
AboutCode

AboutCode.org

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CONTENTS

1	Aboutcode Projects	1
2	Documentation Guide	205
3	Tutorial Documents	209
4	How-To Documents	211
5	Reference Documents	213
6	Discussion Documents	215
7	Indices and Tables	217

ABOUTCODE PROJECTS

1.1 ScanCode-Toolkit Documentation

1.1.1 Getting Started

Home

ScanCode is a tool to scan code and detect licenses, copyrights and more.

Why ScanCode?

Discovering the origin and license for a software component is important, but it is often much harder to accomplish than it should be because:

- A typical software project may reuse tens or hundreds of third-party software components
- Software authors do not always provide copyright and license information
- Copyright and license information that is provided may be hard to find and interpret

ScanCode tries to address this issue by offering:

- A comprehensive code scanner that can detect origin or license information inside codebase files
- A simple command line approach that runs on Windows, Linux, and Mac
- Your choice of JSON or other output formats (SPDX, HTML, CSV) for integration with other tools
- ScanCode workbench for Visualization
- Well-tested, easy to hack, and well-documented code
- Release of the code and reference data under attribution licenses (Apache 2.0 and CC-BY-1.0)
- Plugin System for easily adding new Functionality to Scans.
- Python 3 Unicode Capabilities for better supporting users from 100+ languages.
- Extensive Documentation Support.

What does ScanCode Toolkit do?

ScanCode finds the origin history information that is in your codebase with a focus on:

- Copyright and other origin clues (emails, urls, authors etc)

- License notices and license text with reference information about detected licenses.

Using this data you can:

- Discover the origin and license of the open source and third-party software components that you use,
- Create a software component Inventory for your codebase, and
- Use this data to comply with open source license obligations such as attribution and redistribution.

How does it work?

Given a codebase in a directory, ScanCode will:

- Collect an inventory of the code files and classify the code using file types
- Extract files from any archive using a general purpose extractor
- Extract texts from binary files if needed
- Use an extensible rules engine to detect open source license text and notices
- Use a specialized parser to capture copyright statements
- Identify packaged code and collect metadata from packages
- Report the results in the formats of your choice (JSON, SPDX, etc.) for integration with other tools
- Browse the results using the [ScanCode Workbench](#) companion app to assist your analysis.

ScanCode should enable you to identify the “easy” cases on your own, but a software development team will probably need to build internal expertise or use outside experts (like nexB) in many cases.

ScanCode is written in Python and also uses other open source packages.

Alternatives?

There are several utilities that do some of what ScanCode does - e.g. You can grep files for copyright and license text. This may work well for simple cases - e.g. at the single file level, but we created ScanCode for ourselves because this approach does not help you to see the recurring patterns of licenses and other origin history clues.

Or you can consider other tools such as:

- FOSSology (open source, written in C, Linux only, GPL-licensed)
- Ninka (open source, written in Perl, GPL-licensed)
- Commercially-licensed tools, most of them written in Java

History

ScanCode was originally created by nexB to support our software audit consulting services. We have used and continuously enhanced the underlying toolkit for six years. We decided to release ScanCode as open source software to give software development teams the opportunity to perform as much of the software audit function as they like on their own.

If you have questions or are interested in nexB-provided training or support for ScanCode, please send us a note at info@scancode.io or visit <http://www.nexb.com/>.

We are part of nexB Inc. and most of us are located in the San Francisco Bay Area. Our mission is to provide the tools and services that enable and accelerate component-based software development. Reusing software components is essential for the efficient delivery of software products and systems in every industry.

Thank you for giving ScanCode a try!

Other Important Documentation

1. *Type of Options*
2. *How to Run a Scan*
3. *Basic Tutorials*
4. *How-To Guides*
5. *How it all Works*
6. *Contributing to Code Development*
7. *Contributing to the Documentation*
8. *Plugin Architecture*
9. *FAQ*
10. *Support*

Comprehensive Installation

ScanCode requires Python 2.7.x and is tested on Linux, Mac, and Windows. Make sure Python 2.7 is installed first.

System Requirements

- Hardware : ScanCode will run best with a modern X86 processor and at least 2GB of RAM and 250MB of disk.
- Supported operating systems : ScanCode should run on these OSes:
 1. Linux: on most recent 64-bit Linux distributions (32-bit distros are only partially supported),
 2. Mac: on recent Mac OSX (10.6.8 and up),
 3. Windows: on Windows 7 and up (32- or 64-bit) using a 32-bit Python.

Prerequisites

ScanCode needs a Python 2.7 interpreter.

- On Linux: Use your package manager to install python2.7. If Python 2.7 is not available from your package manager, you must compile it from sources. For instance, visit <https://github.com/dejacode/about-code-tool/wiki/BuildingPython27OnCentos6> for instructions to compile Python from sources on Centos.
- On Ubuntu 12.04, 14.04 and 16.04, you will need to install these packages first: `python-dev bzip2 xz-utils zlib1g libxml2-dev libxslt1-dev`
- On Debian and Debian-based distros you will need to install these packages first: `python-dev libbz2-1.0 xz-utils zlib1g libxml2-dev libxslt1-dev`

- On RPM-based distros, you will need to install these packages first: `python-devel zlib bzip2-libs xz-libs libxml2-devel libxslt-devel`
- **On Windows:**

Use the Python 2.7 32-bit (e.g. The Windows x86 MSI installer) for X86 regardless of whether you run Windows on 32-bit or 64-bit. **DO NOT USE Python X86_64 installer** even if you run 64 bit Windows. Download Python from this url: <https://www.python.org/ftp/python/2.7.13/python-2.7.13.msi>

Install Python on the c: drive and use all default installer options (scancode will try to find python just in c:python27python.exe). See the Windows installation section for more installation details.
- On Mac: Download and install Python from this url: <https://www.python.org/ftp/python/2.7.13/python-2.7.13-macosx10.6.pkg>

Do not use Unicode, non-ASCII in your installation Path

There is a bug in underlying libraries that prevent this.

Installation on Linux and Mac

Download and extract the latest ScanCode release from: <https://github.com/nexB/scancode-toolkit/releases/>

Open a terminal in the extracted directory and run:

```
./scancode --help
```

This will configure ScanCode and display the command line help.

Installation on Windows

- Download the latest ScanCode release zip file from <https://github.com/nexB/scancode-toolkit/releases/>
- In Windows Explorer (called File Explorer on Windows 10), select the downloaded ScanCode zip and right-click.
- In the pop-up menu select 'Extract All...'
- In the pop-up window 'Extract zip folders' ('Extract Compressed (Zipped) Folders' on Windows 10) use the default options to extract.
- Once the extraction is complete, a new Windows Explorer/File Explorer window will pop up.
- In this Explorer window, select the new folder that was created and right-click.

Note: On Windows 10, double-click the new folder, select one of the files inside the folder (e.g., 'setup.py'), and right-click.

- In the pop-up menu select 'Properties'.
- In the pop-up window 'Properties', select the Location value. Copy this to the clipboard and close the 'Properties' window.
- Press the start menu button (On Windows 10, click the search box or search icon in the taskbar.)
- In the search box type:

```
cmd
```

- Select 'cmd.exe' listed in the search results. (On Windows 10, you may see 'Command Prompt' instead – select that.)
- A new 'cmd.exe' window ('Command Prompt' on Windows 10) pops up.
- In this window (aka a 'command prompt'), type the following (i.e., 'cd' followed by a space):

```
cd
```

- Right-click in this window and select Paste. This will paste the path where you extracted ScanCode.
- Press Enter.
- This will change the current location of your command prompt to the root directory where ScanCode is installed.
- Then type:

```
scancode -h
```

- Press enter. This will configure your ScanCode installation.
- Several messages are displayed followed by the scancode command help.
- The installation is complete.

Un-installation

- Delete the directory in which you extracted ScanCode.
- Delete any temporary files created in your system temp directory under a ScanCode directory.

IDE Configuration

The instructions below assume that you followed the [Contributing to Code Development](#) including a python virtualenv.

PyCharm

Open the settings dialog and navigate to “Project Interpreter”. Click on the gear button in the upper left corner and select “Add Local”. Find the python binary in the virtualenv (bin/python in the repository root) and confirm. Open a file that contains tests and set a breakpoint. Right click in the test and select “Debug <name of test>”. Afterwards you can re-run the same test in the debugger using the appropriate keyboard shortcut (e.g. Shift-F9, depending on platform and configured layout).

Visual Studio Code

Install the [Python extension](#) from Microsoft.

The configure script should have created a VSCode workspace directory with a basic settings.json. To do this manually, add to or create the workspace settings file .vscode/settings.json:

```
"python.pythonPath": "${workspaceRoot}/bin/python",
"python.unitTest.pyTestEnabled": true
```

If you created the file, also add `{` and `}` on the first and last line respectively.

When you open the project root folder in VSCode, the status bar should show the correct python interpreter and, after a while, a “Run Tests” button. If not, try restarting VSCode.

Open a file that contains tests (e.g. `tests/cluecode/test_copyrights.py`). Above the test functions you should now see “Run Test” and “Debug Test”. Set a breakpoint in a test function and click on “Debug Test” above it. The debugger panel should show up on the left and show the program state at the breakpoint. Stepping over and into code seems not to work. Clicking one of those buttons just runs the test to completion. As a workaround, navigate to the function you want to step into, set another breakpoint and click on “continue” instead.

Documentation

This page provides an index of current ScanCode user documentation.

Documentation

The ScanCode toolkit documentation lives at aboutcode.readthedocs.io/en/latest/scancode-toolkit/.

Contribute to Docs

See *Contributing to the Documentation* for more details.

Google Summer of Docs

See *Google Season of Docs 2019* for more details.

What’s New in This Release?

A new release of Scancode-Toolkit is here!

Quick Summary

- Version - 3.1.1
- Tag - “v.3.1.1”
- Date - 5th September 2019
- Type - Pre-Release
- Comments - Release v3.1.1 which the release candidate 2 of 3.1.x

Main New Features

This is the first 3.1 release with the best, fastest and most efficient ScanCode ever released.

This release contains many improvements, fixes and new features including breaking API changes (when compared to 2.2.x). See the [CHANGELOG](#) for details.

This release also comes with a Full Documentation hosted at aboutcode.readthedocs.io/en/latest/scancode-toolkit/.

To install, download `scancode-toolkit-3.1.1.zip` or `scancode-toolkit-3.1.1.tar.bz2` from the Downloads section below and follow installation instructions in the [README](#).

This is also available as a Python library from Pypi with `pip install scancode-toolkit`.

You can also download the corresponding source code for bundled pre-built third-party binaries from these locations:

- <https://github.com/nexB/scancode-thirdparty-src/archive/v1.0.0.tar.gz>
- <https://github.com/nexB/scancode-thirdparty-src/archive/v1.0.0.zip>

Brief Summary Of Changes

Documentation Support

`pip install`

Python 3 Support

Explanations

1.1.2 Command Line Interface Reference

Synopsis

ScanCode detects licenses, copyrights, package manifests and direct dependencies and more, both in source code and binary files, by scanning the files. This page introduces you to the ScanCode Toolkit Command Line Interface in the following sections:

- Quickstart
- Type of Options
- Output Formats
- Other Important Documentation

Quickstart

The basic usage is:

```
path/to/scancode [OPTIONS] <OUTPUT FORMAT OPTION(s)> <SCAN INPUT>
```

To scan the `samples` directory, the command will be:

```
path/to/scancode -clpieu --json-pp path/to/output.json path/to/samples
```

Note: The `<OUTPUT FORMAT OPTION(s)>` includes both the output option and output file name. For example in `./scancode -clpieu --json-pp output.json samples`, `--json-pp output.json` is `<OUTPUT FORMAT OPTION(s)>`.

Tip: On Windows use `scancode` instead of `path/to/scancode`.

Warning: There isn't a "Default" output option in Versions 3.x onwards, you have to specify `<OUTPUT FORMAT OPTION(s)>` explicitly.

Alternatively, instead of using `path/to/scancode` (the path from root of file system) we can go into the `scancode` directory (like `scancode-toolkit-3.1.1`) and then use `./scancode`. The same applies for input and output options. To scan a folder `samples` inside `ScanCode` directory, and output to a file `output.json` in the same directory, the command will be:

```
./scancode -clpieu --json-pp output.json samples
```

While a scan using absolute paths from the file system root will look like:

```
home/ayansm/software/scancode-toolkit-3.1.1/scancode -clpieu --json-pp home/ayansm/  
↪scan_scan_results/output.json home/ayansm/codebases/samples/
```

Throughout the documentation `./scancode --clpieu --json-pp output.json samples` will be used as an example when the terminal is at `scancode-toolkit-3.1.1` and we are scanning the default `samples` folder distributed with `Scancode-Toolkit`.

Scans the `<SCAN INPUT>` file or directory for license, origin and packages and saves results to `FILE(s)` using one or more output format option. Error and progress are printed to `stdout`.

Type of Options

ScanCode Toolkit Command Line options can be divided into these major sections:

- *All "Basic" Scan Options*
- *Extractcode Options*
- *All "Core" Scan Options*
- *Controlling Scancode Output and Filters*
- *Pre-Scan Options*
- *Post-Scan Options*

Output Formats

The output file format is set by using the various output options. The default output format is JSON, the entire file being in one line, without whitespace characters.

The following example scans will show you how to run a scan with each of the result formats. For the scans, we will use the `samples` directory provided with the `ScanCode Toolkit`.

JSON file output

Scan the `samples` directory and save the scan to a JSON file::

```
./scancode -clpieu --json-pp output.json samples
```

A sample JSON output file structure will look like:

```
{
  "headers": [
    {
      "tool_name": "scancode-toolkit",
      "tool_version": "3.1.1",
      "options": {
        "input": [
          "samples/"
        ],
        "--copyright": true,
        "--email": true,
        "--info": true,
        "--json-pp": "output.json",
        "--license": true,
        "--package": true,
        "--url": true
      },
      "notice": "Generated with ScanCode and provided on an \"AS IS\" BASIS, WITHOUT
↳ WARRANTIES\nOR CONDITIONS OF ANY KIND, either express or implied. No content
↳ created from\nScanCode should be considered or used as legal advice. Consult an
↳ Attorney\nfor any legal advice.\nScanCode is a free software code scanning tool
↳ from nexB Inc. and others.\nVisit https://github.com/nexB/scancode-toolkit/ for
↳ support and download.",
      "start_timestamp": "2019-10-19T191117.292858",
      "end_timestamp": "2019-10-19T191219.743133",
      "message": null,
      "errors": [],
      "extra_data": {
        "files_count": 36
      }
    }
  ],
  "files": [
    {
      "path": "samples",
      "type": "directory",
      ...
      ...
      "scan_errors": []
    },
    {
      "path": "samples/README",
      "type": "file",
      "name": "README",
      "base_name": "README",
      "extension": "",
      "size": 236,
      "date": "2019-02-12",
      "sha1": "2e07e32c52d607204fad196052d70e3d18fb8636",
      "md5": "effc6856ef85a9250fbla470792b3f38",
      "mime_type": "text/plain",
      "file_type": "ASCII text",

```

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```

    "programming_language": null,
    "is_binary": false,
    "is_text": true,
    "is_archive": false,
    "is_media": false,
    "is_source": false,
    "is_script": false,
    "licenses": [],
    "license_expressions": [],
    "copyrights": [],
    "holders": [],
    "authors": [],
    "packages": [],
    "emails": [],
    "urls": [],
    "files_count": 0,
    "dirs_count": 0,
    "size_count": 0,
    "scan_errors": []
  },
  ...
  ...
  ...
  {
    "path": "samples/zlib/iostream2/zstream_test.cpp",
    "type": "file",
    "name": "zstream_test.cpp",
    "base_name": "zstream_test",
    "extension": ".cpp",
    "size": 711,
    "date": "2019-02-12",
    ...
    ...
    ...
    "scan_errors": []
  }
]
}

```

A sample JSON output for an individual file will look like:

```

{
  "path": "samples/zlib/iostream2/zstream.h",
  "type": "file",
  "name": "zstream.h",
  "base_name": "zstream",
  "extension": ".h",
  "size": 9283,
  "date": "2019-02-12",
  "sha1": "fca4540d490fff36bb90fd801cf9cd8fc695bb17",
  "md5": "a980b61c1e8be68d5cdb1236ba6b43e7",
  "mime_type": "text/x-c++",
  "file_type": "C++ source, ASCII text",
  "programming_language": "C++",
  "is_binary": false,
  "is_text": true,
  "is_archive": false,

```

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```

"is_media": false,
"is_source": true,
"is_script": false,
"licenses": [
  {
    "key": "mit-old-style",
    "score": 100.0,
    "name": "MIT Old Style",
    "short_name": "MIT Old Style",
    "category": "Permissive",
    "is_exception": false,
    "owner": "MIT",
    "homepage_url": "http://fedoraproject.org/wiki/Licensing:MIT#Old_Style",
    "text_url": "http://fedoraproject.org/wiki/Licensing:MIT#Old_Style",
    "reference_url": "https://enterprise.dejacode.com/urn/urn:dje:license:mit-old-
↪style",
    "spdx_license_key": null,
    "spdx_url": "",
    "start_line": 9,
    "end_line": 15,
    "matched_rule": {
      "identifier": "mit-old-style_cmr-no_1.RULE",
      "license_expression": "mit-old-style",
      "licenses": [
        "mit-old-style"
      ],
      "is_license_text": true,
      "is_license_notice": false,
      "is_license_reference": false,
      "is_license_tag": false,
      "matcher": "2-aho",
      "rule_length": 71,
      "matched_length": 71,
      "match_coverage": 100.0,
      "rule_relevance": 100
    }
  }
],
"license_expressions": [
  "mit-old-style"
],
"copyrights": [
  {
    "value": "Copyright (c) 1997 Christian Michelsen Research AS Advanced Computing
↪",
    "start_line": 3,
    "end_line": 5
  }
],
"holders": [
  {
    "value": "Christian Michelsen Research AS Advanced Computing",
    "start_line": 3,
    "end_line": 5
  }
],
"authors": [],

```

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```

"packages": [],
"emails": [],
"urls": [
  {
    "url": "http://www.cmr.no/",
    "start_line": 7,
    "end_line": 7
  }
],
"files_count": 0,
"dirts_count": 0,
"size_count": 0,
"scan_errors": []
},

```

Static HTML output

Scan the `samples` directory for licenses and copyrights and save the scan results to an HTML file. When the scan is done, open `samples.html` in your web browser.

