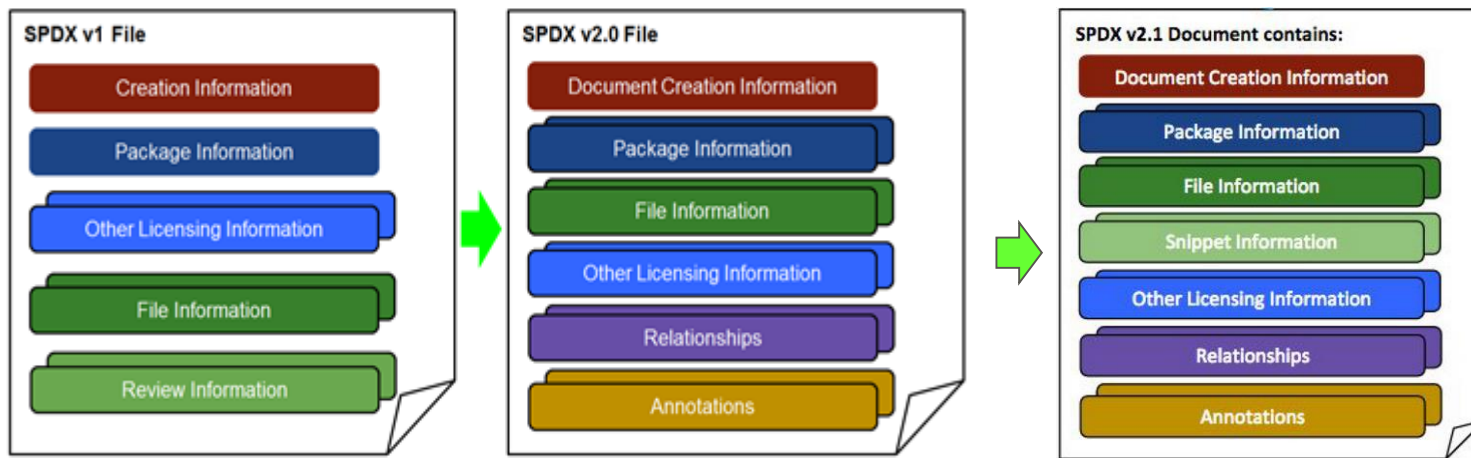
- Obtain details from <http://spdx.org/participate>
- http://wiki.spdx.org/view/General_Meeting/Minutes

The status of SPDX Specification

History



New features in SPDX v2.x



Obtain details from

- <https://spdx.org/about-spdx/what-is-spdx>
- http://wiki.spdx.org/view/Technical_Team/SPDX_Specification_Versions
- http://spdx.org/sites/spdx/files/publications/SPDX_2.0_Collab_2015.pdf

Formats

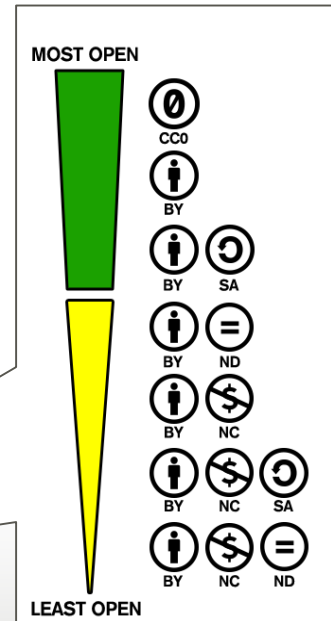
- Tag:value
- RDF/XML

Important or useful tags

- SPDXVersion
- DataLicense
- Creator
- PackageName
- PackageOriginator
- PackageVersion
- PackageHomePage
- PackageLicenseDeclared

A sample of SPDX file

```
SPDXVersion: SPDX-2.0
DataLicense: CC0-1.0
PackageName: Foo
PackageOriginator: David A. Wheeler
PackageHomePage: https://github.com/david-a-wheeler/spdx-tutorial/
PackageLicenseDeclared: MIT
```



Yocto+SPDX

- What is Yocto
- Current state
- Current problems of Yocto+SPDX



What is Yocto

https://www.yoctoproject.org

LINUX FOUNDATION COLLABORATIVE PROJECTS


yocto PROJECT

SEARCH Go

- ABOUT
- ECOSYSTEM
- DOWNLOADS
- TOOLS + RESOURCES
- DOCUMENTATION

New to the Project
Want to learn more, or just kick the tires? Start here.


[START HERE TO LEARN MORE](#)



It's not an embedded Linux distribution – it creates a custom one for you

The Yocto Project is an open source collaboration project that provides templates, tools and methods to help you create custom Linux-based systems for embedded products regardless of the hardware architecture. [Read more](#)

- [read the Yocto Project Backgrounder](#)
- [learn about Toaster, the Yocto Project Graphical UI](#)
- [register for developer day at ELC in Berlin](#)



Introducing the Yocto Project

<https://www.yoctoproject.org/>

Status

History

- Yocto+SPDX was supported from yocto 1.5.

SPDX Specification

- Yocto+SPDX supports SPDX v1.1 specification.

SPDX Implementation

- Yocto+SPDX generates spdx files by using fossology2 with fossology-spdx module.

Activity of Yocto+SPDX

- There are almost no improvements in spdx module.

```
$ git log --pretty=format:"%ad %s" meta/classes/spdx.bbclass
Thu Nov 5 17:48:18 2015 +0200 bbclass: fix spelling mistakes
Thu Nov 13 15:49:52 2014 +0100 spdx.bbclass: improved error handling and code cleanup
Mon Oct 20 16:09:15 2014 +0200 spdx.bbclass: improved stability, fixed SPDX compliance issues. Changes are reflected in licenses.conf.
Tue Sep 23 17:48:12 2014 +0800 spdx.bbclass: Add SPDX-specific source tree variable.
Sun Sep 1 08:52:40 2013 +0100 meta: Don't use deprecated bitbake API
Fri Aug 23 14:40:35 2013 -0700 SPDX:real-time license scanning and SPDX output.
```

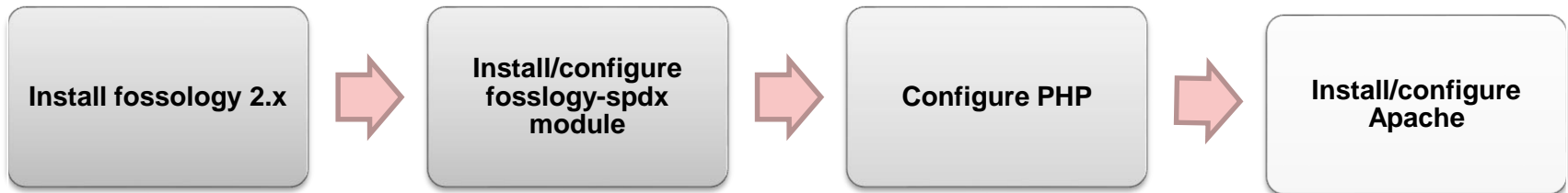
Only support SPDX v1.1

- Even SPDX v1.1, Yocto+SPDX doesn't support well.

Section	Fields	Mandatory	Yocto+SPDX
Creation Information	Creator	Yes	NO
Package Information	Package Download Location	Yes	NO
	All Licenses Information from Files	Yes	NO
	Declared License	Yes	NO

Complex

- Complex to build a Yocto+SPDX environment



Poor performance

- Create a sdx file will spend too much time



Our contributions to Yocto+SPDX

- Aim to make Yocto+SPDX support SPDX 1.2
- Aim to make Yocto+SPDX support SPDX 2.0
- Discuss the Yocto+SPDX in SPDX General Meeting

Make Yocto+SPDX support SPDX 1.2 (1/2)

Deviations from SPDX 1.2 specification

No.	Section	Field	Mandatory	Already in Yocto+SPDX	Compliance With SPDX-1.2	Need to be fixed
1	SPDX Document Information	SPDX Version	Yes	Yes	No	Yes
2		Data License	Yes	Yes	Yes	No
3		Document Comment	No	Yes	Yes	No
4	Creation Information	Creator	Yes	Yes	No	Yes
5		Created	Yes	Yes	Yes	No
6		Creator Comment	No	Yes	Yes	No
7		License List Version	No	No	Unkown	No
8	Package Information	Package Name	Yes	Yes	Yes	No
9		Package Version	No	Yes	Yes	No
10		Package File Name	No	Yes	Yes	No
11		Package Supplier	No	Yes	Yes	No
12		Package Originator	No	Yes	Yes	No
13		Package Download Location	Yes	Yes	No	Yes
14		Package Verification Code	Yes	Yes	Yes	No
15		Package Checksum	No	Yes	Yes	No
16		Package Home Page	No	No	Unkown	No
17		Source Information	No	No	Unkown	No
18		Concluded License	Yes	Yes	Yes	No
19		All Licenses Information from Files	Yes	Yes	No	Yes
20		Declared License	Yes	Yes	No	Yes
21		Comments on License	No	No	Unkown	No
22		Copyright Text	Yes	Yes	Yes	No
23		Package Summary Description	No	Yes	No	Yes
24		Package Detailed Description	No	Yes	Yes	No
25	Other Licensing Information Detected	Identifier Assigned	Conditional	No	No	Yes
26		Extracted Text	Conditional	No	No	Yes
27		License Name	Conditional	No	No	Yes
28		License Cross Reference	No	No	Unkown	No
29		License Comment	No	No	Unkown	No
30	File Information	File Name	Yes	Yes	Yes	No
31		File Type	No	Yes	Yes	No
32		File Checksum	Yes	Yes	Yes	No
33		Concluded License	Yes	Yes	Yes	No
34		License Information in File	Yes	Yes	Yes	No
35		Comments on License	No	No	Unkown	No
36		Copyright Text	Yes	Yes	Yes	No
37		Artifact of Project Name	No	No	Unkown	No
38		Artifact of Project Homepage	No	No	Unkown	No
39		Artifact of Project Uniform Resource Identifier	No	No	Unkown	No
40		File Comment	No	No	Unkown	No
41		File Notice	No	No	Unkown	No
42		File Contributor	No	No	Unkown	No
43		File Dependencies	No	No	Unkown	No
44		Review Information	Reviewer	No	No	Yes
45	Review Date		Conditional	No	Unkown	No
46	Review Comment		No	No	Yes	No

- Make Yocto+SPDX be compliant with SPDX-1.2 specification

发件人: Lei, Maohui 发送时间: 2015/6/10 (周三) 18:09
收件人: openembedded-core@lists.openembedded.org
抄送: Lei, Maohui
主题: [PATCH v4 0/3] These patches aim to make the spdx file be compliant with the SPDX 1.2 Specification.

Those patches aim to make the spdx file be compliant with the SPDX 1.2 Specification.

If you want to use this feature, you need to do:

1. Make sure your fossology+spdx server works well. You can get spdx file with the following command.
curl <http://127.0.0.1/repo/> --no-proxy 127.0.0.1 -k -F mod=spdx_license_once -F noCopyright=false
-F jsonOutput=false -F fullSPDXFlag=true -F [file=@xxx.tar.gz](#) -o xxx.spdx
2. Add the following INHERIT statement and set the SPDX_MANIFEST_DIR at the end of your conf/local.conf file found in the Build Directory.
INHERIT += "spdx"

Lei Maohui (3):

licenses.conf: Modified parameters for new spdx.bbclass
spdx.bbclass: Create the spdx file which is compliant with SPDX
1.2 Specification
spdx: create a directory to save source code

```
meta/classes/spdx.bbclass | 431 ++++++-----  
meta/conf/licenses.conf | 86 +++-----  
2 files changed, 184 insertions(+), 333 deletions(-)
```

1.8.4.2

- **This patch has not been merged into mainline tree. But already been used by some people or companies.**