```
./scancode -clpieu --html output.html samples
```

location	start	end	what	value
samples/arch/zlib.tar.gz-extract/zlib-1.2.8/adler32.c	1	3	copyright	Copyright (c) 1995-2011 Mark Adler
samples/arch/zlib.tar.gz-extract/zlib-1.2.8/adler32.c	3	3	license	zlib
samples/arch/zlib.tar.gz-extract/zlib-1.2.8/zlib.h	4	4	copyright	Copyright (c) 1995-2013 Jean-loup Gailly and Mark Adler
samples/arch/zlib.tar.gz-extract/zlib-1.2.8/zlib.h	6	20	license	zlib
samples/arch/zlib.tar.gz-extract/zlib-1.2.8/zutil.h	1	3	copyright	Copyright (c) 1995-2013 Jean-loup Gailly.
samples/arch/zlib.tar.gz-extract/zlib-1.2.8/zutil.h	3	3	license	zlib
samples/JGroups/EULA	3	108	license	jboss-eula
samples/JGroups/EULA	104	104	copyright	Copyright 2006 Red Hat, Inc.
samples/JGroups/LICENSE	1	502	license	lgpl-2.1-plus
samples/JGroups/LICENSE	4	7	copyright	Copyright (c) 1991, 1999 Free Software Foundation, Inc.
samples/JGroups/LICENSE	426	433	copyright	copyrighted by the Free Software Foundation
samples/JGroups/licenses/apache-1.1.txt	2	56	license	apache-1.1
samples/JGroups/licenses/apache-1.1.txt	4	5	copyright	Copyright (c) 2000 The Apache Software Foundation.
samples/JGroups/licenses/apache-2.0.txt	2	202	license	apache-2.0
samples/JGroups/licenses/bouncycastle.txt	5	5	copyright	Copyright (c) 2000 - 2006 The Legion Of The Bouncy Castle
samples/JGroups/licenses/bouncycastle.txt	7	18	license	mit
samples/JGroups/licenses/cpl-1.0.txt	1	1	license	cpl-1.0
samples/JGroups/licenses/gpl.txt	1	502	license	lgpl-2.1-plus
samples/JGroups/licenses/gpl.txt	4	7	copyright	Copyright (c) 1991, 1999 Free Software Foundation, Inc.
samples/JGroups/licenses/gpl.txt	426	433	copyright	copyrighted by the Free Software Foundation
samples/JGroups/src/FixedMembershipToken.java	2	5	copyright	Copyright 2005, JBoss Inc.

Package Information

location	type	packaging	primary_language
samples/arch/zlib.tar.gz	plain tarball	archive	None

Licenses

key	short_name	category	owner	dejacode_url	homepage_url
apache-1.1	Apache 1.1	Attribution	Apache Software Foundation	https://enterprise.dejacode.com/license_library/Demo/apache-1.1/	http://www.apache.org/licenses/
apache-2.0	Apache 2.0	Attribution	Apache Software Foundation	https://enterprise.dejacode.com/license_library/Demo/apache-2.0/	http://www.apache.org/licenses/
boost-1.0	Boost 1.0	Attribution	Boost	https://enterprise.dejacode.com/license_library/Demo/boost-1.0/	http://www.boost.org/users/license.html
cc-by-2.5	CC-BY-2.5	Attribution	Creative Commons	https://enterprise.dejacode.com/license_library/Demo/cc-by-2.5/	http://creativecommons.org/licenses/by/2.5/
cmr-no	CMR License	Attribution	CMR - Christian Michelsen Research AS	https://enterprise.dejacode.com/license_library/Demo/cmr-no/	
cpl-1.0	CPL 1.0	Copyleft Limited	IBM	https://enterprise.dejacode.com/license_library/Demo/cpl-1.0/	http://www.eclipse.org/legal/cpl-v10.html
gpl-2.0-plus-ada	GPL 2.0 or later with Ada exception	Copyleft Limited	Dmitriy Anisimkov	https://enterprise.dejacode.com/license_library/Demo/gpl-2.0-plus-ada/	
jboss-eula	JBoss EULA	Proprietary Free	JBoss Community	https://enterprise.dejacode.com/license_library/Demo/jboss-eula/	
lgpl-2.1-plus	LGPL 2.1 or later	Copyleft Limited	Free Software Foundation (FSF)	https://enterprise.dejacode.com/license_library/Demo/lgpl-2.1-plus/	http://www.gnu.org/licenses/old-licenses/lgpl-2.1-standalone.html

Other Important Documentation

1. *Type of Options*
2. *How to Run a Scan*
3. *Basic Tutorials*
4. *How-To Guides*
5. *How it all Works*
6. *Contributing to Code Development*
7. *Contributing to the Documentation*
8. *Plugin Architecture*
9. *FAQ*
10. *Support*

Getting Help from the Command Line

ScanCode-Toolkit Command Line Interface can help you to search for specific options or use cases from the command line itself. These are two options are `--help` and `--examples`, and are very helpful if you need a quick glance of the options or use cases. Or it can be useful when you can't access, the more elaborate online documentation.

All Documentation/Help Options

-h, --help	Show the <i>Help text</i> and exit.
--examples	Show the <i>Command Examples Text</i> and exit.
--about	Show information about ScanCode and licensing and exit.
--version	Show the version and exit.
--list-packages	Show the list of supported package types and exit.
--plugins	Show the list of available ScanCode plugins and exit.
--print-options	Show the list of selected options and exit.

Help text

The Scancode-Toolkit Command Line Interface has a Help option displaying all the options. It also displays basic usage, and some simple examples. The command line option for this is `--help`.

Tip: You can also use the shorter `-h` option, which does the same.

For Linux based systems the full command is:

```
$ ./scancode --help
```

And for windows, it will be like:

```
$ scancode --help
```

Note: Make sure you are in the Scancode Root Directory before carrying out this command. After extracting the `.zip` or `.tar.bz` file, the folder for Scancode-Toolkit version 3.1.1 will be named like “scancode-toolkit-3.1.1”.

The Following Help Text is displayed, i.e. This is the help text for Scancode Version 3.1.1

```
Usage: scancode [OPTIONS] <OUTPUT FORMAT OPTION(s)> <input>...

scan the <input> file or directory for license, origin and packages
and save results to FILE(s) using one or more output format option.

Error and progress are printed to stderr.

Options:

primary scans:
  -l, --license      Scan <input> for licenses.
  -p, --package      Scan <input> for package manifests and packages.
  -c, --copyright    Scan <input> for copyrights.

other scans:
  -i, --info         Scan <input> for file information (size, checksums, etc).
  --generated        Classify automatically generated code files with a flag.
  -e, --email        Scan <input> for emails.
  -u, --url          Scan <input> for urls.
```

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```

scan options:
  --license-score INTEGER      Do not return license matches with a
                                score lower than this score. A number
                                between 0 and 100. [default: 0]
  --license-text               Include the detected licenses matched
                                text.
  --license-text-diagnostics   In the matched license text, include
                                diagnostic highlights surrounding with
                                square brackets [] words that are not
                                matched.
  --license-url-template TEXT  Set the template URL used for the license
                                reference URLs. Curly braces ({} ) are
                                replaced by the license key. [default: h
                                ttps://enterprise.dejacode.com/urn/urn:dj
                                e:license:{}]
  --max-email INT              Report only up to INT emails found in a
                                file. Use 0 for no limit. [default: 50]
  --max-url INT                Report only up to INT urls found in a
                                file. Use 0 for no limit. [default: 50]

output formats:
  --json FILE                  Write scan output as compact JSON to FILE.
  --json-pp FILE               Write scan output as pretty-printed JSON to
                                FILE.
  --json-lines FILE            Write scan output as JSON Lines to FILE.
  --csv FILE                   Write scan output as CSV to FILE.
  --html FILE                  Write scan output as HTML to FILE.
  --custom-output FILE         Write scan output to FILE formatted with the
                                custom Jinja template file.
  --custom-template FILE       Use this Jinja template FILE as a custom
                                template.
  --spdx-rdf FILE              Write scan output as SPDX RDF to FILE.
  --spdx-tv FILE               Write scan output as SPDX Tag/Value to FILE.
  --html-app FILE              (DEPRECATED: use the ScanCode Workbench app
                                instead ) Write scan output as a mini HTML
                                application to FILE.

output filters:
  --ignore-author <pattern>    Ignore a file (and all its findings)
                                if an author contains a match to the
                                <pattern> regular expression. Note
                                that this will ignore a file even if
                                it has other findings such as a
                                license or errors.
  --ignore-copyright-holder <pattern>
                                Ignore a file (and all its findings)
                                if a copyright holder contains a match
                                to the <pattern> regular expression.
                                Note that this will ignore a file even
                                if it has other scanned data such as a
                                license or errors.
  --only-findings              Only return files or directories with
                                findings for the requested scans.
                                Files and directories without findings
                                are omitted (file information is not
                                treated as findings).

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output control:
  --full-root      Report full, absolute paths.
  --strip-root     Strip the root directory segment of all paths. The
                   default is to always include the last directory segment
                   of the scanned path such that all paths have a common
                   root directory.

pre-scan:
  --ignore <pattern>      Ignore files matching <pattern>.
  --include <pattern>     Include files matching <pattern>.
  --classify            Classify files with flags telling if the
                       file is a legal, or readme or test file,
                       etc.
  --facet <facet>=<pattern> Add the <facet> to files with a path
                       matching <pattern>.

post-scan:
  --consolidate        Group resources by Packages or license and
                       copyright holder and return those groupings
                       as a list of consolidated packages and a list
                       of consolidated components. This requires the
                       scan to have/be run with the copyright,
                       license, and package options active
  --filter-clues       Filter redundant duplicated clues already
                       contained in detected license and copyright
                       texts and notices.
  --is-license-text    Set the "is_license_text" flag to true for
                       files that contain mostly license texts and
                       notices (e.g over 90% of the content).
                       [EXPERIMENTAL]
  --license-clarity-score Compute a summary license clarity score at
                       the codebase level.
  --license-policy FILE Load a License Policy file and apply it to
                       the scan at the Resource level.
  --mark-source        Set the "is_source" to true for directories
                       that contain over 90% of source files as
                       children and descendants. Count the number of
                       source files in a directory as a new
                       source_file_counts attribute
  --summary            Summarize license, copyright and other scans
                       at the codebase level.
  --summary-by-facet   Summarize license, copyright and other scans
                       and group the results by facet.
  --summary-key-files  Summarize license, copyright and other scans
                       for key, top-level files. Key files are top-
                       level codebase files such as COPYING, README
                       and package manifests as reported by the
                       --classify option "is_legal", "is_readme",
                       "is_manifest" and "is_top_level" flags.
  --summary-with-details Summarize license, copyright and other scans
                       at the codebase level, keeping intermediate
                       details at the file and directory level.

core:
  --timeout <secs>      Stop an unfinished file scan after a timeout
                       in seconds. [default: 120 seconds]

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-n, --processes INT      Set the number of parallel processes to use.
                          Disable parallel processing if 0. Also
                          disable threading if -1. [default: 1]
--quiet                  Do not print summary or progress.
--verbose                Print progress as file-by-file path instead
                          of a progress bar. Print verbose scan
                          counters.
--from-json              Load codebase from an existing JSON scan
--max-in-memory INTEGER  Maximum number of files and directories scan
                          details kept in memory during a scan.
                          Additional files and directories scan details
                          above this number are cached on-disk rather
                          than in memory. Use 0 to use unlimited memory
                          and disable on-disk caching. Use -1 to use
                          only on-disk caching. [default: 10000]

miscellaneous:
--reindex-licenses      Check the license index cache and reindex if
                          needed and exit.

documentation:
-h, --help              Show this message and exit.
--about                 Show information about ScanCode and licensing and
                          exit.
--version               Show the version and exit.
--examples              Show command examples and exit.
--list-packages         Show the list of supported package types and exit.
--plugins               Show the list of available ScanCode plugins and exit.
--print-options         Show the list of selected options and exit.

Examples (use --examples for more):

Scan the 'samples' directory for licenses and copyrights.
Save scan results to the 'scancode_result.json' JSON file:

    scancode --license --copyright --json-pp scancode_result.json
    samples

Scan the 'samples' directory for licenses and package manifests. Print scan
results on screen as pretty-formatted JSON (using the special '-' FILE to print
to on screen/to stdout):

    scancode --json-pp - --license --package samples

Note: when you run scancode, a progress bar is displayed with a
counter of the number of files processed. Use --verbose to display
file-by-file progress.

```

Command Examples Text

The ScanCode-Toolkit Command Line Interface has an `--examples` option which displays some basic examples (more than the basic synopsis in `--help`). These examples include the following aspects of code scanning:

- Scanning Single File/Directory
- Output Scan results to stdout (as JSON) or HTML/JSON file

- Scanning for only Copyrights/Licenses
- Ignoring Files
- Using GLOB Patterns to Scan Multiple Files
- Using Verbose Mode

The command line option for displaying these basic examples is `--examples`.

For Linux based systems the full command is:

```
$ ./scancode --examples
```

And for windows, it will be like:

```
$ scancode --examples
```

The Following Text is displayed, i.e. This is the examples for Scancode Version 3.1.1

```
Scancode command lines examples:

(Note for Windows: use '\' back slash instead of '/' forward slash for paths.)

Scan a single file for copyrights. Print scan results to stdout as pretty JSON:

    scancode --copyright samples/zlib/zlib.h --json-pp -

Scan a single file for licenses, print verbose progress to stderr as each
file is scanned. Save scan to a JSON file:

    scancode --license --verbose samples/zlib/zlib.h --json licenses.json

Scan a directory explicitly for licenses and copyrights. Redirect JSON scan
results to a file:

    scancode --license --copyright samples/zlib/ --json - > scan.json

Scan a directory while ignoring a single file. Scan for license, copyright and
package manifests. Use four parallel processes.
Print scan results to stdout as pretty formatted JSON.

    scancode -lc --package --ignore README --processes 4 --json-pp - samples/

Scan a directory while ignoring all files with .txt extension.
Print scan results to stdout as pretty formatted JSON.
It is recommended to use quotes around glob patterns to prevent pattern
expansion by the shell:

    scancode --json-pp - --ignore "*.txt" samples/

Special characters supported in GLOB pattern:
- *      matches everything
- ?      matches any single character
- [seq]  matches any character in seq
- ![seq] matches any character not in seq

For a literal match, wrap the meta-characters in brackets.
For example, '[?]' matches the character '?'.
For details on GLOB patterns see https://en.wikipedia.org/wiki/Glob\_\(programming\).
```

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Note: Glob patterns cannot be applied to path as strings.
For example, this will not ignore "samples/JGroups/licenses".

```
scancode --json - --ignore "samples*licenses" samples/
```

Scan a directory while ignoring multiple files (or glob patterns).
Print the scan results to stdout as JSON:

```
scancode --json - --ignore README --ignore "*.txt" samples/
```

Scan a directory for licenses and copyrights. Save scan results to an HTML file:

```
scancode --license --copyright --html scancode_result.html samples/zlib
```

To extract archives, see the 'extractcode' command instead.

Plugins Help Text

The command line option for displaying all the plugins is:

- --plugins

For Linux based systems the full command is:

```
$ ./scancode --plugins
```

And for windows, it will be like:

```
$ scancode --plugins
```

Note: Plugins that are shown by using --plugins include the following:

1. Post-Scan Plugins
2. Pre-Scan Plugins
3. Output Options
4. Output Control
5. Basic Scan Options

The Following Text is displayed, i.e. This is the available plugins for Scancode Version 3.1.1

```
-----
Plugin: scancode_output:csv  class: formattedcode.output_csv:CsvOutput
codebase_attributes:
resource_attributes:
sort_order: 100
required_plugins:
options:
  help_group: output formats, name: csv: --csv
```

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```

    help: Write scan output as CSV to FILE.
doc: None

-----

Plugin: scancode_output:html  class: formattedcode.output_html:HtmlOutput
codebase_attributes:
resource_attributes:
sort_order: 100
required_plugins:
options:
    help_group: output formats, name: html: --html
    help: Write scan output as HTML to FILE.
doc: None

-----

Plugin: scancode_output:html-app  class: formattedcode.output_html:HtmlAppOutput
codebase_attributes:
resource_attributes:
sort_order: 100
required_plugins:
options:
    help_group: output formats, name: html_app: --html-app
    help: (DEPRECATED: use the ScanCode Workbench app instead ) Write scan output_
↪ as a mini HTML application to FILE.
doc:
    Write scan output as a mini HTML application.

-----

Plugin: scancode_output:json  class: formattedcode.output_json:JsonCompactOutput
codebase_attributes:
resource_attributes:
sort_order: 100
required_plugins:
options:
    help_group: output formats, name: output_json: --json
    help: Write scan output as compact JSON to FILE.
doc: None

-----

Plugin: scancode_output:json-pp  class: formattedcode.output_json:JsonPrettyOutput
codebase_attributes:
resource_attributes:
sort_order: 100
required_plugins:
options:
    help_group: output formats, name: output_json_pp: --json-pp
    help: Write scan output as pretty-printed JSON to FILE.
doc: None

-----

Plugin: scancode_output:jsonlines  class: formattedcode.output_
↪ jsonlines:JsonLinesOutput
codebase_attributes:
resource_attributes:
sort_order: 100
required_plugins:
options:

```

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```

    help_group: output formats, name: output_json_lines: --json-lines
    help: Write scan output as JSON Lines to FILE.
doc: None
-----

Plugin: scancode_output:spdx-rdf  class: formattedcode.output_spdx:SpdxRdfOutput
codebase_attributes:
resource_attributes:
sort_order: 100
required_plugins:
options:
    help_group: output formats, name: spdx_rdf: --spdx-rdf
    help: Write scan output as SPDX RDF to FILE.
doc: None
-----

Plugin: scancode_output:spdx-tv  class: formattedcode.output_spdx:SpdxTvOutput
codebase_attributes:
resource_attributes:
sort_order: 100
required_plugins:
options:
    help_group: output formats, name: spdx_tv: --spdx-tv
    help: Write scan output as SPDX Tag/Value to FILE.
doc: None
-----

Plugin: scancode_output:template  class: formattedcode.output_
↳html:CustomTemplateOutput
codebase_attributes:
resource_attributes:
sort_order: 100
required_plugins:
options:
    help_group: output formats, name: custom_output: --custom-output
    help: Write scan output to FILE formatted with the custom Jinja template file.
    help_group: output formats, name: custom_template: --custom-template
    help: Use this Jinja template FILE as a custom template.
doc: None
-----

Plugin: scancode_output_filter:ignore-copyrights  class: cluecode.plugin_ignore_
↳copyrights:IgnoreCopyrights
codebase_attributes:
resource_attributes:
sort_order: 100
required_plugins:
options:
    help_group: output filters, name: ignore_copyright_holder: --ignore-copyright-
↳holder
    help: Ignore a file (and all its findings) if a copyright holder contains a
↳match to the <pattern> regular expression. Note that this will ignore a file even
↳if it has other scanned data such as a license or errors.
    help_group: output filters, name: ignore_author: --ignore-author
    help: Ignore a file (and all its findings) if an author contains a match to the
↳<pattern> regular expression. Note that this will ignore a file even if it has
↳other findings such as a license or errors.

```

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```

doc:
    Filter findings that match given copyright holder or author patterns.
    Has no effect unless the --copyright scan is requested.

-----
Plugin: scancode_output_filter:only-findings  class: scancode.plugin_only_
↳findings:OnlyFindings
  codebase_attributes:
  resource_attributes:
  sort_order: 100
  required_plugins:
  options:
    help_group: output filters, name: only_findings: --only-findings
    help: Only return files or directories with findings for the requested scans.
↳Files and directories without findings are omitted (file information is not treated
↳as findings).
  doc:
    Filter files or directories without scan findings for the requested scans.

-----
Plugin: scancode_post_scan:classify-package  class: summarycode.
↳classify:PackageTopAndKeyFilesTagger
  codebase_attributes:
  resource_attributes:
  sort_order: 0
  required_plugins:
  options:
  doc:
    Tag resources as key or top level based on Package-type specific settings.

-----
Plugin: scancode_post_scan:consolidate  class: scancode.plugin_
↳consolidate:Consolidator
  codebase_attributes: consolidated_components, consolidated_packages
  resource_attributes: consolidated_to
  sort_order: 8
  required_plugins:
  options:
    help_group: post-scan, name: consolidate: --consolidate
    help: Group resources by Packages or license and copyright holder and return
↳those groupings as a list of consolidated packages and a list of consolidated
↳components. This requires the scan to have/be run with the copyright, license, and
↳package options active
  doc:
    A ScanCode post-scan plugin to return consolidated components and consolidated
    packages for different types of codebase summarization.

    A consolidated component is a group of Resources that have the same origin.
    Currently, consolidated components are created by grouping Resources that have
    the same license expression and copyright holders and the files that contain
    this license expression and copyright holders combination make up 75% or more of
    the files in the directory where they are found.

    A consolidated package is a detected package in the scanned codebase that has
    been enhanced with data about other licenses and holders found within it.

    If a Resource is part of a consolidated component or consolidated package, then

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the identifier of the consolidated component **or** consolidated package it **is** part of **is in** the Resource's ``consolidated\_to`` field.

```

-----
Plugin: scancode_post_scan:filter-clues  class: cluecode.plugin_filter_
↳clues:RedundantCluesFilter
  codebase_attributes:
  resource_attributes:
  sort_order: 1
  required_plugins:
  options:
    help_group: post-scan, name: filter_clues: --filter-clues
    help: Filter redundant duplicated clues already contained in detected license_
↳and copyright texts and notices.
  doc:
    Filter redundant clues (copyrights, authors, emails, and urls) that are already
    contained in another more important scan result.
-----

```

```

-----
Plugin: scancode_post_scan:is-license-text  class: licensedcode.plugin_license_
↳text:IsLicenseText
  codebase_attributes:
  resource_attributes: is_license_text
  sort_order: 80
  required_plugins:
  options:
    help_group: post-scan, name: is_license_text: --is-license-text
    help: Set the "is_license_text" flag to true for files that contain mostly_
↳license texts and notices (e.g over 90% of the content). [EXPERIMENTAL]
  doc:
    Set the "is_license_text" flag to true for at the file level for text files
    that contain mostly (as 90% of their size) license texts or notices.
    Has no effect unless --license, --license-text and --info scan data
    are available.
-----

```

```

-----
Plugin: scancode_post_scan:license-clarity-score  class: summarycode.
↳score:LicenseClarityScore
  codebase_attributes: license_clarity_score
  resource_attributes:
  sort_order: 110
  required_plugins:
  options:
    help_group: post-scan, name: license_clarity_score: --license-clarity-score
    help: Compute a summary license clarity score at the codebase level.
  doc:
    Compute a License clarity score at the codebase level.
-----

```

```

-----
Plugin: scancode_post_scan:license-policy  class: licensedcode.plugin_license_
↳policy:LicensePolicy
  codebase_attributes:
  resource_attributes: license_policy
  sort_order: 9
  required_plugins:
  options:
    help_group: post-scan, name: license_policy: --license-policy
-----

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```

    help: Load a License Policy file and apply it to the scan at the Resource level.
doc:
    Add the "license_policy" attribute to a resource if it contains a
    detected license key that is found in the license_policy.yml file

-----

Plugin: scancode_post_scan:mark-source  class: scancode.plugin_mark_source:MarkSource
codebase_attributes:
resource_attributes: source_count
sort_order: 8
required_plugins:
options:
    help_group: post-scan, name: mark_source: --mark-source
    help: Set the "is_source" to true for directories that contain over 90% of
↳source files as children and descendants. Count the number of source files in a
↳directory as a new source_file_counts attribute
doc:
    Set the "is_source" flag to true for directories that contain
    over 90% of source files as direct children.
    Has no effect unless the --info scan is requested.

-----

Plugin: scancode_post_scan:summary  class: summarycode.summarizer:ScanSummary
codebase_attributes: summary
resource_attributes:
sort_order: 10
required_plugins:
options:
    help_group: post-scan, name: summary: --summary
    help: Summarize license, copyright and other scans at the codebase level.
doc:
    Summarize a scan at the codebase level.

-----

Plugin: scancode_post_scan:summary-by-facet  class: summarycode.
↳summarizer:ScanByFacetSummary
codebase_attributes: summary_by_facet
resource_attributes:
sort_order: 200
required_plugins:
options:
    help_group: post-scan, name: summary_by_facet: --summary-by-facet
    help: Summarize license, copyright and other scans and group the results by
↳facet.
doc:
    Summarize a scan at the codebase level grouping by facets.

-----

Plugin: scancode_post_scan:summary-keeping-details  class: summarycode.
↳summarizer:ScanSummaryWithDetails
codebase_attributes: summary
resource_attributes: summary
sort_order: 100
required_plugins:
options:
    help_group: post-scan, name: summary_with_details: --summary-with-details
    help: Summarize license, copyright and other scans at the codebase level,
↳keeping intermediate details at the file and directory level.

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```

doc:
    Summarize a scan at the codebase level and keep file and directory details.

-----
Plugin: scancode_post_scan:summary-key-files  class: summarycode.
↳summarizer:ScanKeyFilesSummary
  codebase_attributes: summary_of_key_files
  resource_attributes:
  sort_order: 150
  required_plugins:
  options:
    help_group: post-scan, name: summary_key_files: --summary-key-files
    help: Summarize license, copyright and other scans for key, top-level files.
↳Key files are top-level codebase files such as COPYING, README and package
↳manifests as reported by the --classify option "is_legal", "is_readme", "is_manifest
↳" and "is_top_level" flags.
  doc:
    Summarize a scan at the codebase level for only key files.

-----
Plugin: scancode_pre_scan:classify  class: summarycode.classify:FileClassifier
  codebase_attributes:
  resource_attributes: is_legal, is_manifest, is_readme, is_top_level, is_key_file
  sort_order: 50
  required_plugins:
  options:
    help_group: pre-scan, name: classify: --classify
    help: Classify files with flags telling if the file is a legal, or readme or
↳test file, etc.
  doc:
    Classify a file such as a COPYING file or a package manifest with a flag.

-----
Plugin: scancode_pre_scan:facet  class: summarycode.facet:AddFacet
  codebase_attributes:
  resource_attributes: facets
  sort_order: 20
  required_plugins:
  options:
    help_group: pre-scan, name: facet: --facet
    help: Add the <facet> to files with a path matching <pattern>.
  doc:
    Assign one or more "facet" to each file (and NOT to directories). Facets are
    a way to qualify that some part of the scanned code may be core code vs.
    test vs. data, etc.

-----
Plugin: scancode_pre_scan:ignore  class: scancode.plugin_ignore:ProcessIgnore
  codebase_attributes:
  resource_attributes:
  sort_order: 100
  required_plugins:
  options:
    help_group: pre-scan, name: ignore: --ignore
    help: Ignore files matching <pattern>.
    help_group: pre-scan, name: include: --include
    help: Include files matching <pattern>.