Make Yocto+SPDX support SPDX 2.0

AIMS

- Support SPDX 2.0
- Good performance
- Easy to build a Yocto+SPDX environment

SPDX Create Tools

- FOSSology3
- TripleCheck Reporter
- DoSOCSv2

<https://spdx.org/ToolsCommunity>

Community Tools

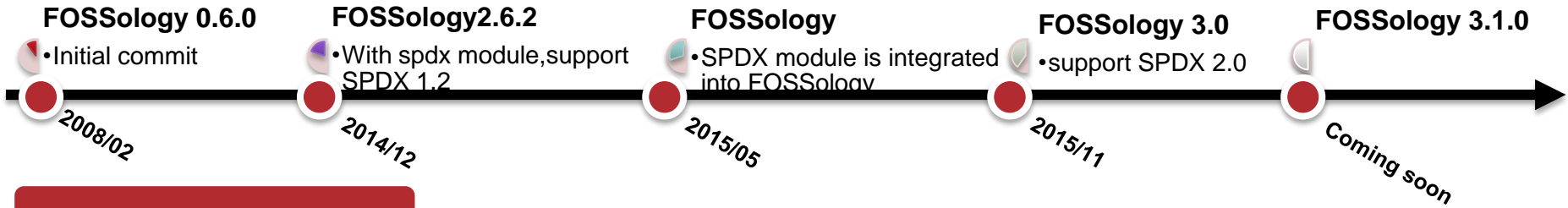
This page lists community based tools that support SPDX. To have your tool listed contact the [outreach team and follow the instructions](#)

AIRS	AIRS helps supply chain partners share data regarding identification of open source components in software packages thus reducing redundant work in a software supply chain. Although initially developed to work with Black Duck® Protex™, AIRS is designed with an abstraction layer to be extensible to other scanning tools.
FOSSology	FOSSology is an open source license compliance software system and toolkit. As a toolkit you can run license, copyright and export control scans from the command line. As a system, a database and web ui are provided to give you a compliance workflow. License, copyright and export scanners are tools available to help with your compliance activities. FOSSology can generate SPDX Documents.
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. 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 was created and is hosted at the University of Nebraska at Omaha. For more information you can go here . Access to the source is available here
OSIT	OSIT allows developers to scan, self-verify their source code and report during development. Developers can import or export SPDX documents with the tool to automatically identify potential issues (AIRS is embedded in OSIT)
SPDX Go Parser	A Google Summer of Code project that implemented an SPDX parser in the Go Language. May not be updated to 2.0 of the specification.
SPDX Python Parser	A Google Summer of Code project that implemented an SPDX parser in Python. May not be updated to 2.0 of the specification.
SPDX Simplify	Simplifies a SPDX expression (including ones with sub-expressions) down to a list of license choices. Licenses that are OR'd together will be returned as-is and licenses that are AND'd together will be returned as <code>MultipleLicenses</code>
TripleCheck Reporter	The TripleCheck reporter is the ideal tool for a quick overlook of the licensing compliance status for a given set of source code files in your desktop computer (Windows, Linux, Mac OSX). If some license or copyright is not detected by the tool, you can easily add new rules by yourself. We are building a community around open source tooling and your help is welcome to grow the open database of licensing rules. Look for us on GitHub.

• What is FOSSology

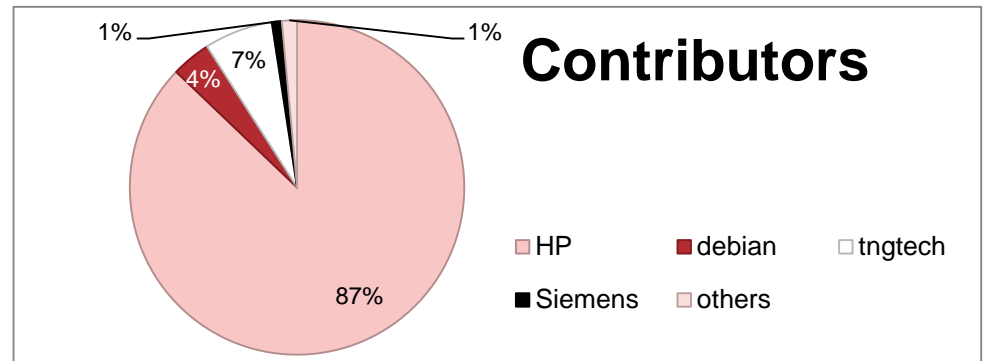
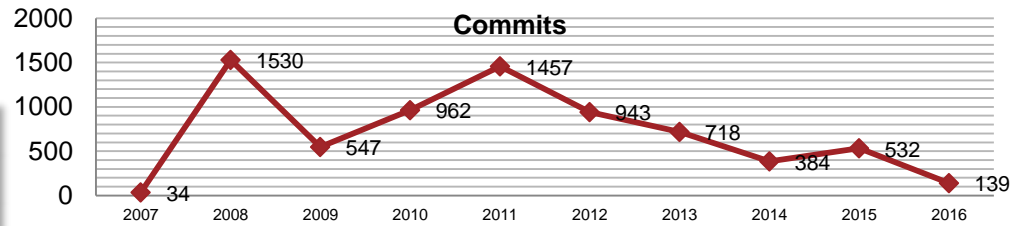
•FOSSology is a open source license compliance software system and toolkit. As a toolkit you can run license, copyright and export control scans from the command line. As a system, a database and web ui are provided to give you a compliance workflow. License, copyright and export scanners are tools available to help with your compliance activities. ([Website](#))

• History



• Project Activity

Item		FOSSology
Last release		2015-11
Contributors	All Time	45
	Past 12 Months	24
Commits	All Time	7,294
	Past 12 Months	409
Activity level		Moderate



(1) Data comes from OpenHub - www.openhub.net.
 (2) Git Repository: <https://github.com/fossology/fossology>
<https://github.com/FOSSology-SPDX/fossology-spdx>

- How to use FOSSology3

The screenshot shows the FOSSology3 web interface. At the top, there is a navigation bar with links for Home, Search, Browse, Upload, Jobs, Organize, Admin, and Help. The 'Upload' link is highlighted with a red box and a callout arrow. Below the navigation bar, there is a 'Show Jobs' button and a 'Close' button. The main content area displays a message: 'SPDX 2 generation scheduled as job #98'. Below this message is a table of jobs. The table has columns for Job/Dependency, Status, and Average items/sec. The table contains several rows, with the last row (job #95) having a 'Download SPDY' button next to it. A callout arrow points to this button with the text '[Download SPDY]'. The table data is as follows:

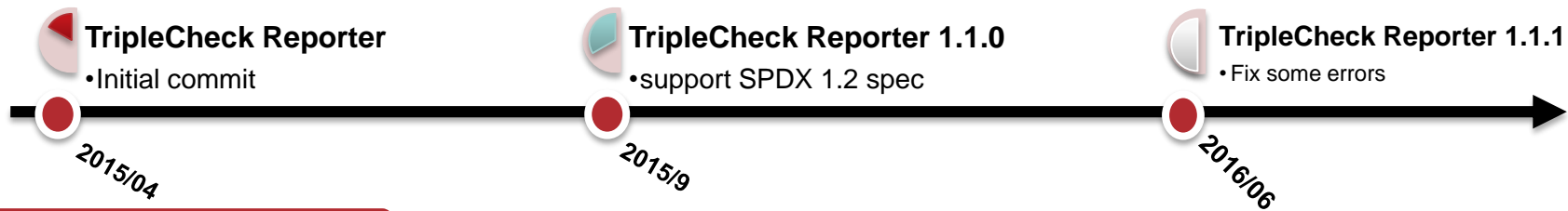
Job/Dependency	Status	Average items/sec	ETA
cpio-2.11.tar.gz			
98	spdx2		
cpio-2.11.tar.gz			
97	Completed	2016-06-18 09:36 - 2016-06-18 09:36	0.00 items/sec
cpio-2.11.tar.gz			
95	Completed	ununpack	540 items 2016-06-18 09:36 - 2016-06-18 09:36
96 / 95	Completed	adj2nest	540 items 2016-06-18 09:36 - 2016-06-18 09:36



• What is TripleCheck Reporter

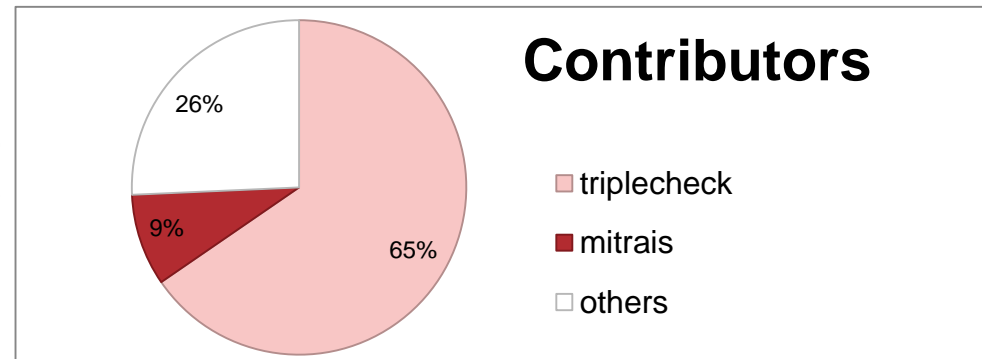
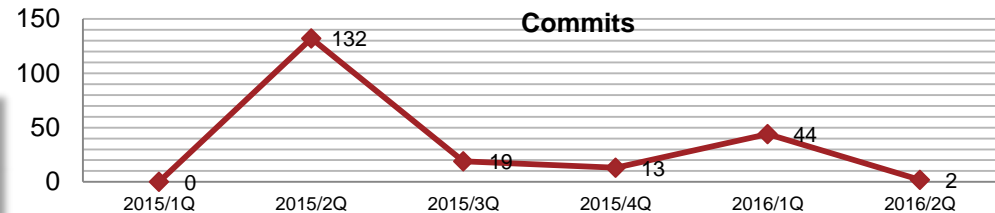
- The TripleCheck reporter is the ideal tool for a quick overlook of the licensing compliance status for a given set of source code files in your desktop computer (Linux, Windows and Mac OS X). ([Website](#))

• History



• Project Activity

Item		TripleCheck
Last release		2016/06
Contributors	All Time	5
	Past 12 Months	3
Commits	All Time	224
	Past 12 Months	92
Activity level		Low



(1) Data comes from OpenHub - www.openhub.net.
 (2) Git Repository: <https://github.com/triplecheck/triplecheck.github.io>

• How to use TripleCheck Reporter

The screenshot shows the TripleCheck Reporter interface. On the left is a file tree for 'cpio-2.11' with 524 files. The main panel displays 'cpio-2.11' with 67,253 lines of code, 524 files, and 6 Mb in size. A pie chart shows 41% (red) for 'No license declared' and 59% (green) for 'License declared'. Below the chart is a 'License evidence' section with a table of license types and file counts.

License	Count	Percentage	Action
GPL-3.0+	231	75%	View
GPL-3.0	32	10.4%	View
Not recognized	23	7.5%	View
LGPL-3.0+	8	2.6%	View
Public_Domain	6	1.9%	View
GPL-2.0+	6	1.9%	View
MIT, Public_Domain	1	0.3%	View

7

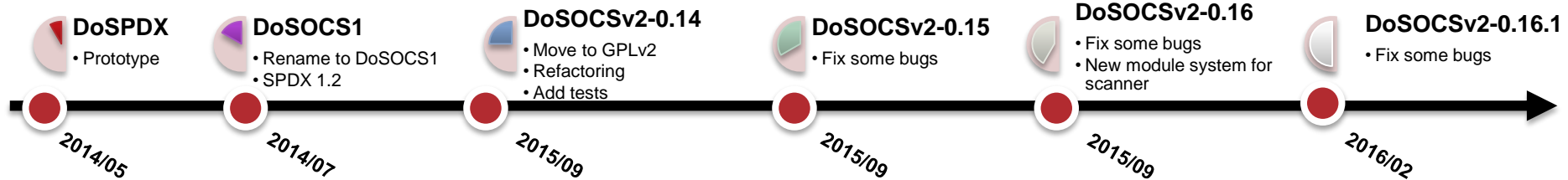
```
##-----  
## SPDX Document Information  
##-----  
SPDXVersion: SPDX-1.2  
DataLicense: CC0-1.0  
##-----  
## Creation Information  
##-----  
Creator: Person: root  
Creator: Tool: TripleCheck 1.1.1  
Created: 2016-07-10T18:05:33Z  
##-----  
## Package Information  
##-----  
PackageName: cpio-2.11  
PackageLicenseDeclared: NOASSERTION  
##-----  
## File Information  
##-----  
FileName: ./Makefile.am  
FileType: OTHER  
FileChecksum: SHA1:  
3b7a83d30d4ade6e3ad48f3da5f957a9da2078d9  
FileChecksum: SHA256:  
82c2300ee5d555ede3d038398ab1c13f76ff6931158  
d474a5bedae5b4ad2fe3  
FileChecksum: MD5:  
b7310cf3b97f49a1335fa68fb5b6c93c  
FileSize: 1024 bytes (1024 bytes)  
FileCopyrightText: <text></text>  
LicenseInfoInFile: GPL-3.0+
```