```

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```

doc:
    Include or ignore files matching patterns.

-----

Plugin: scancode_scan:copyrights  class: cluecode.plugin_copyright:CopyrightScanner
codebase_attributes:
resource_attributes: copyrights, holders, authors
sort_order: 4
required_plugins:
options:
    help_group: primary scans, name: copyright: -c, --copyright
    help: Scan <input> for copyrights.
doc:
    Scan a Resource for copyrights.

-----

Plugin: scancode_scan:emails  class: cluecode.plugin_email:EmailScanner
codebase_attributes:
resource_attributes: emails
sort_order: 8
required_plugins:
options:
    help_group: other scans, name: email: -e, --email
    help: Scan <input> for emails.
    help_group: scan options, name: max_email: --max-email
    help: Report only up to INT emails found in a file. Use 0 for no limit.
doc:
    Scan a Resource for emails.

-----

Plugin: scancode_scan:generated  class: summarycode.generated:GeneratedCodeDetector
codebase_attributes:
resource_attributes: is_generated
sort_order: 50
required_plugins:
options:
    help_group: other scans, name: generated: --generated
    help: Classify automatically generated code files with a flag.
doc:
    Tag a file as generated.

-----

Plugin: scancode_scan:info  class: scancode.plugin_info:InfoScanner
codebase_attributes:
resource_attributes: date, sha1, md5, mime_type, file_type, programming_language, is_binary, is_text, is_archive, is_media, is_source, is_script
sort_order: 0
required_plugins:
options:
    help_group: other scans, name: info: -i, --info
    help: Scan <input> for file information (size, checksums, etc).
doc:
    Scan a file Resource for miscellaneous information such as mime/filetype and
    basic checksums.

-----

Plugin: scancode_scan:licenses  class: licensedcode.plugin_license:LicenseScanner

```

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```

codebase_attributes:
resource_attributes: licenses, license_expressions
sort_order: 2
required_plugins:
options:
  help_group: primary scans, name: license: -l, --license
  help: Scan <input> for licenses.
  help_group: scan options, name: license_score: --license-score
  help: Do not return license matches with a score lower than this score. A
↪number between 0 and 100.
  help_group: scan options, name: license_text: --license-text
  help: Include the detected licenses matched text.
  help_group: scan options, name: license_text_diagnostics: --license-text-
↪diagnostics
  help: In the matched license text, include diagnostic highlights surrounding
↪with square brackets [] words that are not matched.
  help_group: scan options, name: license_url_template: --license-url-template
  help: Set the template URL used for the license reference URLs. Curly braces ({}
↪) are replaced by the license key.
  help_group: scan options, name: license_diag: --license-diag
  help: (DEPRECATED: this is always included by default now). Include diagnostic
↪information in license scan results.
  help_group: miscellaneous, name: reindex_licenses: --reindex-licenses
  help: Check the license index cache and reindex if needed and exit.
doc:
  Scan a Resource for licenses.

-----

Plugin: scancode_scan:packages class: packagedcode.plugin_package:PackageScanner
codebase_attributes:
resource_attributes: packages
sort_order: 6
required_plugins: scan:licenses
options:
  help_group: primary scans, name: package: -p, --package
  help: Scan <input> for package manifests and packages.
  help_group: documentation, name: list_packages: --list-packages
  help: Show the list of supported package types and exit.
doc:
  Scan a Resource for Package manifests and report these as "packages" at the
  right file or directory level.

-----

Plugin: scancode_scan:urls class: cluecode.plugin_url:UrlScanner
codebase_attributes:
resource_attributes: urls
sort_order: 10
required_plugins:
options:
  help_group: other scans, name: url: -u, --url
  help: Scan <input> for urls.
  help_group: scan options, name: max_url: --max-url
  help: Report only up to INT urls found in a file. Use 0 for no limit.
doc:
  Scan a Resource for URLs.

```

--list-packages Option

This shows all the types of packages that can be scanned using Scancode. These are located in packagedcode i.e. Code used to parse various package formats.

--print-options Option

This option prints the options selected for one specific scan command.

If we run this command:

```
./scancode -clpieu --json-pp sample.json samples --classify --summary --summary-with-  
↪details --print-options
```

The output will be:

```
Options:  
  classify: True  
  copyright: True  
  email: True  
  info: True  
  license: True  
  list_packages: None  
  output_json_pp: <unopened file 'sample.json' wb>  
  package: True  
  reindex_licenses: None  
  summary: True  
  summary_with_details: True  
  url: True
```

All Available Options

This section contains an exhaustive list of all Scancode options, arranged in various sections. The sections are as follows:

- Basic Scan Options
- Core Scan Options
- Output Formats
- Controlling Output and Filters
- Pre-Scan Options
- Post-Scan Options

There's also another section for `extractcode` options.

The order of the sections and all their options is the same as in the `:ref:'cli_help_text'`, available in the command line.

All “Basic” Scan Options

Option lists are two-column lists of command-line options and descriptions, documenting a program's options. For example:

-c, --copyright	Scan <input> for copyrights. Sub-Options: • <code>--consolidate</code>
-l, --license	Scan <input> for licenses. Sub-Options: • <code>--consolidate</code> • <code>--license-score INT</code> • <code>--license-text</code> • <code>--license-url-template TEXT</code> • <code>--license-text-diagnostics</code> • <code>--is-license-text</code>
-p, --package	Scan <input> for packages. Sub-Options: • <code>--consolidate</code>
-e, --email	Scan <input> for emails. Sub-Options: • <code>--max-email INT</code>
-u, --url	Scan <input> for urls. Sub-Options: • <code>--max-url INT</code>
-i, --info	Include information such as: • Size, • Type, • Date, • Programming language, • sha1 and md5 hashes, • binary/text/archive/media/source/script flags • Additional options through more CLI options Sub-Options: • <code>--mark-source</code>

Note: Unlike previous 2.x versions, `-c`, `-l`, and `-p` are not default. If any of combination of these options are used, ScanCode only performs that specific task, and not the others. `./scancode -e` only scans for emails, and doesn't scan for copyright/license/packages/general information.

Note: These options, i.e. `-c`, `-l`, `-p`, `-e`, `-u`, and `-i` can be used together. As in, instead of `./scancode -c -i -p`, you can write `./scancode -cip` and it will be the same.

- | | |
|------------------------------------|---|
| --generated | Classify automatically generated code files with a flag. |
| --max-email INT | Report only up to INT emails found in a file. Use 0 for no limit. [Default: 50]
Sub-Option of - <code>--email</code> |
| --max-url INT | Report only up to INT urls found in a file. Use 0 for no limit. [Default: 50]
Sub-Option of - <code>--url</code> |
| --license-score INTEGER | Do not return license matches with scores lower than this score. A number between 0 and 100. [Default: 0] Here, a bigger number means a better match, i.e. Setting a higher license score translates to a higher threshold (with equal or less number of matches).
Sub-Option of - <code>--license</code> |
| --license-text | Include the matched text for the detected licenses in the output report.
Sub-Option of - <code>--license</code>
Sub-Options: <ul style="list-style-type: none">• <code>--license-text-diagnostics</code>• <code>--is-license-text</code> |
| --license-url-template TEXT | Set the template URL used for the license reference URLs.
In a template URL, curly braces (<code>{}</code>) are replaced by the license key. [Default: https://enterprise.dejacode.com/urn/urn:dje:license:{}]
Sub-Option of - <code>--license</code> |
| --license-text-diagnostics | In the matched license text, include diagnostic highlights surrounding with square brackets <code>[]</code> words that are not matched.
Sub-Option of - <code>--license</code> and <code>--license-text</code> |
-

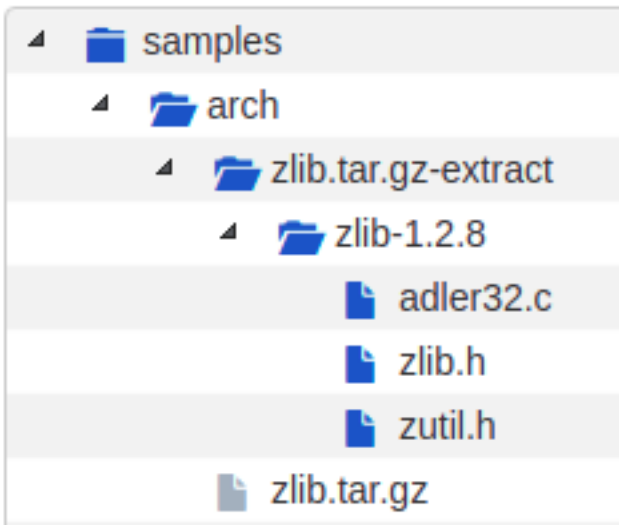
All Extractcode Options

This is intended to be used as an input preparation step, before running the scan. Archives found in an extracted archive are extracted **recursively** by default. Extraction is done in-place in a directory named ‘-extract’ side-by-side with an archive.

To extract the packages in the `samples` directory

```
./extractcode samples
```

This extracts the `zlib.tar.gz` package:



--shallow	Do not extract recursively nested archives (e.g. Not archives in archives).
--verbose	Print verbose file-by-file progress messages.
--quiet	Do not print any summary or progress message.
-h, --help	Show the extractcode help message and exit.
--about	Show information about ScanCode and licensing and exit.
--version	Show the version and exit.

All “Core” Scan Options

-n, --processes INTEGER	Scan <code><input></code> using <code>n</code> parallel processes. [Default: 1]
--verbose	Print verbose file-by-file progress messages.
--quiet	Do not print summary or progress messages.
--timeout FLOAT	Stop scanning a file if scanning takes longer than a timeout in seconds. [Default: 120]
--reindex-licenses	Force a check and possible reindexing of the cached license index.
--from-json	Load codebase from an existing JSON scan
--max-in-memory INTEGER	Maximum number of files and directories scan details kept in memory during a scan. Additional files and directories scan details above this number are cached on-disk rather than in memory. Use 0 to use unlimited memory and disable on-disk caching. Use -1 to use only on-disk caching. [Default: 10000]

Note: All the Core Options are independent options, i.e. They don’t depend on other options.

All Scan Output Options

--json FILE	Write scan output as compact JSON to FILE.
--json-pp FILE	Write scan output as pretty-printed JSON to FILE.
--json-lines FILE	Write scan output as JSON Lines to FILE.
--csv FILE	Write scan output as CSV to FILE.
--html FILE	Write scan output as HTML to FILE.
--custom-output	Write scan output to FILE formatted with the custom Jinja template file. Mandatory Sub-option: • --custom-template FILE
--custom-template FILE	Use this Jinja template FILE as a custom template. Sub-Option of: --custom-output
--spdx-rdf FILE	Write scan output as SPDX RDF to FILE.
--spdx-tv FILE	Write scan output as SPDX Tag/Value to FILE.
--html-app FILE	Write scan output as a mini HTML application to FILE.

Warning: The html-app feature has been deprecated and you should use Scancode Workbench instead to visualize scan results. The official Repository [link](#). Also refer [How to Visualize Scan results](#).

All “Output Control” Scan Options

--strip-root	Strip the root directory segment of all paths.
--full-root	Report full, absolute paths.

Note: The options **--strip-root** and **--full-root** can’t be used together, i.e. Any one option may be used in a single scan.

Note: The default is to always include the last directory segment of the scanned path such that all paths have a common root directory.

--ignore-author <pattern>	Ignore a file (and all its findings) if an author contains a match to the <pattern> regular expression.
--ignore-copyright-holder <pattern>	Ignore a file (and all its findings) if a copyright holder contains a match to the <pattern> regular expression.

Note: Note that this both the options **--ignore-author** and **--ignore-copyright-holder** will ignore a file even if it has other scanned data such as a license or errors.

--only-findings	Only return files or directories with findings for the requested scans. Files and directories without findings are omitted (file information is not treated as findings).
------------------------	---

All “Pre-Scan” Options

--ignore <pattern>	Ignore files matching <pattern>.
--include <pattern>	Include files matching <pattern>.
--classify	Classify files with flags telling if the file is a legal, or readme or test file, etc. Sub-Options: • <code>--license-clarity-score</code> • <code>--summary-key-files</code>
--facet <facet_pattern>	Here <facet_pattern> represents <facet>=<pattern>. Add the <facet> to files with a path matching <pattern>. Sub-Options: • <code>--summary-by-facet</code>

All “Post-Scan” Options

--mark-source	Set the “is_source” flag to true for directories that contain over 90% of source files as direct children and descendants. Count the number of source files in a directory as a new “source_file_counts” attribute Sub-Option of - <code>--url</code>
--consolidate	Group resources by Packages or license and copyright holder and return those groupings as a list of consolidated packages and a list of consolidated components. Sub-Option of - <code>--copyright</code> , <code>--license</code> and <code>--packages</code> .
--filter-clues	Filter redundant duplicated clues already contained in detected licenses, copyright texts and notices.
--is-license-text	Set the “is_license_text” flag to true for files that contain mostly license texts and notices (e.g. over 90% of the content). Sub-Option of - <code>--info</code> and <code>--license-text</code> .

Warning: <code>--is-license-text</code> is an experimental Option.

--license-clarity-score	Compute a summary license clarity score at the codebase level. Sub-Option of - <code>--classify</code> .
--license-policy FILE	Load a License Policy file and apply it to the scan at the Resource level.
--summary	Summarize license, copyright and other scans at the codebase level. Sub-Options:

- `--summary-by-facet`
- `--summary-key-files`
- `--summary-with-details`

--summary-by-facet Summarize license, copyright and other scans and group the results by facet.

Sub-Option of `--summary` and `--facet`.

--summary-key-files Summarize license, copyright and other scans for key, top-level files. Key files are top-level codebase files such as COPYING, README and package manifests as reported by the `--classify` option “is_legal”, “is_readme”, “is_manifest” and “is_top_level” flags.

Sub-Option of `--classify` and `--summary`.

--summary-with-details Summarize license, copyright and other scans at the codebase level, keeping intermediate details at the file and directory level.

How to Run a Scan

In this simple tutorial example, we perform a basic scan on the `samples` directory distributed by default with Scancode.

Warning: This tutorial is for Linux based systems presently. Additional Help for Windows/MacOS will be added.

Setting up a Virtual Environment

Scancode Toolkit 3.1.1 and Workbench 3.1.0 is not compatible with python 3.x so we will create a [virtual environment](#) using the `Virtualenv` tool with a python 2.7 interpreter.

The following commands set up and activate the Virtual Environment `venv-scan3.1.1`:

```
virtualenv -p /usr/bin/python2.7 venv-scan3.1.1
source venv-scan3.1.1/bin/activate
```

Setting up Scancode Toolkit

Get the Scancode Toolkit Version 3.1.1 tarball or .zip archive from the [Toolkit GitHub Release Page](#) under assets options. Download and extract the Archive from command line:

For .zip archive:

```
unzip scancode-toolkit-3.1.1.zip
```

For .tar.bz2 archive:

```
tar -xvf scancode-toolkit-3.1.1.tar.bz2
```

Or Right Click and select “Extract Here”.

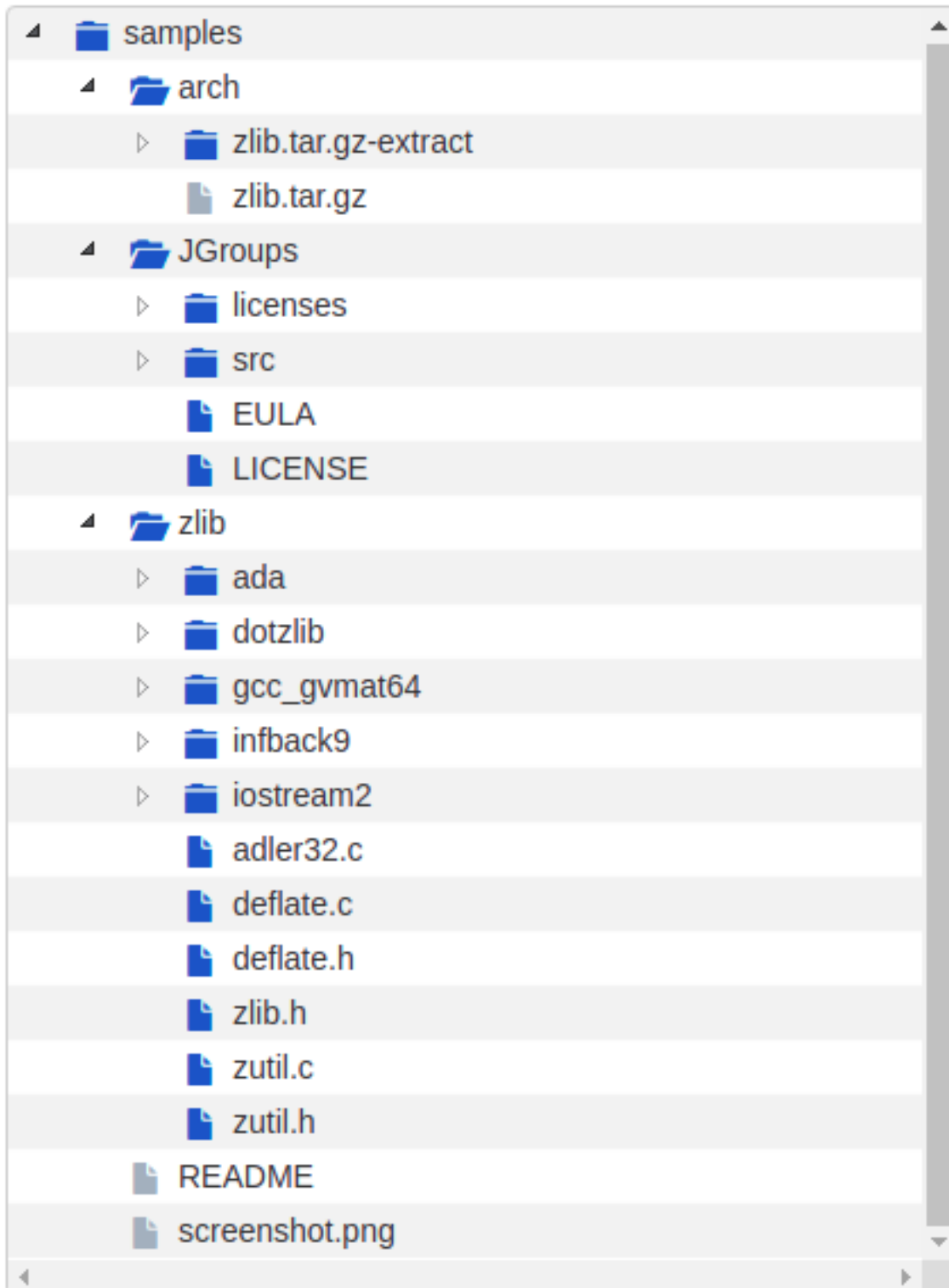
Check whether the [Prerequisites](#) are installed. Open a terminal in the extracted directory and run:

```
./scancode --help
```

This will configure ScanCode and display the command line *Help text*.