What is DoSOCSv2

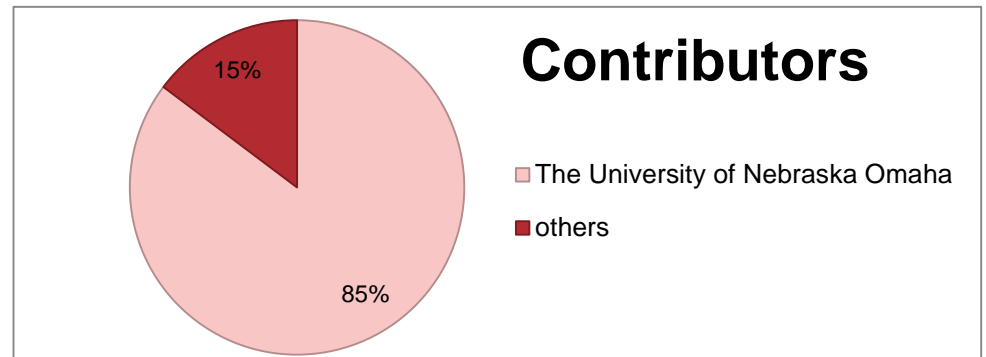
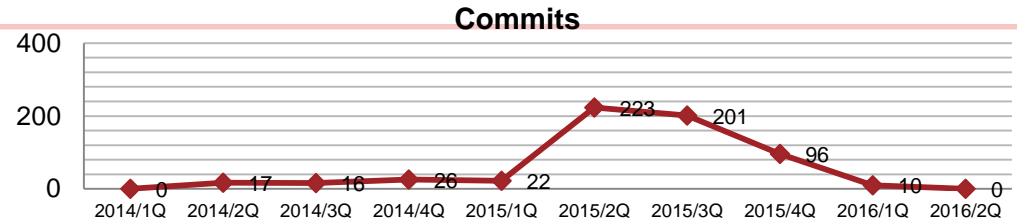
- dosocs2 is a command-line tool for managing SPDX 2.0 documents and data. It can scan source code distributions to produce SPDX information, store that information in a relational database, and extract it in a plain-text format on request. ([Website](#))

History



Project Activity

Item		DoSOCSv2
Last Release		2016/02
Contributors	All Time	12
	Past 12 Months	7
Commits	All Time	611
	Past 12 Months	495
Activity Level		Moderate



(1) Data comes from OpenHub - www.openhub.net.
 (2) Git Repository: <https://github.com/DoSOCSv2/DoSOCSv2>

How to use DoSOCSv2

```
$ dosocs2 oneshot cpio-2.11
dosocs2: cpio-2.11: package_id: 1
dosocs2: running nomos on package 1
cccccpio-2.11: document_id: 1
```

SPDXVersion: SPDX-2.0

```
DataLicense: CC0-1.0
DocumentNamespace: sqlite:///home/leimh/.config/dosocs2/dosocs2.sqlite3/cpio-2.11-fe30375e-3a43-4d1e-9962-eb24f2dbe8bf
DocumentName: cpio-2.11
SPDXID: SPDXRef-DOCUMENT
DocumentComment: <text></text>
```

External Document References

```
## Creation Information
Creator: Tool: dosocs2-0.16.1
Created: 2016-07-09T23:18:52Z
CreatorComment: <text></text>
```

LicenseListVersion: 2.2

Document Annotations

Document Relationships

```
Relationship: SPDXRef-DOCUMENT DESCRIBES SPDXRef-package-cpio_2_11-f6eb-4fa85311
Relationship: SPDXRef-DOCUMENT DESCRIBES SPDXRef-file-ABOUT-NLS-b502-579bb6d1
Relationship: SPDXRef-DOCUMENT DESCRIBES SPDXRef-file-AUTHORS-2cd7-1fb19a33
Relationship: SPDXRef-DOCUMENT DESCRIBES SPDXRef-file-COPYING-8427-1a9a3562
Relationship: SPDXRef-DOCUMENT DESCRIBES SPDXRef-file-ChangeLog-6f23-76c9a0d2
.....
```

DoSOCSv2 is best for Yocto

Item		TripleCheck Reporter	FOSSology3	DoSOCSv2
Last Release		1.1.1	3.0	v0.16.0
License		AGPLv3	GPLv2	GPLv2
Support SPDX version		1.2	2.0	2.0
Scanners		N/A	Nomos, Monk, Ninka	Nomos
Supported Platform	Linux	√	√	√
	Others (Windows/OS X)	√		
Interface adapt to Yocto			√ (Partial support)	√
Graphical user interface		√	√	
Project Activity (http://www.openhub.net)		Low	Moderate	Moderate
Scan time		Short	Long	Middle
Scan unpacked sources		√		√
Build environment complexity		Easy	complex	Easy

发件人: Lei, Maohui

收件人: openembedded-core@lists.openembedded.org

发送时间: 2016/6/27 (周一) 8:12

抄送: Lei, Maohui

主题: [OE-core][PATCH] To make yocto-spx support spdx2.0 SPEC

There are some problems in `spx module(spx.bbclass)`.

1. The newest version of `spx` specification is 2.0. But even `spx 1.1`, `yocto+SPDX` can't support well.
2. It is complex to build a `Yocto+SPDX` environment.
3. Creating a `spx` file spends too much time, especially for large software.

To improve `spx` module ,I change the `spx` create tool from `fossology` to `dosocs2`.

With this patch:

1. Also gets license informations by scanner from `fossology`.

1. Can support `SPDX2.0 SPEC`.

2. Because `dosocs2` can work on directories, so there is no necessary to pack source code before `do_spx`. It can save time for large software.