Looking into Files

As mentioned previously, we are going to perform the scan on the `samples` directory distributed by default with ScanCode Toolkit. Here's the directory structure and respective files:



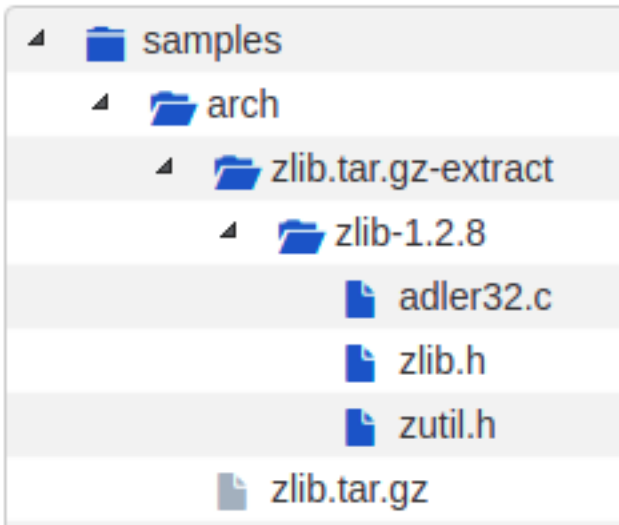
We notice here that the sample files contain a package `zlib.tar.gz`. So we have to extract the archive before running the scan, to also scan the files inside this package.

Performing Extraction

To extract the packages inside `samples` directory:

```
./extractcode samples
```

This extracts the `zlib.tar.gz` package:



Note: `--shallow` option can be used to recursively extract packages.

Deciding Scan Options

These are some common scan options you should consider using before you start the actual scan, according to your requirements.

1. The Basic Scan options, i.e. `-c`, `-l`, `-p`, `-e`, `-u`, and `-i` are to be decided, according to your requirements. If you do not need one specific type of information (say, licenses), consider removing it, because the more things you scan for, longer it will take for the scan to complete.

Note: You have to select these options explicitly, as they are not default anymore from versions 3.x, unlike earlier versions having `-clp` as default.

1. `--license-score INTEGER` is to be set if license matching accuracy is desired (Default is 0, and increasing this means a more accurate match). Also, using `--license-text` includes the matched text to the result.
2. `-n INTEGER` option can be used to speed up the scan using multiple parallel processes.
3. `--timeout FLOAT` option can be used to skip a file taking a lot of time to scan.
4. `--ignore <pattern>` can be used to skip certain group of files.
5. `<OUTPUT FORMAT OPTION(s)>` is also a very important decision when you want to use the output for specific tasks/have requirements. Here we are using `json` as ScanCode Workbench imports `json` files only.

For the complete list of options, refer [All Available Options](#).

Running The Scan

Now, run the scan with the options decided:

```
./scancode -clpeui -n 2 --ignore "*.java" --json-pp sample.json samples
```

A Progress report is shown:

```
Setup plugins...
Collect file inventory...
Scan files for: info, licenses, copyrights, packages, emails, urls with 2 process(es).
↪...
[#####] 29
Scanning done.
Summary:      info, licenses, copyrights, packages, emails, urls with 2 process(es)
Errors count: 0
Scan Speed:   1.09 files/sec. 40.67 KB/sec.
Initial counts: 49 resource(s): 36 file(s) and 13 directorie(s)
Final counts:  42 resource(s): 29 file(s) and 13 directorie(s) for 1.06 MB
Timings:
  scan_start: 2019-09-24T203514.573671
  scan_end:   2019-09-24T203545.649805
  setup_scan:licenses: 4.30s
  setup: 4.30s
  scan: 26.62s
  total: 31.14s
Removing temporary files...done.
```

Other Important Documentation

1. *Type of Options*
2. *How to Run a Scan*
3. *Basic Tutorials*
4. *How-To Guides*
5. *How it all Works*
6. *Contributing to Code Development*
7. *Contributing to the Documentation*
8. *Plugin Architecture*
9. *FAQ*
10. *Support*

Basic Options

All “Basic” Scan Options

Option lists are two-column lists of command-line options and descriptions, documenting a program’s options. For example:

-c, --copyright	Scan <input> for copyrights. Sub-Options: • <code>--consolidate</code>
-l, --license	Scan <input> for licenses. Sub-Options: • <code>--consolidate</code> • <code>--license-score INT</code> • <code>--license-text</code> • <code>--license-url-template TEXT</code> • <code>--license-text-diagnostics</code> • <code>--is-license-text</code>
-p, --package	Scan <input> for packages. Sub-Options: • <code>--consolidate</code>
-e, --email	Scan <input> for emails. Sub-Options: • <code>--max-email INT</code>
-u, --url	Scan <input> for urls. Sub-Options: • <code>--max-url INT</code>
-i, --info	Include information such as: • Size, • Type, • Date, • Programming language, • sha1 and md5 hashes, • binary/text/archive/media/source/script flags • Additional options through more CLI options Sub-Options: • <code>--mark-source</code>

Note: Unlike previous 2.x versions, `-c`, `-l`, and `-p` are not default. If any of combination of these options are used, ScanCode only performs that specific task, and not the others. `./scancode -e` only scans for emails, and doesn't scan for copyright/license/packages/general information.

Note: These options, i.e. `-c`, `-l`, `-p`, `-e`, `-u`, and `-i` can be used together. As in, instead of `./scancode -c -i -p`, you can write `./scancode -cip` and it will be the same.

--generated	Classify automatically generated code files with a flag.
--max-email INT	Report only up to INT emails found in a file. Use 0 for no limit. [Default: 50] Sub-Option of <code>--email</code>
--max-url INT	Report only up to INT urls found in a file. Use 0 for no limit. [Default: 50] Sub-Option of <code>--url</code>
--license-score INTEGER	Do not return license matches with scores lower than this score. A number between 0 and 100. [Default: 0] Here, a bigger number means a better match, i.e. Setting a higher license score translates to a higher threshold (with equal or less number of matches). Sub-Option of <code>--license</code>
--license-text	Include the matched text for the detected licenses in the output report. Sub-Option of <code>--license</code> Sub-Options: • <code>--license-text-diagnostics</code> • <code>--is-license-text</code>
--license-url-template TEXT	Set the template URL used for the license reference URLs. In a template URL, curly braces (<code>{}</code>) are replaced by the license key. [Default: <a ,"="" href="https://enterprise.dejacode.com/urn/urn:dje:license:{}">https://enterprise.dejacode.com/urn/urn:dje:license:{}",] Sub-Option of <code>--license</code>
--license-text-diagnostics	In the matched license text, include diagnostic highlights surrounding with square brackets <code>[]</code> words that are not matched. Sub-Option of <code>--license</code> and <code>--license-text</code>

--generated Options

The `--generated` option classifies automatically generated code files with a flag.

An example of using `--generated` in a scan:

```
./scancode -clpieu --json-pp output.json samples --generated
```

In the results, for each file the following attribute is added with it's corresponding true/false value

```
"is_generated": true
```

In the samples folder, the following files have a true value for their `is_generated` attribute:

```
"samples/zlib/dotzlib/LICENSE_1_0.txt"  
"samples/JGroups/licenses/apache-2.0.txt"
```

--max-email Options

Dependency

The option `--max-email` is a sub-option of and requires the option `--email`.

If in the files that are scanned, in individual files, there are a lot of emails (i.e lists) which are unnecessary and clutter the scan results, `--max-email` option can be used to report emails only up to a limit in individual files.

Some important INTEGER values of the `--max-email` INTEGER option:

- 0 - No limit, include all emails.
- 50 - Default.

An example usage:

```
./scancode -clpieu --json-pp output.json samples --max-email 5
```

This only reports 5 email addresses per file and ignores the rest.

--max-url Options

Dependency

The option `--max-url` is a sub-option of and requires the option `--url`.

If in the files that are scanned, in individual files, there are a lot of links to other websites (i.e url lists) which are unnecessary and clutter the scan results, `--max-url` option can be used to report urls only up to a limit in individual files.

Some important INTEGER values of the `--max-url` INTEGER option:

- 0 - No limit, include all urls.
- 50 - Default.

An example usage:

```
./scancode -clpieu --json-pp output.json samples --max-url 10
```

This only reports 10 urls per file and ignores the rest.

--license-score Options

Dependency

The option `--license-score` is a sub-option of and requires the option `--license`.

License matching strictness, i.e. How closely matched licenses are detected in a scan, can be modified by using this `--license-score` option.

Some important INTEGER values of the `--license-score` INTEGER option:

- **0** - Default and Lowest Value, All matches are reported.
- **100** - Highest Value, Only licenses with a much better match are reported

Here, a bigger number means a better match, i.e. Setting a higher license score translates to a higher threshold for matching licenses (with equal or less number of license matches).

An example usage:

```
./scancode -clpieu --json-pp output.json samples --license-score 70
```

Here's the license results on setting the integer value to 100, Vs. the default value 0. This is visualized using ScanCode workbench in the License Info Dashboard.

Table 1: License scan results of Samples Directory.

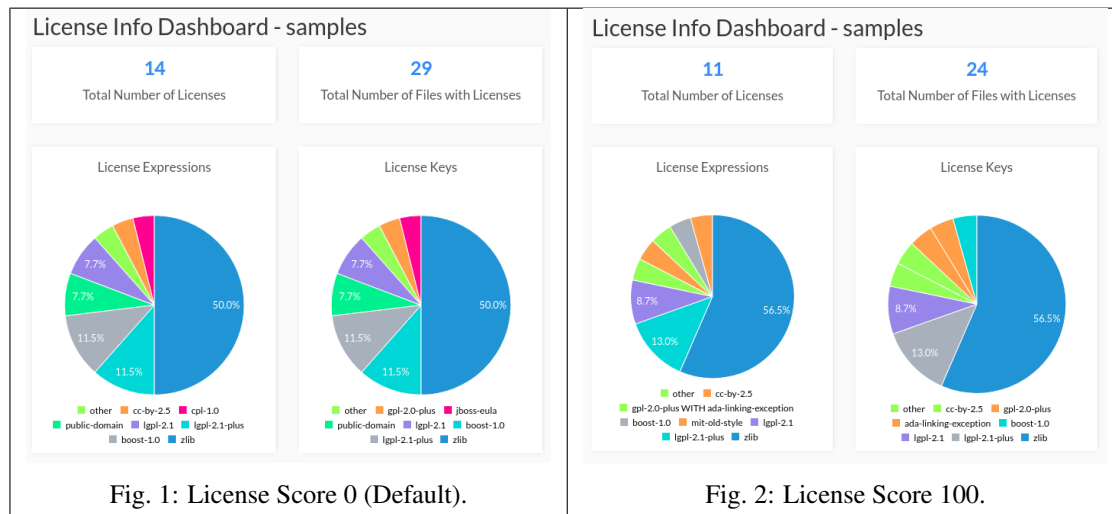


Fig. 1: License Score 0 (Default).

Fig. 2: License Score 100.

--license-text Options

Dependency

The option `--license-text` is a sub-option of and requires the option `--license`.

Sub-Option

The option `--license-text-diagnostics` and `--is-license-text` are sub-options of `--license-text`. `--is-license-text` is a Post-Scan Option.

With the `--license-text` option, the scan results attribute “matched text” includes the matched text for the detected license.

An example Scan:

```
./scancode -cplieu --json-pp output.json samples --license-text
```

An example matched text included in the results is as follows:

```
"matched_text":
"  This software is provided 'as-is', without any express or implied
warranty. In no event will the authors be held liable for any damages
arising from the use of this software.
Permission is granted to anyone to use this software for any purpose,
including commercial applications, and to alter it and redistribute it
freely, subject to the following restrictions:
1. The origin of this software must not be misrepresented; you must not
claim that you wrote the original software. If you use this software
in a product, an acknowledgment in the product documentation would be
appreciated but is not required.
2. Altered source versions must be plainly marked as such, and must not be
misrepresented as being the original software.
3. This notice may not be removed or altered from any source distribution.

Jean-loup Gailly          Mark Adler
jloup@gzip.org           madler@alumni.caltech.edu"
```

- The file in which this license was detected: samples/arch/zlib.tar.gz-extract/zlib-1.2.8/zlib.h
- License name: “ZLIB License”

--license-url-template Options

Dependency

The option `--license-url-template` is a sub-option of and requires the option `--license`.

The `--license-url-template` option sets the template URL used for the license reference URLs.

The default template URL is : `[https://enterprise.dejacode.com/urn/urn:dje:license:{}]` In a template URL, curly braces (`{}`) are replaced by the license key.

So, by default the license reference URL points to the dejacode page for that license.

A scan example using the `--license-url-template` TEXT option

```
./scancode -cplieu --json-pp output.json samples --license-url-template_
↪https://github.com/nexB/scancode-toolkit/tree/develop/src/licensedcode/
↪data/licenses/{}.yaml
```

In a normal scan, reference url for “ZLIB License” is as follows:

```
"reference_url": "https://enterprise.dejacode.com/urn/urn:dje:license:zlib",
```

After using the option in the following manner:

```
`--license-url-template https://github.com/nexB/scancode-toolkit/tree/
↪develop/src/licensedcode/data/licenses/{}`
```

the reference URL changes to this `zlib.yml` file:

```
"reference_url": "https://github.com/nexB/scancode-toolkit/tree/develop/src/
↳licensedcode/data/licenses/zlib.yml",
```

The reference URL changes for all detected licenses in the scan, across the scan result file.

--license-text-diagnostics Options

Dependency

The option `--license-text-diagnostics` is a sub-option of and requires the options `--license` and `--license-text`.

In the matched license text, include diagnostic highlights surrounding with square brackets `[]` words that are not matched.

In a normal scan, whole lines of text are included in the matched license text, including parts that are possibly unmatched.

An example Scan:

```
./scancode -cplieu --json-pp output.json samples --license-text --license-
↳text-diagnostics
```

Running a scan on the `samples` directory with `--license-text` `--license-text-diagnostics` options, causes the following difference in the scan result of the file `samples/JGroups/licenses/bouncycastle.txt`.

Without Diagnostics:

```
"matched_text":
"License Copyright (c) 2000 - 2006 The Legion Of The Bouncy Castle
(http://www.bouncycastle.org) Permission is hereby granted, free of charge,
↳to any person
obtaining a copy of this software and associated documentation files (the \
↳"Software\"),
to deal in the Software without restriction
```

With Diagnostics on:

```
"matched_text":
"License [Copyright] ([c]) [2000] - [2006] [The] [Legion] [Of] [The]
↳[Bouncy] [Castle]
([http]://[www].[bouncycastle].[org]) Permission is hereby granted, free of
↳charge, to any person
obtaining a copy of this software and associated documentation files (the \
↳"Software\"),
to deal in the Software without restriction,
```

Core Options

All “Core” Scan Options

-n, --processes INTEGER	Scan <input> using n parallel processes. [Default: 1]
--verbose	Print verbose file-by-file progress messages.
--quiet	Do not print summary or progress messages.
--timeout FLOAT	Stop scanning a file if scanning takes longer than a timeout in seconds. [Default: 120]
--reindex-licenses	Force a check and possible reindexing of the cached license index.
--from-json	Load codebase from an existing JSON scan
--max-in-memory INTEGER	Maximum number of files and directories scan details kept in memory during a scan. Additional files and directories scan details above this number are cached on-disk rather than in memory. Use 0 to use unlimited memory and disable on-disk caching. Use -1 to use only on-disk caching. [Default: 10000]

Note: All the Core Options are independent options, i.e. They don’t depend on other options.

Comparing Progress Message Options

Default Progress Message:

```
Scanning files for: infos, licenses, copyrights, packages, emails, urls with
↪1 process(es)...
Building license detection index...Done.
Scanning files...
[#####] 43
Scanning done.
Scan statistics: 43 files scanned in 33s.
Scan options:   infos, licenses, copyrights, packages, emails, urls with 1
↪process(es).
Scanning speed: 1.4 files per sec.
Scanning time:  30s.
Indexing time:  2s.
Saving results.
```

Progress Message with “--verbose“:

```
Scanning files for: infos, licenses, copyrights, packages, emails, urls with
↪1 process(es)...
Building license detection index...Done.
Scanning files...
Scanned: screenshot.png
Scanned: README
...
Scanned: zlib/dotzlib/ChecksumImpl.cs
Scanned: zlib/dotzlib/readme.txt
Scanned: zlib/gcc_gvmat64/gvmat64.S
Scanned: zlib/ada/zlib.ads
Scanned: zlib/infbck9/infbck9.c
```

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```
Scanned: zlib/inflback9/inflback9.h
Scanned: arch/zlib.tar.gz
Scanning done.
Scan statistics: 43 files scanned in 29s.
Scan options:   infos, licenses, copyrights, packages, emails, urls with 1_
↳process(es).
Scanning speed: 1.58 files per sec.
Scanning time: 27s.
Indexing time: 2s.
Saving results.
```

So, with `--verbose` enables, progress messages for individual files are shown.

With the “`--quiet`” option enabled, nothing is printed on the Command Line.

`--timeout` Option

This option sets scan timeout for **each file** (and not the entire scan). If some file scan exceeds the specified timeout, that file isn’t scanned anymore and the next file scanning starts. This helps avoiding very large/long files, and saves time.

Also the number (timeout in seconds) to be followed by this option can be a floating point number, i.e. 1.5467.

`--reindex-licenses` Option

ScanCode maintains a license index to search for and detect licenses. When Scancode is configured for the first time, a license index is built and used in every scan thereafter.

This `--reindex-licenses` option rebuilds the license index. Running a scan with this option displays the following message to the terminal in addition to what it normally shows:

```
Checking and rebuilding the license index...
```

`--from-json` Option

If you want to input scan results from a `.json` file, and run a scan again on those same files, with some other options/output format, you can do so using the `--from-json` option.

An example scan command using `--from-json`:

```
./scancode --from-json sample.json --json-pp sample_2.json --classify
```

This inputs the scan results from `sample.json`, runs the post-scan plugin `--classify` and outputs the results for this scan to `sample_2.json`.

--max-in-memory Option

During a scan, as individual files are scanned, the scan details for those files are kept on memory till the scan is completed. Then after the scan is completed, they are written in the specified output format.

Now, if the scan involves a very large number of files, they might not fit in the memory during the scan. For this reason, disk-caching can be used for some/all of the files.

Some important INTEGER values of the `--max-in-memory` INTEGER option:

- **0** - Unlimited Memory, store all the file/directory scan results on memory
- **-1** - Use only Disk-Caching, store all the file/directory scan results on disk
- **10000** - Default, store 10,000 file/directory scan results on memory and the rest on disk

An example usage:

```
./scancode -clieue --json-pp sample.json samples --max-in-memory -1
```

Scancode Output Formats

Scan results generated by Scancode are available in different formats, to be specified by the following options.

All Scan Output Options

- | | |
|-------------------------------|--|
| --json FILE | Write scan output as compact JSON to FILE. |
| --json-pp FILE | Write scan output as pretty-printed JSON to FILE. |
| --json-lines FILE | Write scan output as JSON Lines to FILE. |
| --csv FILE | Write scan output as CSV to FILE. |
| --html FILE | Write scan output as HTML to FILE. |
| --custom-output | Write scan output to FILE formatted with the custom Jinja template file. |
| | Mandatory Sub-option: |
| | • <code>--custom-template FILE</code> |
| --custom-template FILE | Use this Jinja template FILE as a custom template. |
| | Sub-Option of: <code>--custom-output</code> |
| --spdx-rdf FILE | Write scan output as SPDX RDF to FILE. |
| --spdx-tv FILE | Write scan output as SPDX Tag/Value to FILE. |
| --html-app FILE | Write scan output as a mini HTML application to FILE. |

Warning: The html-app feature has been deprecated and you should use Scancode Workbench instead to visualize scan results. The official Repository [link](#). Also refer [How to Visualize Scan results](#).

Note: You can Output Scan Results in two different file formats simultaneously in one Scan. An example - `./scancode -clpieue --json-pp output.json --html output.html samples`.

Note: All the examples and snippets that follows has been generated by scanning the `samples` folder distributed with `scancode-toolkit`.

--json FILE

Among the ScanCode Output Formats, `json` is the most important one, and is recommended over others. Scancode Workbench and other applications that use Scancode Result data as input accept only the `json` format.

Note: There isn't any default output option in ScanCode Versions 3.x, unlike 2.x versions (which had `json` as default).

The following code performs a scan on the `samples` directory, and publishes the results in `json` format:

```
./scancode -clpieu --json output.json samples
```

Note: The default `json` format prints the whole report without line breaks/spaces/indentations, which can be ugly to look at.