Lei Maohui (1):

To Make `yocto-spx` support `spx v2.0` specification.

```
meta/classes/spx.bbclass | 488 ++++++-----
meta/conf/licenses.conf  |  67 +-----
2 files changed, 184 insertions(+), 371 deletions(-)
```

--

1.9.1

```
meta/classes/spx.bbclass | 488 ++++++-----
meta/conf/licenses.conf  |  67 +-----
2 files changed, 184 insertions(+), 371 deletions(-)
```

```
diff --git a/meta/classes/spx.bbclass b/meta/classes/spx.bbclass index 0c92765..892199d 100644
```

```
--- a/meta/classes/spx.bbclass
```

```
+++ b/meta/classes/spx.bbclass
```

```
@@ -1,12 +1,9 @@
```

```
# This class integrates real-time license scanning, generation of SPDX standard # output and verifying license info during the building process.
```

```
-# It is a combination of efforts from the OE-Core, SPDX and Fossology projects.
```

```
+# It is a combination of efforts from the OE-Core, SPDX and DoSOCSv2 projects.
```

```
#
```

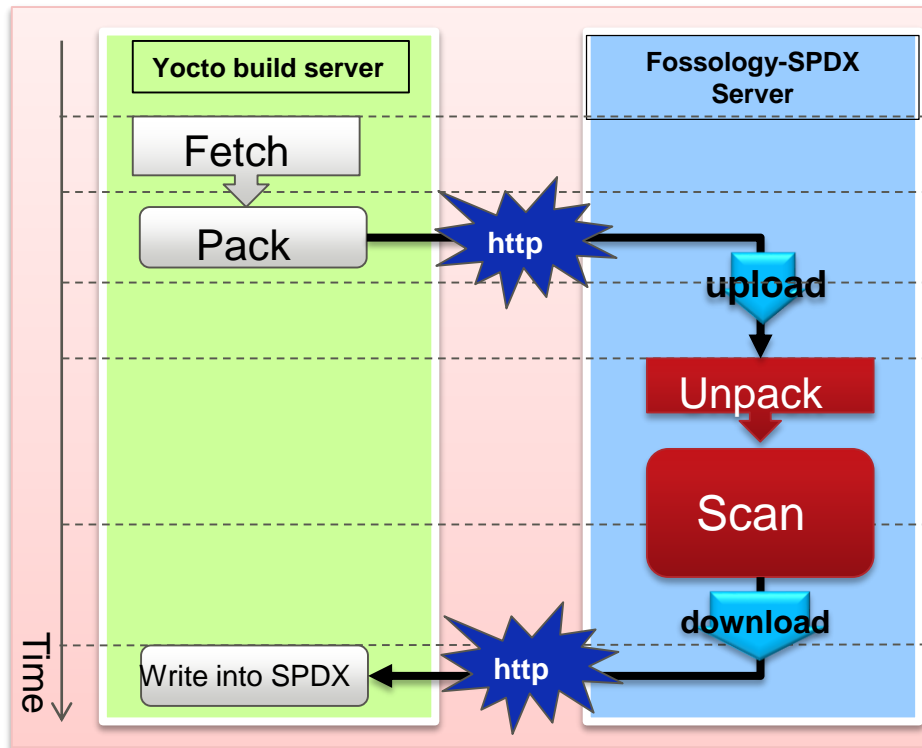
```
-# For more information on FOSSology:
```

```
-# http://www.fossology.org
```

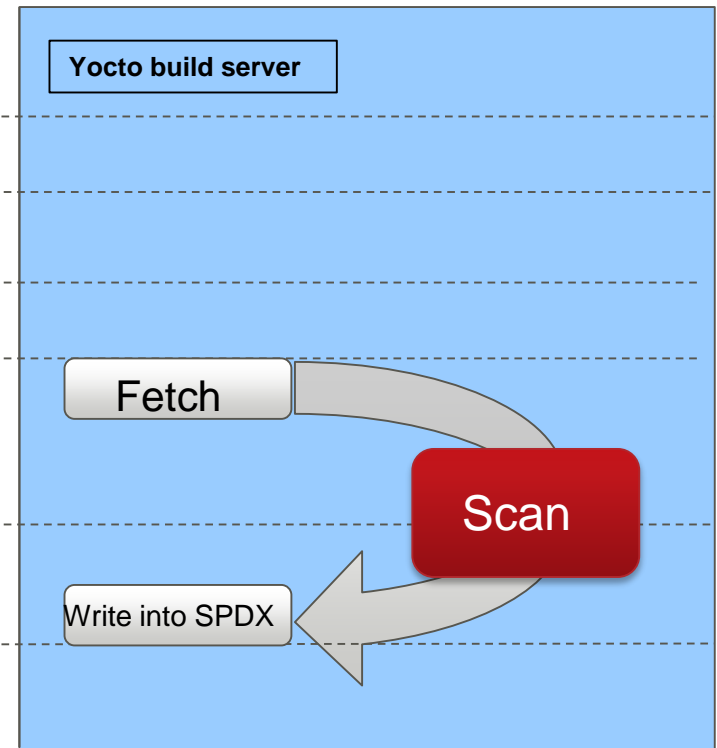
```
..
```

Before and after (1/3)

Before



After



Before and after (2/3)

- With our patch, Yocto+SPDX has better performance after first time.



Item		Before	After
SPDX version		SPDX 1.1	SPDX 2.0
SPDX create tool		fossology-spdx	dosocs2
Scanner		nomos	nomos
LicenseListVersion		1.19	2.2
Performance (e.g. glibc- 2.24)	First time	75min	44min
	Second time	77min	6min