```
(venv-scan3.1.1) ayansm@AyanUbuntuDell:~/Desktop/GSoD/scancode-toolkit-versions/scancode-toolkit-3.1.1$ ./scancode -clpieu --json - samples
Setup plugins...
Collect file inventory...
Scan files for: info, licenses, copyrights, packages, emails, urls with 1 process(es)...
[#####] 36
{"headers":{"tool_name":"scancode-toolkit","tool_version":"3.1.1","options":{"input":["samples"],"--copyright":true,"--email":true,"--info":true,"--j
son":"","--license":true,"--package":true,"--url":true},"notice":"Generated with ScanCode and provided on an \"AS IS\" BASIS, WITHOUT WARRANTIES\\NOR
CONDITIONS OF ANY KIND, either express or implied. No content created from\\nScanCode should be considered or used as legal advice. Consult an Attorney
\\nfor any legal advice.\\nScanCode is a free software code scanning tool from nexB Inc. and others.\\nVisit https://github.com/nexB/scancode-toolkit/ fo
r support and download.",\"start_timestamp\":\"2019-10-20T013633.417138\", \"end_timestamp\":\"2019-10-20T013742.659168\", \"message\":null, \"errors\":[],\"extra_dat
a\":{\"files_count\":36}}},\"files\":{\"path\":\"samples\", \"type\":\"directory\", \"name\":\"samples\", \"base_name\":\"samples\", \"extension\":\"\", \"size\":0, \"date\":null, \"shai
\":null, \"md5\":null, \"mime_type\":null, \"file_type\":null, \"programming_language\":null, \"is_binary\":false, \"is_text\":false, \"is_archive\":false, \"is_media\":false,
\"is_source\":false, \"is_script\":false, \"licenses\":[], \"license_expressions\":[], \"copyrights\":[], \"holders\":[], \"authors\":[], \"packages\":[], \"emails\":[], \"urls\":
[], \"files_count\":36, \"dirs_count\":12, \"size_count\":1260700, \"scan_errors\":[]}, {\"path\":\"samples/README\", \"type\":\"file\", \"name\":\"README\", \"base_name\":\"README
\", \"extension\":\"\", \"size\":236, \"date\":\"2019-02-12\", \"sha1\":\"2e07e32c52d607204fad196052d70e3d18fb8636\", \"md5\":\"effc6856ef85a9250fb1a470792b3f38\", \"mime_type\":
\"text/plain\", \"file_type\":\"ASCII text\", \"programming_language\":null, \"is_binary\":false, \"is_text\":true, \"is_archive\":false, \"is_media\":false, \"is_source\":fal
se, \"is_script\":false, \"licenses\":[], \"license_expressions\":[], \"copyrights\":[], \"holders\":[], \"authors\":[], \"packages\":[], \"emails\":[], \"urls\":[\"http://
/zlib.net/zlib-1.2.8.tar.gz\", \"start_line\":3, \"end_line\":3}, {\"url\":\"http://master.dl.sourceforge.net/project/javagroups/JGroups/2.10.0.GA/JGroups-2.10.0
.GA.src.zip\", \"start_line\":4, \"end_line\":4}, {\"files_count\":0, \"dirs_count\":0, \"size_count\":0, \"scan_errors\":[]}, {\"path\":\"samples/screenshot.png\", \"type\":\"fi
le\", \"name\":\"screenshot.png\", \"base_name\":\"screenshot\", \"extension\":\".png\", \"size\":622754, \"date\":\"2019-02-12\", \"sha1\":\"01ff4b1de0bc6c75c9cca6e46c80c1802d69
76d4\", \"md5\":\"b6ef5a9077147423c98b42a6a25e57a\", \"mime_type\":\"image/png\", \"file_type\":\"PNG image data, 2880 x 1666, 8-bit/color RGB, non-interlaced\", \"pro
gramming_language\":null, \"is_binary\":true, \"is_text\":false, \"is_archive\":false, \"is_media\":true, \"is_source\":false, \"is_script\":false, \"licenses\":[], \"license
_expressions\":[], \"copyrights\":[], \"holders\":[], \"authors\":[], \"packages\":[], \"emails\":[], \"urls\":[], \"files_count\":0, \"dirs_count\":0, \"size_count\":0, \"scan_err
ors\":[]}, {\"path\":\"samples/arch\", \"type\":\"directory\", \"name\":\"arch\", \"base_name\":\"arch\", \"extension\":\"\", \"size\":0, \"date\":null, \"sha1\":null, \"md5\":null, \"mime_t
ype\":null, \"file_type\":null, \"programming_language\":null, \"is_binary\":false, \"is_text\":false, \"is_archive\":false, \"is_media\":false, \"is_source\":false, \"is scr
ipt\":false, \"licenses\":[], \"license_expressions\":[], \"copyrights\":[], \"holders\":[], \"authors\":[], \"packages\":[], \"emails\":[], \"urls\":[], \"files_count\":4, \"dirs
_count\":2, \"size_count\":127720, \"scan_errors\":[]}, {\"path\":\"samples/arch/zlib.tar.gz\", \"type\":\"file\", \"name\":\"zlib.tar.gz\", \"base_name\":\"zlib\", \"extension\":\".
tar.gz\", \"size\":28103, \"date\":\"2019-02-12\", \"sha1\":\"576f0ccfe534d7f5ff5d6400078d3c6586de3abd\", \"md5\":\"20b2370751abfc08bb3556c1d8114b5a\", \"mime_type\":\"appli
cation/x-gzip\", \"file_type\":\"gzip compressed data, last modified: Wed Jul 15 14:38:19 2015, from Unix\", \"programming_language\":null, \"is_binary\":true, \"is_text\":fals
e, \"is_archive\":true, \"is_media\":false, \"is_source\":false, \"is_script\":false, \"licenses\":[], \"license_expressions\":[], \"copyrights\":[], \"holders\":[]
}, \"authors\":[], \"packages\":[], \"emails\":[], \"urls\":[], \"files_count\":0, \"dirs_count\":0, \"size_count\":0, \"scan_errors\":[]}, {\"path\":\"samples/arch/zlib.tar.gz-e
xtract\", \"type\":\"directory\", \"name\":\"zlib.tar.gz-extract\", \"base_name\":\"zlib.tar.gz-extract\", \"extension\":\"\", \"size\":0, \"date\":null, \"sha1\":null, \"md5\":null,
\"mime_type\":null, \"file_type\":null, \"programming_language\":null, \"is_binary\":false, \"is_text\":false, \"is_archive\":false, \"is_media\":false, \"is_source\":false, \"is scr
ipt\":false, \"licenses\":[], \"license_expressions\":[], \"copyrights\":[], \"holders\":[], \"authors\":[], \"packages\":[], \"emails\":[], \"urls\":[], \"files_count\":3,
\"dirs_count\":1, \"size_count\":99617, \"scan_errors\":[]}, {\"path\":\"samples/arch/zlib.tar.gz-extract/zlib-1.2.8\", \"type\":\"directory\", \"name\":\"zlib-1.2.8\", \"base
_name\":\"zlib-1.2.8\", \"extension\":\"\", \"size\":0, \"date\":null, \"sha1\":null, \"md5\":null, \"mime_type\":null, \"file_type\":null, \"programming_language\":null, \"is_bin
ary\":true, \"is_text\":false, \"is_archive\":false, \"is_media\":false, \"is_source\":false, \"is_script\":false, \"licenses\":[], \"license_expressions\":[], \"copyrights\":[], \"holders\":[], \"authors\":[], \"packages\":[], \"emails\":[], \"urls\":[]}
```

The entire JSON file is structured in the following manner:

At first some general information on the scan, what options were used, the number of files etc. And then all the files follow.

```
{
  "headers": {
    {
```

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```

    "tool_name": "scancode-toolkit",
    "tool_version": "3.1.1",
    "options": {
      "input": [
        "samples/"
      ],
      "--copyright": true,
      "--email": true,
      "--info": true,
      "--json-pp": "output.json",
      "--license": true,
      "--package": true,
      "--url": true
    },
    "notice": "Generated with ScanCode and provided on an \"AS IS\" BASIS,
    ↳WITHOUT WARRANTIES\\NOR CONDITIONS OF ANY KIND, either express or implied.
    ↳No content created from\\nScanCode should be considered or used as legal
    ↳advice. Consult an Attorney\\nfor any legal advice.\\nScanCode is a free
    ↳software code scanning tool from nexB Inc. and others.\\nVisit https://
    ↳github.com/nexB/scancode-toolkit/ for support and download.",
    "start_timestamp": "2019-10-19T191117.292858",
    "end_timestamp": "2019-10-19T191219.743133",
    "message": null,
    "errors": [],
    "extra_data": {
      "files_count": 36
    }
  }
],
"files": [
  {
    "path": "samples",
    "type": "directory",
    ...
    ...
    "scan_errors": []
  },
  {
    "path": "samples/README",
    "type": "file",
    "name": "README",
    "base_name": "README",
    "extension": "",
    "size": 236,
    "date": "2019-02-12",
    "sha1": "2e07e32c52d607204fad196052d70e3d18fb8636",
    "md5": "effc6856ef85a9250fb1a470792b3f38",
    "mime_type": "text/plain",
    "file_type": "ASCII text",
    "programming_language": null,
    "is_binary": false,
    "is_text": true,
    "is_archive": false,
    "is_media": false,
    "is_source": false,
    "is_script": false,

```

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```
    "licenses": [],
    "license_expressions": [],
    "copyrights": [],
    "holders": [],
    "authors": [],
    "packages": [],
    "emails": [],
    "urls": [],
    "files_count": 0,
    "dirs_count": 0,
    "size_count": 0,
    "scan_errors": []
  },
  ...
  ...
  ...
  {
    "path": "samples/zlib/iostream2/zstream_test.cpp",
    "type": "file",
    "name": "zstream_test.cpp",
    "base_name": "zstream_test",
    "extension": ".cpp",
    "size": 711,
    "date": "2019-02-12",
    ...
    ...
    ...
    "scan_errors": []
  }
]
}
```

--json-pp FILE

json-pp stands for JSON Pretty-Print format. In the previous format, i.e. Simple json, the whole output is printed in one line, which isn't well suited for getting information if you're looking at the file itself (or printing at stdout). So this option formats the output results in json but in a properly spaced and indented manner, and is easy to look at.

The following code performs a scan on the samples directory, and publishes the results in json-pp format:

```
./scancode -clpieu --json-pp output.json samples
```

A sample JSON output for an individual file will look like:

```
{
  "path": "samples/zlib/iostream2/zstream.h",
  "type": "file",
  "name": "zstream.h",
  "base_name": "zstream",
  "extension": ".h",
  "size": 9283,
```

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```

"date": "2019-02-12",
"sha1": "fca4540d490fff36bb90fd801cf9cd8fc695bb17",
"md5": "a980b61cle8be68d5cdb1236ba6b43e7",
"mime_type": "text/x-c++",
"file_type": "C++ source, ASCII text",
"programming_language": "C++",
"is_binary": false,
"is_text": true,
"is_archive": false,
"is_media": false,
"is_source": true,
"is_script": false,
"licenses": [
  {
    "key": "mit-old-style",
    "score": 100.0,
    "name": "MIT Old Style",
    "short_name": "MIT Old Style",
    "category": "Permissive",
    "is_exception": false,
    "owner": "MIT",
    "homepage_url": "http://fedoraproject.org/wiki/Licensing:MIT#Old_Style
↪",
    "text_url": "http://fedoraproject.org/wiki/Licensing:MIT#Old_Style",
    "reference_url": "https://enterprise.dejacode.com/urn/
↪urn:dje:license:mit-old-style",
    "spdx_license_key": null,
    "spdx_url": "",
    "start_line": 9,
    "end_line": 15,
    "matched_rule": {
      "identifier": "mit-old-style_cmr-no_1.RULE",
      "license_expression": "mit-old-style",
      "licenses": [
        "mit-old-style"
      ],
      "is_license_text": true,
      "is_license_notice": false,
      "is_license_reference": false,
      "is_license_tag": false,
      "matcher": "2-aho",
      "rule_length": 71,
      "matched_length": 71,
      "match_coverage": 100.0,
      "rule_relevance": 100
    }
  }
],
"license_expressions": [
  "mit-old-style"
],
"copyrights": [
  {
    "value": "Copyright (c) 1997 Christian Michelsen Research AS Advanced_
↪Computing",
    "start_line": 3,
    "end_line": 5
  }
]

```

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```

    }
  ],
  "holders": [
    {
      "value": "Christian Michelsen Research AS Advanced Computing",
      "start_line": 3,
      "end_line": 5
    }
  ],
  "authors": [],
  "packages": [],
  "emails": [],
  "urls": [
    {
      "url": "http://www.cmr.no/",
      "start_line": 7,
      "end_line": 7
    }
  ],
  "files_count": 0,
  "dirs_count": 0,
  "size_count": 0,
  "scan_errors": []
},

```

This is the recommended Output option for Scancode Toolkit.

--json-lines FILE

ScanCode also has a `--json-lines` format option, where each report of a file scanned is formatted in one line.

The following code performs a scan on the samples directory, and publishes the results in json-lines format:

```
./scancode -clpieu --json-lines output.json samples
```

Here is a sample line from a report generated by the jsonlines format:

```
{ "files": [ { "path": "samples/zlib/ada", "licenses": [], "copyrights": [], "packages": [] } ] }
```

The header information is also formatted in one line (i.e. The First Line of the file).

The whole Output file looks like:

```

{ "headers": [ { "tool_name": "scancode-toolkit", "tool_version": "3.1.1", "options":
  ↳ { "input": [ "samples/" ], "--copyright": true, "--email": true, "--info": true, "--
  ↳ json-lines": "output.json", "--license": true, "--package": true, "--url": true },
  ↳ "notice": "Generated with ScanCode and provided on an \"AS IS\" BASIS,
  ↳ WITHOUT WARRANTIES\\NOR CONDITIONS OF ANY KIND, either express or implied.
  ↳ No content created from\\nScanCode should be considered or used as legal
  ↳ advice. Consult an Attorney\\nfor any legal advice.\\nScanCode is a free
  ↳ software code scanning tool from nexB Inc. and others.\\nVisit https://
  ↳ github.com/nexB/scancode-toolkit/ for support and download." }, "start
  ↳ timestamp": "2019-10-19T210920.143831", "end_timestamp": "2019-10-19T211052.
  ↳ 048182", "message": null, "errors": [], "extra_data": { "files_count": 36 } } ] }

```

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```

{"files":[{"path":"samples" ... "scan_errors":[]]}
{"files":[{"path":"samples/README", ... "scan_errors":[]]}
{"files":[{"path":"samples/screenshot.png", ... "scan_errors":[]]}
{"files":[{"path":"samples/arch", ... "scan_errors":[]]}
{"files":[{"path":"samples/arch/zlib.tar.gz", ... "scan_errors":[]]}
{"files":[{"path":"samples/arch/zlib.tar.gz-extract", ... "scan_errors":[]]}
{"files":[{"path":"samples/arch/zlib.tar.gz-extract/zlib-1.2.8", ... "scan_
↪errors":[]]}
{"files":[{"path":"samples/arch/zlib.tar.gz-extract/zlib-1.2.8/adler32.c", ..
↪. "scan_errors":[]]}
{"files":[{"path":"samples/arch/zlib.tar.gz-extract/zlib-1.2.8/zlib.h", ...
↪"scan_errors":[]]}
{"files":[{"path":"samples/arch/zlib.tar.gz-extract/zlib-1.2.8/zutil.h", ...
↪"scan_errors":[]]}
{"files":[{"path":"samples/JGroups", ... "scan_errors":[]]}
{"files":[{"path":"samples/JGroups/EULA", ... "scan_errors":[]]}
{"files":[{"path":"samples/JGroups/LICENSE", ... "scan_errors":[]]}
{"files":[{"path":"samples/JGroups/licenses", ... "scan_errors":[]]}
{"files":[{"path":"samples/JGroups/licenses/apache-1.1.txt", ... "scan_errors
↪":[]]}
{"files":[{"path":"samples/JGroups/licenses/apache-2.0.txt", ... "scan_errors
↪":[]]}
{"files":[{"path":"samples/JGroups/licenses/bouncycastle.txt", ... "scan_
↪errors":[]]}
{"files":[{"path":"samples/JGroups/licenses/cpl-1.0.txt", ... "scan_errors
↪":[]]}
{"files":[{"path":"samples/JGroups/licenses/lgpl.txt", ... "scan_errors":[]
↪}]
{"files":[{"path":"samples/JGroups/src", ... "scan_errors":[]]}
{"files":[{"path":"samples/JGroups/src/FixedMembershipToken.java", ... "scan_
↪errors":[]]}
{"files":[{"path":"samples/JGroups/src/GuardedBy.java", ... "scan_errors":[]
↪}]
{"files":[{"path":"samples/JGroups/src/ImmutableReference.java", ... "scan_
↪errors":[]]}
{"files":[{"path":"samples/JGroups/src/RATE_LIMITER.java", ... "scan_errors
↪":[]]}
{"files":[{"path":"samples/JGroups/src/RouterStub.java", ... "scan_errors
↪":[]]}
{"files":[{"path":"samples/JGroups/src/RouterStubManager.java", ... "scan_
↪errors":[]]}
{"files":[{"path":"samples/JGroups/src/S3_PING.java", ... "scan_errors":[]]}
{"files":[{"path":"samples/zlib", ... "scan_errors":[]]}
{"files":[{"path":"samples/zlib/adler32.c", ... "scan_errors":[]]}
{"files":[{"path":"samples/zlib/deflate.c", ... "scan_errors":[]]}
{"files":[{"path":"samples/zlib/deflate.h", ... "scan_errors":[]]}
{"files":[{"path":"samples/zlib/zlib.h", ... "scan_errors":[]]}
{"files":[{"path":"samples/zlib/zutil.c", ... "scan_errors":[]]}
{"files":[{"path":"samples/zlib/zutil.h", ... "scan_errors":[]]}
{"files":[{"path":"samples/zlib/ada", ... "scan_errors":[]]}
{"files":[{"path":"samples/zlib/ada/zlib.ads", ... "scan_errors":[]]}
{"files":[{"path":"samples/zlib/dotzlib", ... "scan_errors":[]]}
{"files":[{"path":"samples/zlib/dotzlib/AssemblyInfo.cs", ... "scan_errors
↪":[]]}
{"files":[{"path":"samples/zlib/dotzlib/ChecksumImpl.cs", ... "scan_errors
↪":[]]}
{"files":[{"path":"samples/zlib/dotzlib/LICENSE_1_0.txt", ... "scan_errors
↪":[]]}

```

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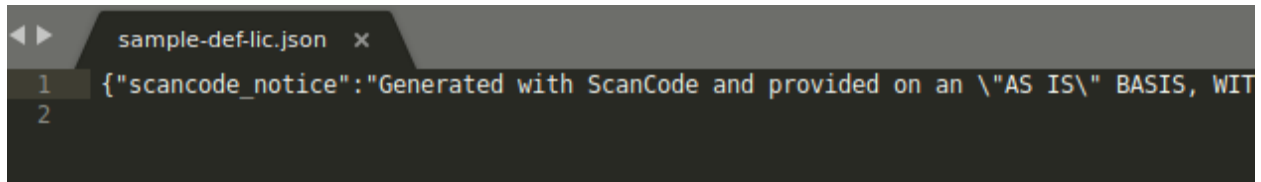
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```
{ "files": [{"path": "samples/zlib/dotzlib/readme.txt", ... "scan_errors": []}] }
{ "files": [{"path": "samples/zlib/gcc_gvmat64" ... "scan_errors": []}] }
{ "files": [{"path": "samples/zlib/gcc_gvmat64/gvmat64.S" ... "scan_errors": []}
↪ ] }
{ "files": [{"path": "samples/zlib/infbck9", ... "scan_errors": []}] }
{ "files": [{"path": "samples/zlib/infbck9/infbck9.c", ... "scan_errors": []}] }
{ "files": [{"path": "samples/zlib/infbck9/infbck9.h", ... "scan_errors": []}] }
{ "files": [{"path": "samples/zlib/iostream2", ... "scan_errors": []}] }
{ "files": [{"path": "samples/zlib/iostream2/zstream.h", ... "scan_errors": []}] }
{ "files": [{"path": "samples/zlib/iostream2/zstream_test.cpp", ... "scan_errors
↪ ": []}] }
```

Note: This jsonlines format also omits other file information like type, name, date, extension, sha1 and md5 hashes, programming language etc.

Comparing Different json Output Formats

Default `--json` Output:



`--json-pp` Output:

`--json-lines` Output:

`--spdx-rdf` FILE

SPDX stands for “Software Package and Data Exchange” and is an open standard for communicating software bill of material information (including components, licenses, copyrights, and security references).

The following code performs a scan on the samples directory, and publishes the results in `spdx-rdf` format:

```
./scancode -clpieu --spdx-rdf output.spdx samples
```

Learn more about SPDX specifications [here](#) and in this [GitHub repository](#).

Here the file is structured as a dictionary of named properties and classes using W3C’s [RDF Technology](#).

... figure:: data/output_spdx_rdf1.png

```
{
  "path": "samples/JGroups/licenses/apache-1.1.txt",
  "type": "file",
  "name": "apache-1.1.txt",
  "base_name": "apache-1.1",
  "extension": ".txt",
  "date": "2019-09-18",
  "size": 2937,
  "sha1": "186d9195787fcbf2e5401b966159395640e06d11",
  "md5": "8c909d7735f28f4fdb0128ee57fb430e",
  "files_count": null,
  "mime_type": "text/plain",
  "file_type": "ASCII text, with CRLF line terminators",
  "programming_language": null,
  "is_binary": false,
  "is_text": true,
  "is_archive": false,
  "is_media": false,
  "is_source": false,
  "is_script": false,
  "scan_errors": [],
  "copyrights": [
    {
      "statements": [
        "Copyright (c) 2000 The Apache Software Foundation."
      ],
      "holders": [
        "The Apache Software Foundation."
      ],
      "authors": [],
      "start_line": 4,
      "end_line": 5
    },
    {
      "statements": [],
      "holders": [],
      "authors": [
        "the Apache Software Foundation"
      ],
      "start_line": 20,
      "end_line": 23
    }
  ],
  "packages": []
}
```