■ Did a short talk about Yocto+SPDX

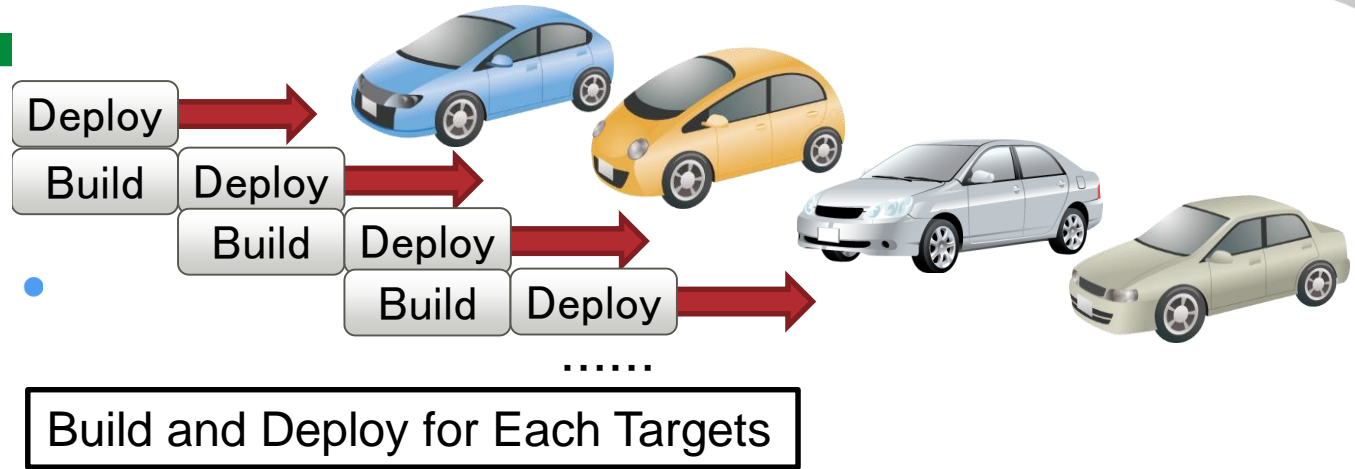
- Talked about Fujitsu's contributions to Yocto+SPDX
- Let SPDX workgroup know the status of Yocto+SPDX
- How to improve the issues

Manager SPDX files by smart

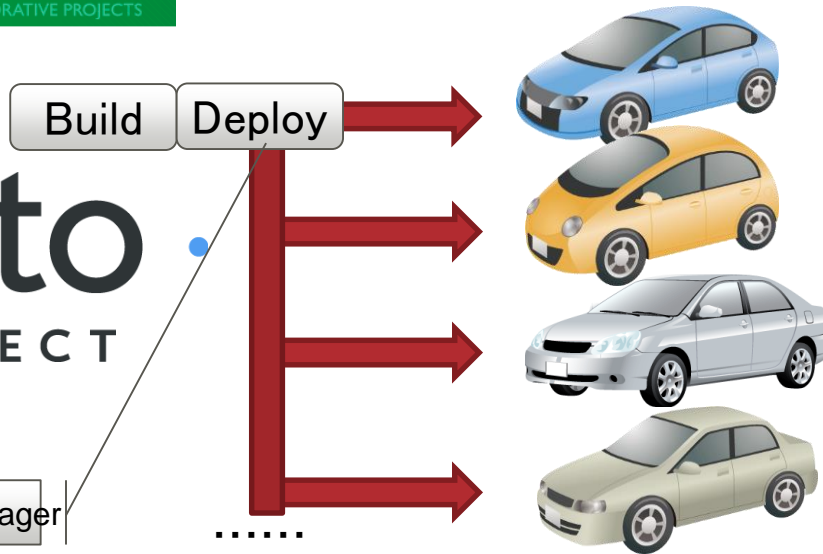
- What is smart
- Smart Package Manager Workflow
- Use of smart
- How to Manager SPDX files by smart

What is smart

LINUX FOUNDATION COLLABORATIVE PROJECTS

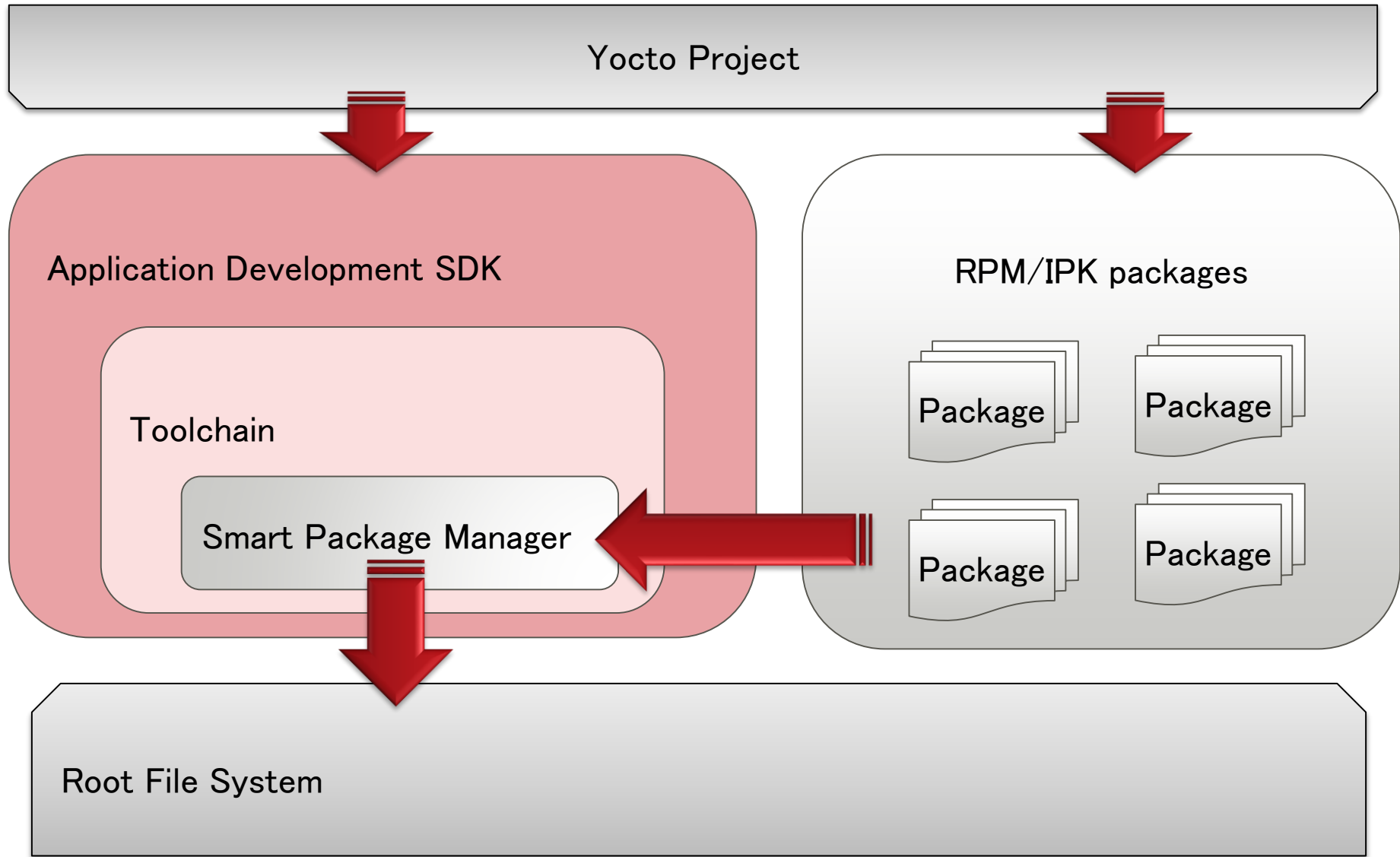


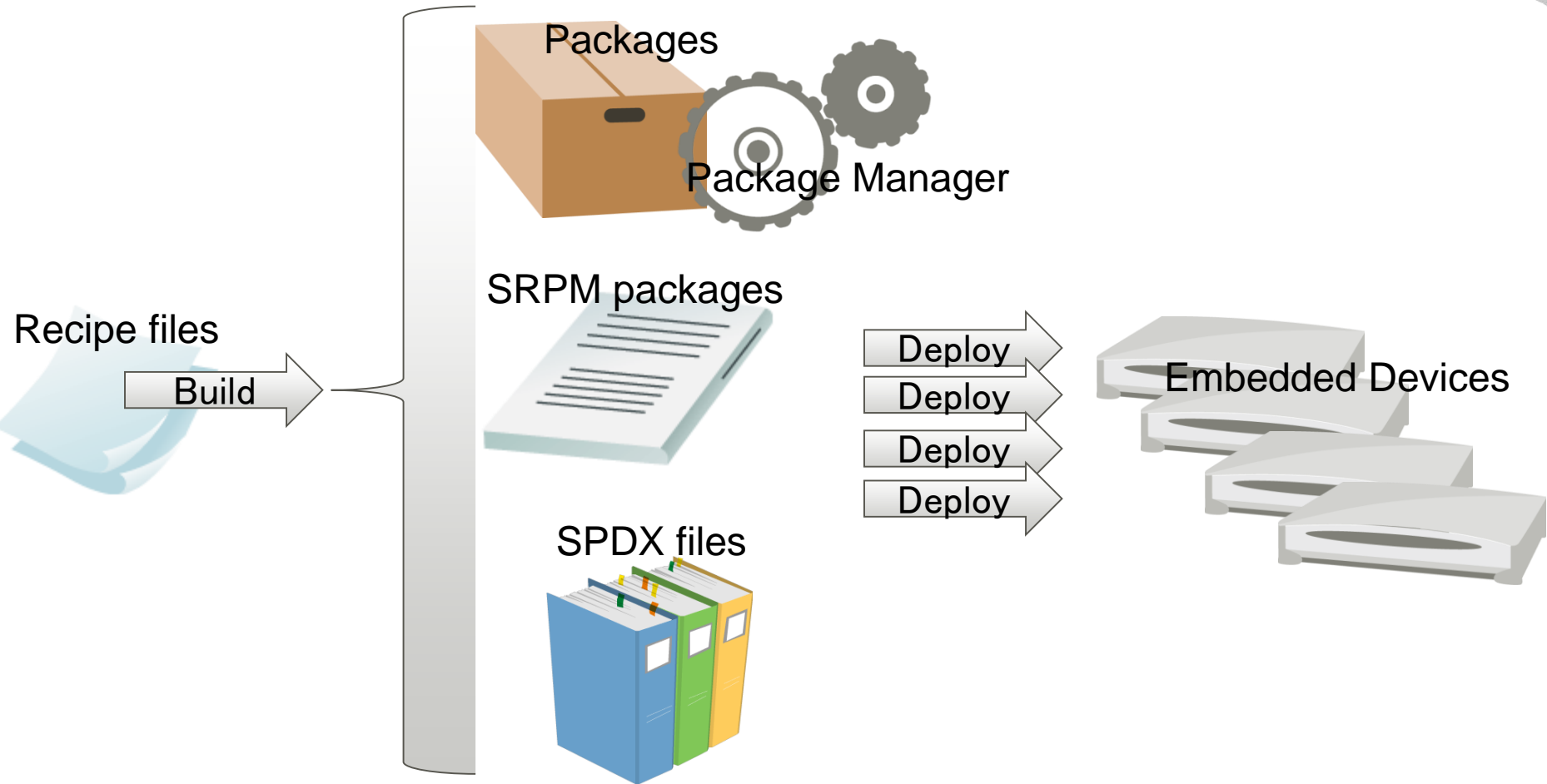
LINUX FOUNDATION COLLABORATIVE PROJECTS



Using Package Manager

Smart Package Manager Workflow






- Accompanied with the package files and SRPM packages, SPDX files are created to manage license information.

Manage spdx files by smart

```
leimh@force:~$ ls ./spdx/  
acl-2.2.52.spdx  
acpid-2.0.23.spdx  
adwaita-icon-theme-3.16.2.1.spdx  
alsa-lib-1.0.29.spdx  
alsa-plugins-1.0.29.spdx  
alsa-state-0.2.0.spdx  
alsa-utils-1.0.29.spdx  
anthy-9100h.spdx  
at-3.1.16.spdx  
atk-2.16.0.spdx  
at-spi2-atk-2.16.0.spdx  
at-spi2-core-2.16.0.spdx  
attr-2.4.47.spdx  
audit-2.4.3.spdx  
augeas-1.4.0.spdx  
avahi-0.6.31.spdx
```

- Introduce spdx
 - Why we need SPDX
 - What SPDX can do
- Introduce the problems of Yocto+SPDX.
 - Only supports SPDX1.1
 - Complex to use
 - Poor performance
- What we have done for Yocto+SPDX.
 - Make Yocto+SPDX switch to DoSOCSv2.
 - Discuss Yocto+SPDX in in SPDX General Meeting
- Manager SPDX files by smart
 - Manager SPDX files smarter by smart

Any Questions?



FUJITSU

shaping tomorrow with you