```
{
  "header": {
    "scancode notice": "Generated with ScanCode and provided on an \"AS IS\" BASIS, WITHOUT WARRANTIES\\NOR CONDITIONS OF ANY KIND, either express or implied. No content created from ScanCode should be considered or used as legal advice. Consult an Attorney for any legal advice. ScanCode is a free software code scanning tool from nexB Inc. and others. Visit https://github.com/nexB/scancode-toolkit/ for support and download."
  },
  "files": [
    {
      "path": "samples/screenshot.png",
      "scan_errors": [],
      "licenses": [],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/README",
      "scan_errors": [],
      "licenses": [],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/JGroups",
      "scan_errors": [],
      "licenses": [],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/zlib",
      "scan_errors": [],
      "licenses": [],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/arch",
      "scan_errors": [],
      "licenses": [],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/JGroups/EULA",
      "scan_errors": [],
      "licenses": [
        {
          "key": "jboss-eula",
          "score": 100.0,
          "short_name": "JBoss EULA"
        }
      ],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/JGroups/LICENSE",
      "scan_errors": [],
      "licenses": [
        {
          "key": "lgpl-2.1-plus",
          "score": 100.0,
          "short_name": "LGPL"
        }
      ],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/JGroups/src",
      "scan_errors": [],
      "licenses": [],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/JGroups/licenses/lgpl.txt",
      "scan_errors": [],
      "licenses": [
        {
          "key": "lgpl-2.1-plus",
          "score": 100.0,
          "short_name": "LGPL"
        }
      ],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/JGroups/licenses/bouncycastle.txt",
      "scan_errors": [],
      "licenses": [
        {
          "key": "mit",
          "score": 100.0,
          "short_name": "MIT"
        }
      ],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/JGroups/licenses/apache-1.1.txt",
      "scan_errors": [],
      "licenses": [
        {
          "key": "apache-1.1",
          "score": 100.0,
          "short_name": "Apache 1.1"
        }
      ],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/JGroups/licenses/apache-2.0.txt",
      "scan_errors": [],
      "licenses": [
        {
          "key": "apache-2.0",
          "score": 100.0,
          "short_name": "Apache 2.0"
        }
      ],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/JGroups/licenses/cpl-1.0.txt",
      "scan_errors": [],
      "licenses": [
        {
          "key": "cpl-1.0",
          "score": 99.94,
          "short_name": "CPL 1.0"
        }
      ],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/JGroups/src/RouterStub.java",
      "scan_errors": [],
      "licenses": [],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/JGroups/src/FixedMembershipToken.java",
      "scan_errors": [],
      "licenses": [
        {
          "key": "lgpl-2.1-plus",
          "score": 100.0,
          "short_name": "LGPL"
        }
      ],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/JGroups/src/RATE_LIMITER.java",
      "scan_errors": [],
      "licenses": [],
      "copyrights": [
        {
          "statements": [
            {
              "holder": "nexB Inc.",
              "score": 10.0,
          "short_name": "Public Domain"
            }
          ],
          "key": "public-domain",
          "score": 10.0,
          "short_name": "Public Domain"
        }
      ],
      "packages": []
    },
    {
      "path": "samples/JGroups/src/S3_PING.java",
      "scan_errors": [],
      "licenses": [
        {
          "key": "cc-by-2.5",
          "score": 70.0,
          "short_name": "CC BY 2.5"
        }
      ],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/JGroups/src/ImmutableReference.java",
      "scan_errors": [],
      "licenses": [
        {
          "key": "lgpl-2.1-plus",
          "score": 100.0,
          "short_name": "LGPL"
        }
      ],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/JGroups/src/RouterStubManager.java",
      "scan_errors": [],
      "licenses": [
        {
          "key": "lgpl-2.1-plus",
          "score": 100.0,
          "short_name": "LGPL"
        }
      ],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/zlib/zutil.h",
      "scan_errors": [],
      "licenses": [
        {
          "key": "zlib",
          "score": 60.0,
          "short_name": "ZLIB License"
        }
      ],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/zlib/deflate.c",
      "scan_errors": [],
      "licenses": [
        {
          "key": "zlib",
          "score": 60.0,
          "short_name": "ZLIB License"
        }
      ],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/zlib/zlib.h",
      "scan_errors": [],
      "licenses": [
        {
          "key": "zlib",
          "score": 100.0,
          "short_name": "ZLIB License"
        }
      ],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/zlib/zutil.c",
      "scan_errors": [],
      "licenses": [
        {
          "key": "zlib",
          "score": 60.0,
          "short_name": "ZLIB License"
        }
      ],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/zlib/deflate.h",
      "scan_errors": [],
      "licenses": [
        {
          "key": "zlib",
          "score": 60.0,
          "short_name": "ZLIB License"
        }
      ],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/zlib/adler32.c",
      "scan_errors": [],
      "licenses": [
        {
          "key": "zlib",
          "score": 60.0,
          "short_name": "ZLIB License"
        }
      ],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/zlib/iostream2",
      "scan_errors": [],
      "licenses": [],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/zlib/dotzlib",
      "scan_errors": [],
      "licenses": [],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/zlib/gcc_gvmtat64",
      "scan_errors": [],
      "licenses": [],
      "copyrights": [],
      "packages": []
    },
    {
      "path": "samples/zlib/ada",
      "scan_errors": [],
      "licenses": [],
      "copyrights": [],
      "packages": []
    }
  ]
}
```

--spx-tv FILE

This format is another SPDX variant, with the output file being structured in the following manner:

The following code performs a scan on the samples directory, and publishes the results in spx-tv format:

```
./scancode -clpieu --spx-tv output.spx samples
```

A SPDX-TV file starts with:

```
# Document Information

SPDXVersion: SPDX-2.1
DataLicense: CC0-1.0
DocumentComment: <text>Generated with ScanCode and provided on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. No content created from ScanCode should be considered or used as legal advice. Consult an Attorney for any legal advice. ScanCode is a free software code scanning tool from nexB Inc. and others. Visit https://github.com/nexB/scancode-toolkit/ for support and download.</text>

# Creation Info

Creator: Tool: ScanCode 2.2.1
Created: 2019-09-22T21:55:04Z
```

After a section titled #Packages, a list follows.

Each File information is listed under a #File title, for each of the files.

- FileName

```
# Package
PackageName: samples
PackageDownloadLocation: NOASSERTION
PackageVerificationCode: ba63ad293ba27f95c8aa32ab097dc99895f35078
PackageLicenseDeclared: NOASSERTION
PackageLicenseConcluded: NOASSERTION
PackageLicenseInfoFromFiles: Apache-1.1
PackageLicenseInfoFromFiles: Apache-2.0
PackageLicenseInfoFromFiles: BSL-1.0
PackageLicenseInfoFromFiles: CC-BY-2.5
PackageLicenseInfoFromFiles: CPL-1.0
PackageLicenseInfoFromFiles: LGPL-2.1+
PackageLicenseInfoFromFiles: MIT
PackageLicenseInfoFromFiles: Zlib
PackageLicenseInfoFromFiles: LicenseRef-cmr-no
PackageLicenseInfoFromFiles: LicenseRef-gpl-2.0-plus-ada
PackageLicenseInfoFromFiles: LicenseRef-jboss-eula
PackageLicenseInfoFromFiles: LicenseRef-public-domain
PackageCopyrightText: <text>(c) 2004 by Henrik Ravn
(c) Copyright Henrik Ravn 2004
Copyright (c) 1991, 1999 Free Software Foundation, Inc.
Copyright (c) 1995-2005, 2010, 2011, 2012 Jean-loup Gailly.
Copyright (c) 1995-2008 Mark Adler
Copyright (c) 1995-2010 Jean-loup Gailly, Brian Raiter and Gilles Vollant.
Copyright (c) 1995-2011 Mark Adler
Copyright (c) 1995-2012 Jean-loup Gailly
```

- FileChecksum
- LicenseConcluded
- LicenseInfoInFile
- FileCopyrightText

An example goes as follows:

After the files section, there's a section for licenses under a `#Licences` title, with the following information for each license:

- LicenseID
- LicenseComment
- ExtractedText

Here's an example:

--html FILE

ScanCode supports formatting the Output result is a simple `html` format, to open with your favorite browser. This helps quick visualization of the detected license/copyright and other main information in the form of tables.

The following code performs a scan on the samples directory, and publishes the results in HTML format:

```
./scancode -clpieu --html output.html samples
```

File

```
FileName: ./samples/JGroups/EULA
FileChecksum: SHA1: eb232aa0424eca9c4136904e6143b72aaa9cf4de
LicenseConcluded: NOASSERTION
LicenseInfoInFile: LicenseRef-jboss-eula
FileCopyrightText: <text>Copyright 2006 Red Hat, Inc.
</text>
```

File

```
FileName: ./samples/JGroups/LICENSE
FileChecksum: SHA1: e60c2e780886f95df9c9ee36992b8edabec00bcc
LicenseConcluded: NOASSERTION
LicenseInfoInFile: LGPL-2.1+
FileCopyrightText: <text>Copyright (c) 1991, 1999 Free Software Foundation, Inc.
copyrighted by the Free Software Foundation
</text>
```

Extracted Licenses

```
LicenseID: LicenseRef-cmr-no
LicenseComment: <text>See details at https://github.com/nexB/scancode-toolkit/blob/develop/src/licensedcode/data/licenses/cmr-no.yml
</text>
ExtractedText: <text>See details at https://github.com/nexB/scancode-toolkit/blob/develop/src/licensedcode/data/licenses/cmr-no.yml
</text>
```

```
LicenseID: LicenseRef-gpl-2.0-plus-ada
LicenseComment: <text>See details at https://github.com/nexB/scancode-toolkit/blob/develop/src/licensedcode/data/licenses/gpl-2.0-plus-ada.yml
</text>
ExtractedText: <text>See details at https://github.com/nexB/scancode-toolkit/blob/develop/src/licensedcode/data/licenses/gpl-2.0-plus-ada.yml
</text>
```

The HTML page generated has these following Tables:

- Copyright and Licenses Information
- File Information
- Package Information
- Licenses (Links to Dejacode/License Homepage)

Copyrights and Licenses Information				
path	start	end	what	value
samples/JGroups/EULA	3	108	license	jboss-eula
samples/JGroups/EULA	104	104	copyright	Copyright 2006 Red Hat, Inc.
samples/JGroups/LICENSE	1	502	license	lgpl-2.1-plus
samples/JGroups/LICENSE	4	7	copyright	Copyright (c) 1991, 1999 Free Software Foundation, Inc.
samples/JGroups/LICENSE	427	433	copyright	copyrighted by the Free Software Foundation
samples/JGroups/LICENSE	496	497	copyright	
samples/JGroups/licenses/lgpl.txt	1	502	license	lgpl-2.1-plus
samples/JGroups/licenses/lgpl.txt	4	7	copyright	Copyright (c) 1991, 1999 Free Software Foundation, Inc.
samples/JGroups/licenses/lgpl.txt	427	433	copyright	copyrighted by the Free Software Foundation
samples/JGroups/licenses/lgpl.txt	496	497	copyright	
samples/JGroups/licenses/bouncycastle.txt	5	5	copyright	Copyright (c) 2000 - 2006 The Legion Of The Bouncy Castle
samples/JGroups/licenses/bouncycastle.txt	7	18	license	mit
samples/JGroups/licenses/apache-1.1.txt	2	56	license	apache-1.1
samples/JGroups/licenses/apache-1.1.txt	4	5	copyright	Copyright (c) 2000 The Apache Software Foundation.
samples/JGroups/licenses/apache-1.1.txt	20	23	copyright	
samples/JGroups/licenses/apache-2.0.txt	2	202	license	apache-2.0

--html-app FILE

ScanCode also supports formatting the output in a HTML visualization tool, which is more helpful than the standard HTML format.

The following code performs a scan on the samples directory, and publishes the results in `html-app` format:

```
./scancode -clpieu --csv output.html samples
```

The Files scanned are shown in the left sidebar, and the section on the right contains separate tabs for the following:

- License Summary
- Copyright Summary
- Clues
- File Details
- Packages

Note: The HTML app also contains a Search option to easily find what you are looking for.

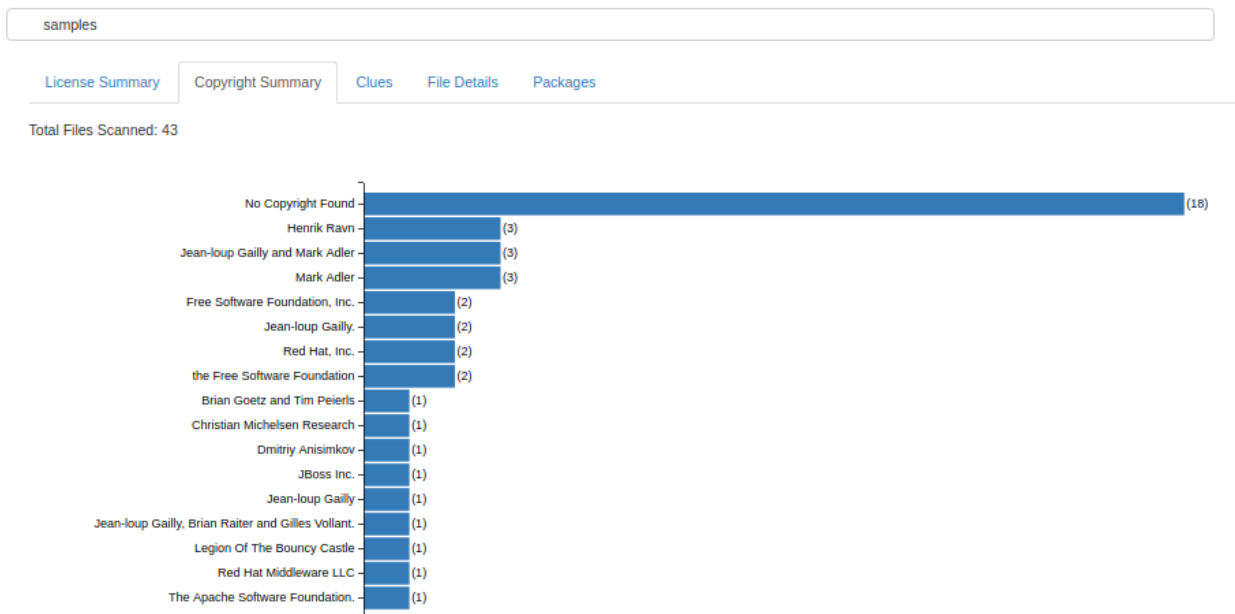
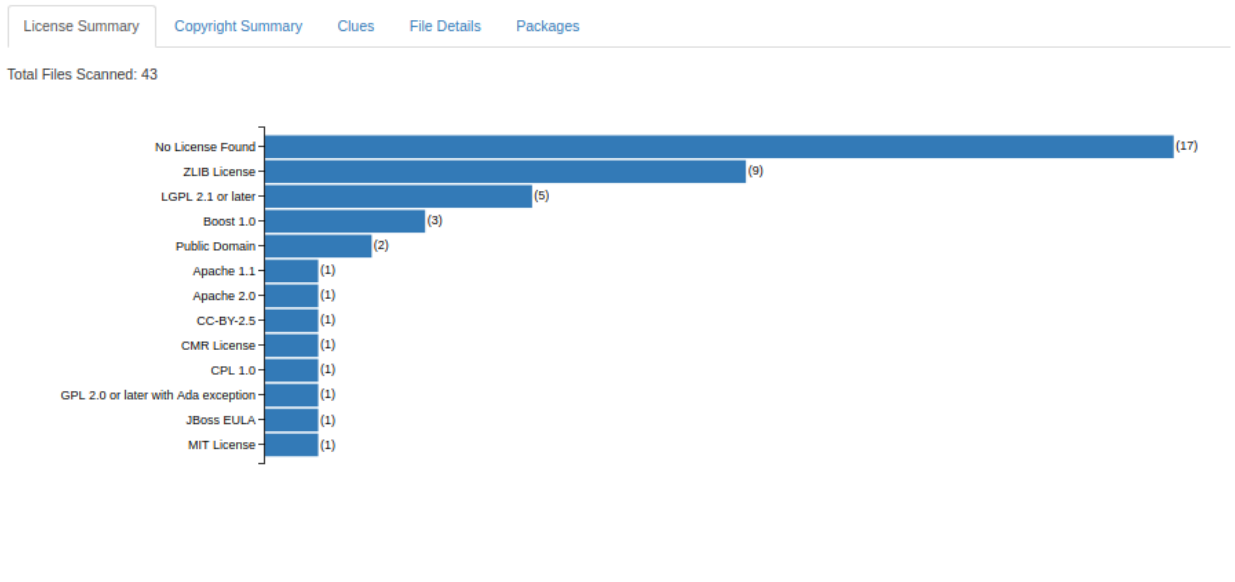
File Information							
path	type	name	extension	date	size	sha1	md5
samples/screenshot.png	file	screenshot.png	.png	2017-09-22	622754	01f4b1de0bc6c75c9cca6e46c80c1802d6976d4	b6ef5a90777147423c98b42a6a25e57a
samples/README	file	README		2019-09-18	238	598b3cadda718999199d9acbb7634f67dc31c9a6	f08e9167711dfa70aa0460f26cbd5cda
samples/JGroups	directory	JGroups		None	241280	None	None
samples/zlib	directory	zlib		None	268762	None	None
samples/arch	directory	arch		None	28103	None	None
samples/JGroups/EULA	file	EULA		2017-09-22	8156	eb232aa0424eca9c4136904e6143b72aaa9c4de	0be0aceb86296727efff0ac0bf8e6bdb3
samples/JGroups/LICENSE	file	LICENSE		2017-09-22	26430	e60c2e780886f95df9c9ee36992b8edabec00bcc	7fbc338309ac38fecd64b04bb903e34
samples/JGroups/licenses	directory	licenses		None	54604	None	None
samples/JGroups/src	directory	src		None	152090	None	None
samples/JGroups/licenses/lgpl.txt	file	lgpl.txt	.txt	2017-09-22	26934	8f1a637d2e2ed1bdb9eb01a7dccb5c12cc0557e1	f14599a2f0896f8c97e2baa4e3d575
samples/JGroups/licenses/bouncycastle.txt	file	bouncycastle.txt	.txt	2017-09-22	1186	74facb0e9a734479f9cd893b5be3fe1bf651b760	9fffd8de865a5705969f62b12838185
samples/JGroups/licenses/apache-1.1.txt	file	apache-1.1.txt	.txt	2019-09-18	2937	186d9195787fcbf2e5401b966159395640e06d11	8c909d7735f28f4db0128ee57fb430e
samples/JGroups/licenses/apache-2.0.txt	file	apache-2.0.txt	.txt	2017-09-22	11560	47b573e3824cd5e02a1a3ae99e2735b49e0256e4	d273d3619c9aef15cda7f6422c4f87
samples/JGroups/licenses/cpl-1.0.txt	file	cpl-1.0.txt	.txt	2017-09-22	11987	681cd776bcd79752543d42490ec7ed22a29fd888	9a6d2c9ae73d59eb3dd38e3909750d14
samples/JGroups/src/RouterStub.java	file	RouterStub.java	.java	2017-09-22	9913	c1f6818f8ee7bddcc9f444bc94c099729d716d52	eeefe23494acbcd8088c93bc1e83c7f2

Package Information		
path	type	packagin
samples/arch/zlib.tar.gz	plain tarball	archive

Licenses					
key	short_name	category	owner	reference_url	homepage_url
apache-1.1	Apache 1.1	Permissive	Apache Software Foundation	https://enterprise.dejacode.com/urn:urn:dje:license:apache-1.1	http://www.apache.org/licenses/
apache-2.0	Apache 2.0	Permissive	Apache Software Foundation	https://enterprise.dejacode.com/urn:urn:dje:license:apache-2.0	http://www.apache.org/licenses/
boost-1.0	Boost 1.0	Permissive	Boost	https://enterprise.dejacode.com/urn:urn:dje:license:boost-1.0	http://www.boost.org/users/license.html
cc-by-2.5	CC-BY-2.5	Permissive	Creative Commons	https://enterprise.dejacode.com/urn:urn:dje:license:cc-by-2.5	http://creativecommons.org/licenses/by/2.5/
cmr-no	CMR License	Permissive	CMR - Christian Michelsen Research AS	https://enterprise.dejacode.com/urn:urn:dje:license:cmr-no	
cpl-1.0	CPL 1.0	Copyleft Limited	IBM	https://enterprise.dejacode.com/urn:urn:dje:license:cpl-1.0	http://www.eclipse.org/legal/cpl-v1.0.html
gpl-2.0-plus-ada	GPL 2.0 or later with Ada exception	Copyleft Limited	Dmitriy Anisimkov	https://enterprise.dejacode.com/urn:urn:dje:license:gpl-2.0-plus-ada	
jboss-eula	JBoss EULA	Proprietary Free	JBoss Community	https://enterprise.dejacode.com/urn:urn:dje:license:iboss-eula	
lgpl-2.1-plus	LGPL 2.1 or later	Copyleft Limited	Free Software Foundation (FSF)	https://enterprise.dejacode.com/urn:urn:dje:license:lgpl-2.1-plus	http://www.gnu.org/licenses/old-licenses/lgpl-2.1-standalone.html
mit	MIT License	Permissive	MIT	https://enterprise.dejacode.com/urn:urn:dje:license:mit	http://opensource.org/licenses/mit-license.php
public-domain	Public Domain	Public Domain	Unspecified	https://enterprise.dejacode.com/urn:urn:dje:license:public-domain	http://www.linfo.org/publicdomain.html
zlib	ZLIB License	Permissive	zlib	https://enterprise.dejacode.com/urn:urn:dje:license:zlib	http://www.zlib.net/

Generated with ScanCode and provided on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. No content created from ScanCode should be considered scanning tool from nexB Inc. and others. Visit <http://www.nexb.com> and <https://github.com/nexB/scancode-toolkit/> for support and download.

Warning: The html-app feature has been deprecated and you should use ScanCode Workbench instead to visualize scan results. The official Repository [link](#). Also refer [How to Visualize Scan results](#).



--csv FILE

ScanCode can publish results in the useful `.csv` format.

License Summary Copyright Summary Clues File Details Packages

Show 10 entries Search:

Path	Type	Name	Extension	Date	Size	SHA1	MD5	File count	MIME type
samples/arch	directory	arch			28103			1	
samples/arch/zlib.tar.gz	file	zlib.tar.gz	.tar.gz	2017-09-22	28103	576f0ccfe534d7f5f5d6400078d3c6586de3abd	20b2370751abfc08bb3556c1d8114b5a		application/x-
samples/JGroups	directory	JGroups			241280			14	
samples/JGroups/EULA	file	EULA		2017-09-22	8156	eb232aa0424eca9c4136904e6143b72aaa9cf4de	0be0aceb8296727efff0ac0bf8e6bdb3		text/plain
samples/JGroups/LICENSE	file	LICENSE		2017-09-22	26430	e60c2e780886f95df9c9ee36992b8edabec00bcc	7fbc338309ac38fecd64b04bb903e34		text/plain
samples/JGroups/licenses	directory	licenses			54604			5	
samples/JGroups/licenses/apache-1.1.txt	file	apache-1.1.txt	.txt	2019-09-18	2937	186d9195787fcbf2e5401b966159395640e06d11	8c909d7735f28f4fdb0128ee57fb430e		text/plain
samples/JGroups/licenses/apache-2.0.txt	file	apache-2.0.txt	.txt	2017-09-22	11560	47b573e3824cd5e02a1a3ae99e2735b49e0256e4	d273d63619c9aeaf15cdf76422c4f87		text/plain
samples/JGroups/licenses/bouncycastle.txt	file	bouncycastle.txt	.txt	2017-09-22	1186	74facb0e9a734479f9cd893b5be3fe1bf651b760	9fffd8de865a5705969f62b128381f85		text/plain
samples/JGroups/licenses/cpl-1.0.txt	file	cpl-1.0.txt	.txt	2017-09-22	11987	681cf776bcd79752543d42490ec7ed22a29fd888	9a6d2c9ae73d59eb3dd38e3909750d14		text/plain

Showing 1 to 10 of 43 entries Previous 1 2 3 4 5 Next

The following code performs a scan on the samples directory, and publishes the results in csv format:

```
./scancode -lpceiu --csv sample.csv samples
```

The first line of the csv file contains the headings, and they are:

- Resource,
- type,
- name,
- base_name,
- extension,
- date,
- size,
- sha1,
- md5,
- files_count,
- mime_type,
- file_type,
- programming_language,
- is_binary,
- is_text,
- is_archive,
- is_media,
- is_source,
- is_script,
- scan_errors,
- license__key,
- license__score,
- license__short_name,
- license__category,
- license__owner,

- `license__homepage_url`,
- `license__text_url`,
- `license__reference_url`,
- `license__spdx_license_key`,
- `license__spdx_url`,
- `matched_rule__identifier`,
- `matched_rule__license_choice`,
- `matched_rule__licenses`,
- `copyright`,
- `copyright_holder`,
- `author`,
- `email`,
- `start_line`,
- `end_line`,
- `url`,
- `package__type`,
- `package__name`,
- `package__version`,
- `package__primary_language`,
- `package__summary`,
- `package__description`,
- `package__size`,
- `package__release_date`,
- `package__homepage_url`,
- `package__notes`,
- `package__bug_tracking_url`,
- `package__vcs_repository`,
- `package__copyright_top_level`

Each subsequent line represents one element, i.e. can be any of the following:

- `license`
- `copyright`
- `package`
- `email`
- `url`

So if there's multiple elements in a file, they are each given an entry with the details mentioned earlier.

Custom Output Format

While the three built-in output formats are convenient for a verity of use-cases, one may wish to create their own output template, using the following arguments:

```
--custom-output FILE --custom-template TEMP_FILE`
```

ScanCode makes this very easy, as it uses the popular Jinja2 template engine. Simply pass the path to the custom template to the `--custom-template` argument, or drop it in a folder to `src/scancode/templates` directory.

For example, if I wanted a simple CLI output I would create a `template2.html` with the particular data I wish to see. In this case, I am only interested in the license and copyright data for this particular scan.

```

1 Resource,type,name,base name,extension,date,size,sha1,md5,files_count,mime_type,file_type,programming language,is binary,is text,is archive,is media,is source,i
s_script,scan_errors,license_key,license_score,license_short_name,license_category,license_owner,license_homepage_url,license_text_url,license_reference
url,license_spdx_license_key,license_spdx_url,matched_rule_identifier,matched_rule_license_choice,matched_rule_licenses,copyright,copyright_holder,author,
email,url,start_line,end_line,package_type,package_name,package_version,package_primary_language,package_summary,package_description,package_size,package
release_date,package_homepage_url,package_notes,package_bug_tracking_url,package_vcs_repository,package_copyright_top_level
2 /samples/screenshot.png,file,screenshot.png,screenshot.png,2017-09-22,622754,01ff4b1de0bc6c75c9cca6e46c80c1802d6976d4,b6ef5a90777147423c98b42a6a25e57a,,image/
png,"PNG image data, 2880 x 1666, 8-bit/color RGB, non-interlaced",,True,False,False,True,False,False,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
3 /samples/README,file,README,README,,2019-09-18,238,598b3cadda718999199d9acbb7634f67dc31c9a6,f08e9167711dfa70aa0460f26cbd5cda,,text/plain,ASCII
text,,False,True,False,False,False,False,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
4 /samples/README,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
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JGroups-2.10.0.GA.src.zip,4,4,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
6 /samples/JGroups/,directory,JGroups,JGroups,,241280,,14,,,False,False,False,False,False,False,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
7 /samples/zlib/,directory,zlib,zlib,,268762,,16,,,False,False,False,False,False,False,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
8 /samples/arch/,directory,arch,arch,,28103,,1,,,False,False,False,False,False,False,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
9 /samples/JGroups/EULA,file,EULA,EULA,,2017-09-22,8156,eb232aa0424eca9c4136904e6143b72aaa9cf4de,0be0aceb8296727efff0ac0bf8e6bdb3,,text/plain,ASCII
text,JavaScript+Lasso,False,True,False,False,True,False,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
10 /samples/JGroups/EULA,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
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http://www.redhat.com/licenses,94,94,,,,,
18 /samples/JGroups/LICENSE,file,LICENSE,LICENSE,,2017-09-22,26430,e60c2e780886f95df9c9ec36992b8edabec00bcc,7fbc338309ac38fefcd6404bb903e34,,text/plain,ASCII
text,,False,True,False,False,False,False,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
19 /samples/JGroups/LICENSE,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
lgpl-2.1-plus,100.00,LGPL 2.1 or later,Copyleft Limited,Free Software Foundation (FSF),http://www.gnu.org/licenses/
old-licenses/lgpl-2.1-standalone.html,http://www.gnu.org/licenses/old-licenses/lgpl-2.1-standalone.html,https://enterprise.dejaode.com/urn/
urn:dje:license:lgpl-2.1-plus,LGPL-2.1+,https://spdx.org/licenses/LGPL-2.1,lgpl-2.1-plus 2.RULE,False,[u'lgpl-2.1-plus'],,,,,1,502,,,,,
20 /samples/JGroups/LICENSE,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
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James Random Hacker,,,,496,497,,,,,
25 /samples/JGroups/licenses/,directory,licenses,licenses,,54604,,5,,,False,False,False,False,False,False,,,,,,,,,,,,,,,,,,,,,,,,
26 /samples/JGroups/src/,directory,src,src,,152090,,7,,,False,False,False,False,False,False,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
27 /samples/JGroups/licenses/lgpl.txt,file,lgpl.txt,lgpl,,2017-09-22,26934,8f1a637d2e2ed1bdb9eb01a7dccb5c12cc0557e1,f14599a2f089f6ff8c97e2baa4e3d575,,text/
plain,"ASCII text, with CRLF line terminators",,False,True,False,False,False,False,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
/samples/JGroups/licenses/lgpl.txt,lgpl-2.1-plus,100.00,LGPL 2.1 or later,Copyleft Limited,Free Software Foundation (FSF),http://www.gnu.org/licenses/
old-licenses/lgpl-2.1-standalone.html,http://www.gnu.org/licenses/old-licenses/lgpl-2.1-standalone.html,https://enterprise.dejaode.com/urn/
urn:dje:license:lgpl-2.1-plus,LGPL-2.1+,https://spdx.org/licenses/LGPL-2.1,lgpl-2.1-plus 2.RULE,False,[u'lgpl-2.1-plus'],,,,,1,502,,,,,

```

```

## template.html:
[
    {% if results.license_copyright %}
        {% for location, data in results.license_copyright.items() %}
            {% for row in data %}
location:"{{ location }}",
            {% if row.what == 'copyright' %}copyright:"{{ row.value|escape }}",{% endif %}
            {% endfor %}
            {% endfor %}
        {% endif %}
]

.. note::

    File name and extension does not matter for the template file.

```

Now I can run ScanCode using my newly created template:

```

$ ./scancode -clpeui --custom-output sample.json --custom-template sample.html samples
Scanning files...
[#####] 46
Scanning done.

```

Now are results are saved in `t.json` and we can easily view them with `head t.json`:

```

[
  location:"samples/JGroups/LICENSE",
  copyright:"Copyright (c) 1991, 1999 Free Software Foundation, Inc.",

  location:"samples/JGroups/LICENSE",
  copyright:"copyrighted by the Free Software Foundation",
]

```

Controlling Scancode Output and Filters

All “Output Control” Scan Options

--strip-root	Strip the root directory segment of all paths.
--full-root	Report full, absolute paths.

Note: The options `--strip-root` and `--full-root` can’t be used together, i.e. Any one option may be used in a single scan.

Note: The default is to always include the last directory segment of the scanned path such that all paths have a common root directory.

--ignore-author <pattern>	Ignore a file (and all its findings) if an author contains a match to the <code><pattern></code> regular expression.
--ignore-copyright-holder <pattern>	Ignore a file (and all its findings) if a copyright holder contains a match to the <code><pattern></code> regular expression.

Note: Note that this both the options `--ignore-author` and `--ignore-copyright-holder` will ignore a file even if it has other scanned data such as a license or errors.

--only-findings	Only return files or directories with findings for the requested scans. Files and directories without findings are omitted (file information is not treated as findings).
------------------------	---

--strip-root Vs. --full-root

For a default scan of the “samples” folder, this a comparison between the default, `strip-root` and `full-root` options.

An example Scan

```
./scancode -cplieu --json-pp output.json samples --full-root
```

These two changes only the “path” attribute of the file information. For this comparison we compare the “path” attributes of the file `LICENSE` inside `JGroups` directory.

The default path:

```
"path": "samples/JGroups/LICENSE",
```

For the `--full-root` option, the path relative to the Root of your local filesystem.

```
"path": "/home/ayansm/Desktop/GSoD/scancode-toolkit-versions/scancode-  
→ toolkit-2.2.1/samples/JGroups/LICENSE"
```

For the `--strip-root` option, the root directory (here `samples`) is removed from path :

```
"path": "JGroups/LICENSE"
```

Note: The options `--strip-root` and `--full-root` can't be used together, i.e. Any one option may be used in a single scan.

Note: The default is to always include the last directory segment of the scanned path such that all paths have a common root directory.

`--ignore-author <pattern>` Option

In a normal scan, all files inside the directory specified as an input argument is scanned and subsequently included in the scan report. But if you want to run the scan on only some selective files, with some specific **common author** then `--ignore-author` option can be used to do the same.

This scan ignores all files with authors matching the string “Apache Software Foundation”:

```
./scancode -cplieu --json-pp output.json samples --ignore-author "Apache_↵  
↵Software Foundation"
```

More information on [Glob Pattern Matching](#).

Note: Note that this both the options `--ignore-author` and `--ignore-copyright-holder` will ignore a file even if it has other scanned data such as a license or errors.

`--ignore-copyright-holder <pattern>` Option

In a normal scan, all files inside the directory specified as an input argument is scanned and subsequently included in the scan report. But if you want to run the scan on only some selective files, with some specific **common copyright holder** then `--ignore-copyright-holder` option can be used to do the same.

This scan ignores all files with Copyright Holders matching the string “Free Software Foundation”:

```
./scancode -cplieu --json-pp output.json samples --ignore-copyright-holder  
↵"Free Software Foundation"
```

More information on [Glob Pattern Matching](#).

`--only-findings` Plugin

This option removes from the scan results, the files where nothing significant has been detected, like files which doesn't contain any licenses, copyrights, emails or urls (if requested in the scan options), and isn't a package.

An example Scan:

```
./scancode -cplieu --json-pp output.json samples --only-findings
```

Note: This also changes in the result displayed, the number of files scanned.

For example, scanning the `sample` files (distributed by default with `scancode-toolkit`) without this option, displays in its report information of 43 files. But after enabling this option, the result shows information for only 31 files.

Pre-Scan Options

All “Pre-Scan” Options

- ignore <pattern>** Ignore files matching <pattern>.
- include <pattern>** Include files matching <pattern>.
- classify** Classify files with flags telling if the file is a legal, or readme or test file, etc.
Sub-Options:
 - `--license-clarity-score`
 - `--summary-key-files`
- facet <facet_pattern>** Here <facet_pattern> represents <facet>=<pattern>. Add the <facet> to files with a path matching <pattern>.
Sub-Options:
 - `--summary-by-facet`

--ignore Option

In a scan, all files inside the directory specified as an input argument is scanned. But if there are some files which you don't want to scan, the `--ignore` option can be used to do the same.

A sample usage:

```
./scancode --ignore "*.java" samples samples.json
```

Here, Scancode ignores files ending with `.java`, and continues with other files as usual.

More information on [Glob Pattern Matching](#).

--include Option

In a normal scan, all files inside the directory specified as an input argument is scanned. But if you want to run the scan on only some selective files, then `--include` option can be used to do the same.

A sample usage:

```
./scancode --include "*.java" samples samples.json
```

Here, Scancode selectively scans files that has names ending with `.java`, and ignores all other files. This is basically complementary in behavior to the `--ignore` option.

More information on [Glob Pattern Matching](#).

--classify

Sub-Option

The options `--license-clarity-score` and `--summary-key-files` are sub-options of `--classify`. `--license-clarity-score` and `--summary-key-files` are Post-Scan Options.

This option makes ScanCode further classify scanned files/directories, to determine whether they fall in these following categories

- legal
- readme
- top-level
- manifest

A manifest file in computing is a file containing metadata for a group of accompanying files that are part of a set or coherent unit.

- key-file

A KEY file is a generic file extension used by various programs when registering legal copies of the software. It may be saved in a plain text format, but generally contains some form of encrypted key string that authenticates the purchase and registers the software.

As in, to the JSON object of each file scanned, these extra attributes are added:

```
"is_legal": false,  
"is_manifest": false,  
"is_readme": true,  
"is_top_level": true,  
"is_key_file": true,
```

--facet Option

Sub-Option

The option `--summary-by-facet` is a sub-option of `--facet`. `--summary-by-facet` is a Post-Scan Option.

Valid `<facet>` values are:

- core,
- dev,
- tests,
- docs,
- data,
- examples.

You can use the `--facet` option in the following manner:

```
./scancode -clpieu --json-pp sample_facet.json samples --facet dev="*.java" -
↪--facet dev="*.c"
```

This adds to the header object, the following attribute:

```
"--facet": [
  "dev=*.java",
  "dev=*.c"
],
```

Here in this example, `.java` and `.c` files are marked as it belongs to facet `dev`.

As a result, `.java` file has the following attribute added:

```
"facets": [
  "dev"
],
```

Note: All other files which are not `dev` are marked to be included in the facet `core`.

For each facet, the `--facet` option precedes the `<facet>=<pattern>` argument. For specifying multiple facets, this whole part is repeated, including the `--facet` option.

For users who want to know *What is a Facet?*.

Glob Pattern Matching

All the Pre-Scan options use pattern matching, so the basics of Glob Pattern Matching is discussed briefly below.

Glob pattern matching is useful for matching a group of files, by using patterns in their names. Then using these patterns, files are grouped and treated differently as required.

Here are some rules from the [Linux Manual](#) on glob patterns. Refer the same for more detailed information.

A string is a wildcard pattern if it contains one of the characters `'?'`, `'*'` or `'['`. Globbing is the operation that expands a wildcard pattern into the list of pathnames matching the pattern. Matching is defined by:

- A `'?'` (not between brackets) matches any single character.
- A `'*'` (not between brackets) matches any string, including the empty string.

- An expression “[...]” where the first character after the leading ‘[’ is not an ‘!’ matches a single character, namely any of the characters enclosed by the brackets.
- There is one special convention: two characters separated by ‘-’ denote a range.
- An expression “[!...]” matches a single character, namely any character that is not matched by the expression obtained by removing the first ‘!’ from it.
- A ‘/’ in a pathname cannot be matched by a ‘?’ or ‘*’ wildcard, or by a range like “[.-0]”.

Note that wildcard patterns are not regular expressions, although they are a bit similar.

For more information on Glob pattern matching refer these resources:

- [Linux Manual](#)
- [Wildcard Match Documentation](#).

You can also import these Python Libraries to practice UNIX style pattern matching:

- [fnmatch](#) for File Name matching
 - [glob](#) for File Path matching
-

What is a Facet?

A facet is defined as follows (by ClearlyDefined):

A facet of a component is a subset of the files related to the component. It’s really just a grouping that helps us understand the shape of the project. Each facet is described by a set of glob expressions, essentially wildcard patterns that are matched against file names.

Each facet definition can have zero or more glob expressions. A file can be captured by more than one facet. Any file found but not captured by a defined facet is automatically assigned to the core facet.

- `core` - The files that go into making the release of the component. Note that the core facet is not explicitly defined. Rather, it is made up of whatever is not in any other facet. So, by default, all files are in the core facet unless otherwise specified.
- `data` - The files included in any data distribution of the component.
- `dev` - Files primarily used at development time (e.g., build utilities) and not distributed with the component
- `docs` - Documentation files. Docs may be included with the executable component or separately or not at all.
- `examples` – Like docs, examples may be included in the main component release or separately.
- `tests` – Test files may include code, data and other artifacts.

Important Links:

- [Facets](#)
- [ClearlyDefined](#)

Post-Scan Options

Post-Scan options activate their respective post-scan plugins which execute the task.

All “Post-Scan” Options

--mark-source	Set the “is_source” flag to true for directories that contain over 90% of source files as direct children and descendants. Count the number of source files in a directory as a new “source_file_counts” attribute Sub-Option of - --url
--consolidate	Group resources by Packages or license and copyright holder and return those groupings as a list of consolidated packages and a list of consolidated components. Sub-Option of - --copyright, --license and --packages.
--filter-clues	Filter redundant duplicated clues already contained in detected licenses, copyright texts and notices.
--is-license-text	Set the “is_license_text” flag to true for files that contain mostly license texts and notices (e.g. over 90% of the content). Sub-Option of - --info and --license-text.

Warning: --is-license-text is an experimental Option.

--license-clarity-score	Compute a summary license clarity score at the codebase level. Sub-Option of - --classify.
--license-policy FILE	Load a License Policy file and apply it to the scan at the Resource level.
--summary	Summarize license, copyright and other scans at the codebase level. Sub-Options: • --summary-by-facet • --summary-key-files • --summary-with-details
--summary-by-facet	Summarize license, copyright and other scans and group the results by facet. Sub-Option of - --summary and --facet.
--summary-key-files	Summarize license, copyright and other scans for key, top-level files. Key files are top- level codebase files such as COPYING, README and package manifests as reported by the --classify option “is_legal”, “is_readme”, “is_manifest” and “is_top_level” flags. Sub-Option of - --classify and --summary.
--summary-with-details	Summarize license, copyright and other scans at the codebase level, keeping intermediate details at the file and directory level.

To see all plugins available via command line help, use --plugins.

Note: Plugins that are shown by using --plugins include the following:

1. Post-Scan Plugins (and, the following)
2. Pre-Scan Plugins
3. Output Options

4. Output Control
 5. Basic Scan Options
-
-

--mark-source Option

Dependency

The option `--mark-source` is a sub-option of and **requires** the option `--info`.

The `mark-source` option marks the “`is_source`” attribute of a directory to be “`True`”, if more than 90% of the files under that directory is source files, i.e. Their “`is_source`” attribute is “`True`”.

When the following command is executed to scan the `samples` directory with this option enabled:

```
./scancode -clpieu --json-pp output.json samples --mark-source
```

Then, the following directories are marked as “`Source`”, i.e. Their “`is_source`” attribute is changed from “`false`” to “`True`”.

- `samples/JGroups/src`
 - `samples/zlib/iostream2`
 - `samples/zlib/gcc_gvmat64`
 - `samples/zlib/ada`
 - `samples/zlib/infbac9`
-

--consolidate Option

Dependency

The option `--consolidate` is a sub-option of and **requires** the options `--license` , `--copyright` and `--package`.

The JSON file containing scan results after using the `--consolidate` Plugin is structured as follows: (note: “...” in the image contains more data)

An example Scan:

```
./scancode -clpieu --json-pp output.json samples --consolidate
```

The JSON output file is structured as follows:

```

{
  "headers": [
    {...}
  ],
  "consolidated_components": [
    {...}
    {
      "type": "license-holders",
      "identifier": "dmitriy_anisimkov_1",
      "consolidated_license_expression": "gpl-2.0-plus WITH ada-linking-
↪exception",
      "consolidated_holders": [
        "Dmitriy Anisimkov"
      ],
      "consolidated_copyright": "Copyright (c) Dmitriy Anisimkov",
      "core_license_expression": "gpl-2.0-plus WITH ada-linking-exception",
      "core_holders": [
        "Dmitriy Anisimkov"
      ],
      "other_license_expression": null,
      "other_holders": [],
      "files_count": 1
    },
    {...}
  ],
  "consolidated_packages": [],
  "files": [
  ]
}

```

Each consolidated component has the following information:

```

"consolidated_components": [
{
  "type": "license-holders",
  "identifier": "dmitriy_anisimkov_1",
  "consolidated_license_expression": "gpl-2.0-plus WITH ada-linking-exception
↪",
  "consolidated_holders": [
    "Dmitriy Anisimkov"
  ],
  "consolidated_copyright": "Copyright (c) Dmitriy Anisimkov",
  "core_license_expression": "gpl-2.0-plus WITH ada-linking-exception",
  "core_holders": [
    "Dmitriy Anisimkov"
  ],
  "other_license_expression": null,
  "other_holders": [],
  "files_count": 1
},

```

In addition to this, in every file/directory where the consolidated part (i.e. License information) was present, a “consolidated_to” attribute is added pointing to the “identifier” of “consolidated_components”:

```
"consolidated_to": [
```

(continues on next page)

(continued from previous page)

```
"dmitriy_anisimkov_1"  
],
```

Note that multiple files may have the same “consolidated_to” attribute.

--filter-clues Option

The `--filter-clues` Plugin filters redundant duplicated clues already contained in detected licenses, copyright texts and notices.

--is-license-text Option

Dependency

The option `--is-license-text` is a sub-option of and requires the options `--info` and `--license-text`. Also, the option `--license-text` is a sub-option of and requires the options `--license`.

If the `--is-license-text` is used, then the “is_license_text” flag is set to true for files that contain mostly license texts and notices. Here mostly means over 90% of the content of the file.

An example Scan:

```
./scancode -clpieu --json-pp output.json samples --license-text --is-license-  
→text
```

If the samples directory is scanned with this plugin, the files containing mostly license texts will have the following attribute set to ‘true’:

```
"is_license_text": true,
```

The files in samples that will have the “is_license_text” to be true are:

```
samples/JGroups/EULA  
samples/JGroups/LICENSE  
samples/JGroups/licenses/apache-1.1.txt  
samples/JGroups/licenses/apache-2.0.txt  
samples/JGroups/licenses/bouncycastle.txt  
samples/JGroups/licenses/cpl-1.0.txt  
samples/JGroups/licenses/lgpl.txt  
samples/zlib/dotzlib/LICENSE_1_0.txt
```

Note that the license objects for each detected license in the files already has “is_license_text” attributes by default, but not the file objects. They only have this attribute if the plugin is used.

Warning: `--is-license-text` is an experimental Option.

--license-clarity-score Option

Dependency

The option `--license-clarity-score` is a sub-option of and requires the option `--classify`.

The `--license-clarity-score` plugin when used in a scan, computes a summary license clarity score at the codebase level.

An example Scan:

```
./scancode -clpieu --json-pp output.json samples --classify --license-
↳clarity-score
```

The “`license_clarity_score`” will have the following attributes:

- “score”
- “declared”
- “discovered”
- “consistency”
- “spdx”
- “license_texts”

Its whole JSON file is structured as follows, when it has “`license_clarity_score`”:

```
{
  "headers": [
    { ...
  },
  "license_clarity_score": {
    "score": 17,
    "declared": false,
    "discovered": 0.69,
    "consistency": false,
    "spdx": false,
    "license_texts": false
  },
  "files": [
    ...
  ]
}
```

--license-policy FILE Option

The Policy file is a YAML (.yaml) document with the following structure:

```
license_policies:
-   license_key: mit
    label: Approved License
    color_code: '#00800'
    icon: icon-ok-circle
-   license_key: agpl-3.0
```

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```
label: Approved License
color_code: '#008000'
icon: icon-ok-circle
```

Note: In the policy file only the “license_key” is a required field.

Applying License Policies during a ScanCode scan, using the `--license-policy` Plugin:

```
./scancode -clipecu --json-pp output.json samples --license-policy policy-
↪file.yml
```

Note: `--license-policy FILE` is not a sub-option of `--license`. It works normally without `-l`.

This adds to every file/directory an object “license_policy”, having as further attributes under it the fields as specified in the .YAML file. Here according to our example .YAML file, the attributes will be:

- “license_key”
- “label”
- “color_code”
- “icon”

Here the `samples` directory is scanned, and the Scan Results for a sample file is as follows:

```
{
  "path": "samples/JGroups/licenses/apache-2.0.txt",
  ...
  ...
  "licenses": [
    ...
    ...
    ...
  ],
  "license_expressions": [
    "apache-2.0"
  ],
  "copyrights": [],
  "holders": [],
  "authors": [],
  "packages": [],
  "emails": [],
  "license_policy": {
    "license_key": "apache-2.0",
    "label": "Approved License",
    "color_code": "#008000",
    "icon": "icon-ok-circle"
  },
  "urls": [],
  "files_count": 0,
  "dirs_count": 0,
  "size_count": 0,
  "scan_errors": []
},
```

More information on the *License Policy Plugin* and usage.

--summary Option

Sub-Option

The option `--summary-by-facet`, `--summary-key-files` and `--summary-with-details` are sub-options of `--summary`. These Sub-Options are all Post-Scan Options.

An example Scan:

```
./scancode -clpieu --json-pp output.json samples --summary
```

The whole JSON file is structured as follows, when the `--summary` plugin is applied:

```
{
  "headers": [
    {
      ...
    }
  ],
  "summary": {
    "license_expressions": [ ...
  ],
    "copyrights": [ ...
  ],
    "holders": [ ...
  ],
    "authors": [ ...
  ],
    "programming_language": [ ...
  ],
    "packages": []
  },
  "files": [ ...
]
}
```

The Summary object has the following attributes.

- “license_expressions”
- “copyrights”
- “holders”
- “authors”
- “programming_language”
- “packages”

Each attribute has multiple entries each containing “value” and “count”, with their values having the summary information inside them.

A sample summary object generated:

```
"summary": {
  "license_expressions": [
    {
      "value": "zlib",
      "count": 13
    },
  ],
},
"copyrights": [
  {
    "value": "Copyright (c) Mark Adler",
    "count": 4
  },
  {
    "value": "Copyright (c) Free Software Foundation, Inc.",
    "count": 2
  },
  {
    "value": "Copyright (c) The Apache Software Foundation",
    "count": 1
  },
  {
    "value": "Copyright Red Hat, Inc. and individual contributors",
    "count": 1
  }
],
"holders": [
  {
    "value": null,
    "count": 10
  },
  {
    "value": "Mark Adler",
    "count": 4
  },
  {
    "value": "Red Hat, Inc. and individual contributors",
    "count": 1
  },
  {
    "value": "The Apache Software Foundation",
    "count": 1
  },
],
"authors": [
  {
    "value": "Bela Ban",
    "count": 4
  },
  {
    "value": "Brian Stansberry",
    "count": 1
  },
  {
    "value": "the Apache Software Foundation (http://www.apache.org/)",
    "count": 1
  }
]
```

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```

],
"programming_language": [
  {
    "value": "C++",
    "count": 13
  },
  {
    "value": "Java",
    "count": 7
  },
],
"packages": []

```

--summary-by-facet Option

Dependency

The option `--summary-by-facet` is a sub-option of and requires the options `--facet` and `--summary`.

Running the scan with `--summary --summary-by-facet` Plugins creates individual summaries for all the facets with the same license, copyright and other scan information, at a codebase level (in addition to the codebase level general summary generated by `--summary` Plugin)

An example scan using the `--summary-by-facet` Plugin:

```

./scancode -clieu --json-pp output.json samples --summary --facet dev="*.java
→" --facet dev="*.c" --summary-by-facet

```

Note: All other files which are not dev are marked to be included in the facet core.

Warning: Running the same scan with `./scancode -clpieu` i.e. with `-p` generates an error. Avoid this.

The JSON file containing scan results is structured as follows:

```

{
  "headers": [ ...
  ],
  "summary": { ...
  },
  "summary_by_facet": [
    {
      "facet": "core",
      "summary": { ...
      }
    },
    {

```

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```
    "facet": "dev",
    "summary": { ...
  },
  {
    "facet": "tests",
    "summary": { ...
  },
  {
    "facet": "docs",
    "summary": { ...
  },
  {
    "facet": "data",
    "summary": { ...
  },
  {
    "facet": "examples",
    "summary": { ...
  }
],
"files": [
]
```

A sample “summary_by_facet” object generated by the previous scan (shortened):

```
"summary_by_facet": [
  {
    "facet": "core",
    "summary": {
      "license_expressions": [
        {
          "value": "mit",
          "count": 1
        },
      ],
      "copyrights": [
        {
          "value": "Copyright (c) Free Software Foundation, Inc.",
          "count": 2
        },
      ],
      "holders": [
        {
          "value": "The Apache Software Foundation",
          "count": 1
        },
      ],
      "authors": [
        {
          "value": "Gilles Vollant",
          "count": 1
        },
      ],
    },
  ],
]
```

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```

    "programming_language": [
      {
        "value": "C++",
        "count": 8
      },
    ]
  },
  {
    "facet": "dev",
    "summary": {
      "license_expressions": [
        {
          "value": "zlib",
          "count": 5
        },
      ],
      "copyrights": [
        {
          "value": "Copyright Red Hat Middleware LLC, and individual_
↪ contributors",
          "count": 1
        },
      ],
      "holders": [
        {
          "value": "Mark Adler",
          "count": 3
        },
      ],
      "authors": [
        {
          "value": "Brian Stansberry",
          "count": 1
        },
      ],
    ],
    "programming_language": [
      {
        "value": "Java",
        "count": 7
      },
      {
        "value": "C++",
        "count": 5
      },
    ]
  },
],
],

```

Note: Summaries for all the facets are generated by default, regardless of facets not having any files under them.

For users who want to know *What is a Facet?*.

--summary-key-files Option

Dependency

The option `--summary-key-files` is a sub-option of and requires the options `--classify` and `--summary`.

An example Scan:

```
./scancode -clpieu --json-pp output.json samples --classify --summary --  
↪summary-key-files
```

Running the scan with `--summary --summary-key-files` Plugins creates summaries for key files with the same license, copyright and other scan information, at a codebase level (in addition to the codebase level general summary generated by `--summary` Plugin)

The resulting JSON file containing the scan results is structured as follows:

```
{  
  "headers": [ ...  
],  
  "summary": {  
    "license_expressions": [ ...  
    ],  
    "copyrights": [ ...  
    ],  
    "holders": [ ...  
    ],  
    "authors": [ ...  
    ],  
    "programming_language": [ ...  
    ],  
    "packages": []  
  },  
  "summary_of_key_files": {  
    "license_expressions": [  
      {  
        "value": null,  
        "count": 1  
      }  
    ],  
    "copyrights": [  
      {  
        "value": null,  
        "count": 1  
      }  
    ],  
    "holders": [  
      {  
        "value": null,  
        "count": 1  
      }  
    ],  
    "authors": [  
      {  
        "value": null,
```

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```

        "count": 1
    }
],
"programming_language": [
    {
        "value": null,
        "count": 1
    }
]
},
"files": [

```

These following flags for each file/directory is also present (generated by `--classify`)

- “is_legal”
- “is_manifest”
- “is_readme”
- “is_top_level”
- “is_key_file”

`--summary-with-details` Option

The `--summary` plugin summarizes license, copyright and other scan information at the codebase level. Now running the scan with the `--summary-with-details` plugin instead creates summaries at individual file/directories with the same license, copyright and other scan information, but at a file/directory level (in addition to the the codebase level summary).

An example Scan:

```
./scancode -clpieu --json-pp output.json samples --summary-with-details
```

Note: `--summary` is redundant in a scan when `--summary-with-details` is already selected.

A sample file object in the scan results (a directory level summary of `samples/arch`) is structured as follows:

```

{
  "path": "samples/arch",
  "type": "directory",
  "name": "arch",
  "base_name": "arch",
  "extension": "",
  "size": 0,
  "date": null,
  "shal": null,
  "md5": null,
  "mime_type": null,
  "file_type": null,
  "programming_language": null,
  "is_binary": false,
  "is_text": false,

```

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```
"is_archive": false,
"is_media": false,
"is_source": false,
"is_script": false,
"licenses": [],
"license_expressions": [],
"copyrights": [],
"holders": [],
"authors": [],
"packages": [],
"emails": [],
"urls": [],
"is_legal": false,
"is_manifest": false,
"is_readme": false,
"is_top_level": true,
"is_key_file": false,
"summary": {
  "license_expressions": [
    {
      "value": "zlib",
      "count": 3
    },
    {
      "value": null,
      "count": 1
    }
  ],
  "copyrights": [
    {
      "value": null,
      "count": 1
    },
    {
      "value": "Copyright (c) Jean-loup Gailly",
      "count": 1
    },
    {
      "value": "Copyright (c) Jean-loup Gailly and Mark Adler",
      "count": 1
    },
    {
      "value": "Copyright (c) Mark Adler",
      "count": 1
    }
  ],
  "holders": [
    {
      "value": null,
      "count": 1
    },
    {
      "value": "Jean-loup Gailly",
      "count": 1
    },
    {
      "value": "Jean-loup Gailly and Mark Adler",
```

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```

        "count": 1
    },
    {
        "value": "Mark Adler",
        "count": 1
    }
],
"authors": [
    {
        "value": null,
        "count": 4
    }
],
"programming_language": [
    {
        "value": "C++",
        "count": 3
    },
    {
        "value": null,
        "count": 1
    }
]
},
"files_count": 4,
"dirs_count": 2,
"size_count": 127720,
"scan_errors": []
},

```

These following flags for each file/directory is also present (generated by `--classify`)

- “is_legal”
- “is_manifest”
- “is_readme”
- “is_top_level”
- “is_key_file”

1.1.3 Basic Tutorials

How to Run a Scan

In this simple tutorial example, we perform a basic scan on the `samples` directory distributed by default with Scan-code.

Warning: This tutorial is for Linux based systems presently. Additional Help for Windows/MacOS will be added.

Setting up a Virtual Environment

Scancode Toolkit 3.1.1 and Workbench 3.1.0 is not compatible with python 3.x so we will create a [virtual environment](#) using the `Virtualenv` tool with a python 2.7 interpreter.

The following commands set up and activate the Virtual Environment `venv-scan3.1.1`:

```
virtualenv -p /usr/bin/python2.7 venv-scan3.1.1
source venv-scan3.1.1/bin/activate
```

Setting up Scancode Toolkit

Get the Scancode Toolkit Version 3.1.1 tarball or .zip archive from the [Toolkit GitHub Release Page](#) under assets options. Download and extract the Archive from command line:

For .zip archive:

```
unzip scancode-toolkit-3.1.1.zip
```

For .tar.bz2 archive:

```
tar -xvf scancode-toolkit-3.1.1.tar.bz2
```

Or Right Click and select “Extract Here”.

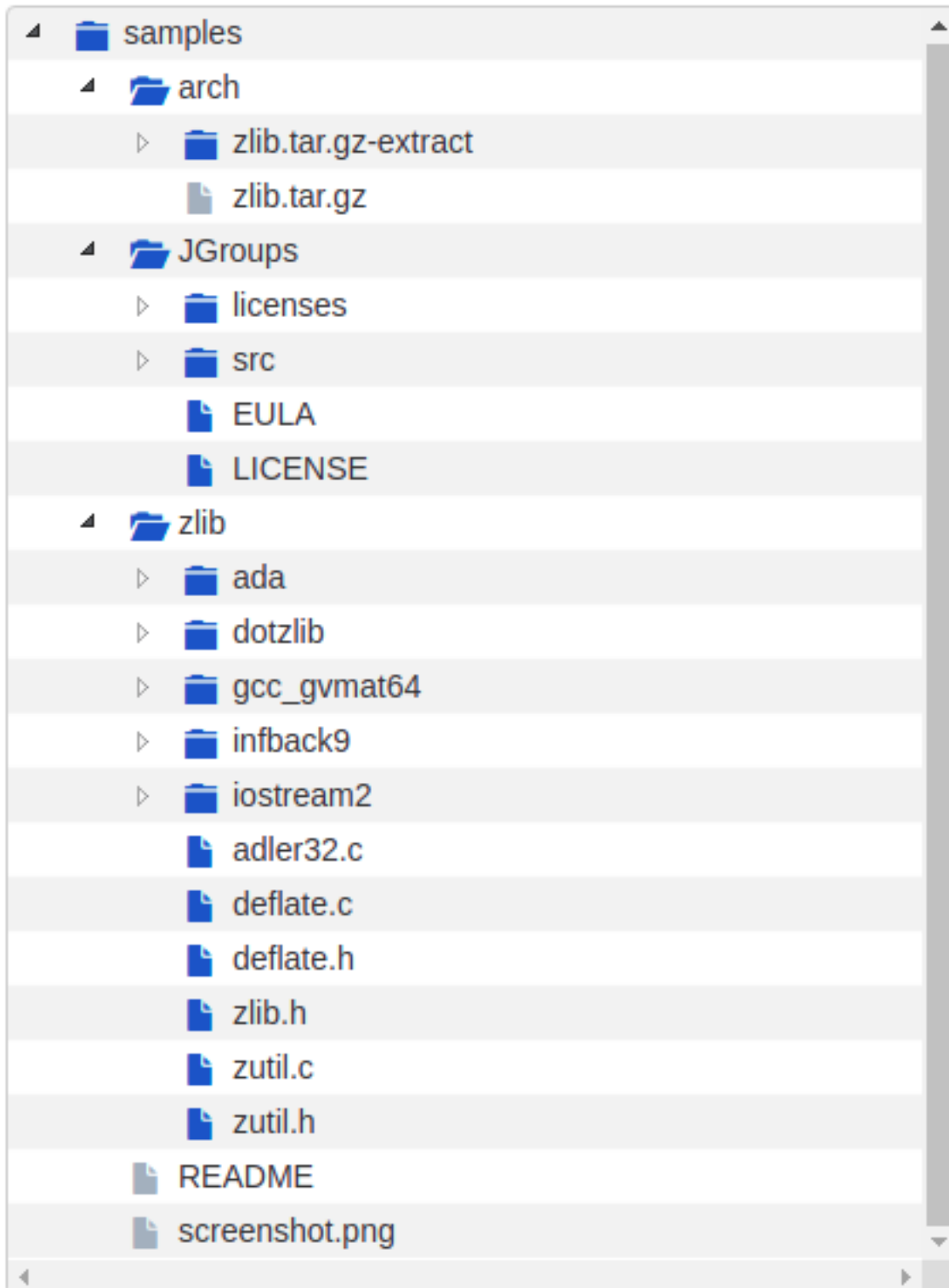
Check whether the *Prerequisites* are installed. Open a terminal in the extracted directory and run:

```
./scancode --help
```

This will configure ScanCode and display the command line *Help text*.

Looking into Files

As mentioned previously, we are going to perform the scan on the `samples` directory distributed by default with Scancode Toolkit. Here’s the directory structure and respective files:



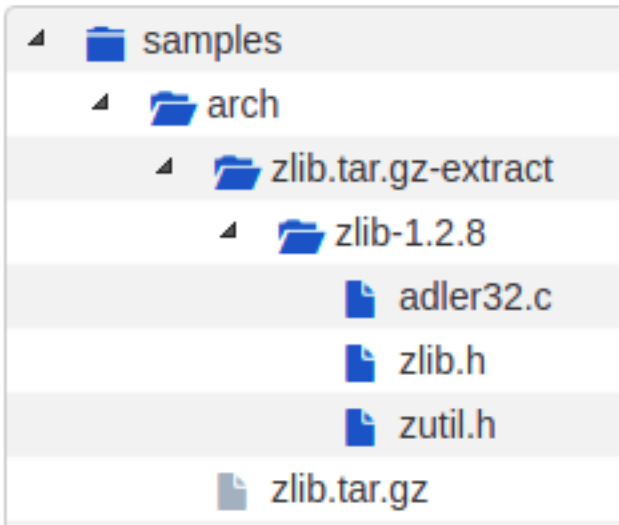
We notice here that the sample files contain a package `zlib.tar.gz`. So we have to extract the archive before running the scan, to also scan the files inside this package.

Performing Extraction

To extract the packages inside `samples` directory:

```
./extractcode samples
```

This extracts the `zlib.tar.gz` package:



Note: `--shallow` option can be used to recursively extract packages.

Deciding Scan Options

These are some common scan options you should consider using before you start the actual scan, according to your requirements.

1. The Basic Scan options, i.e. `-c`, `-l`, `-p`, `-e`, `-u`, and `-i` are to be decided, according to your requirements. If you do not need one specific type of information (say, licenses), consider removing it, because the more things you scan for, longer it will take for the scan to complete.

Note: You have to select these options explicitly, as they are not default anymore from versions 3.x, unlike earlier versions having `-clp` as default.

1. `--license-score` `INTEGER` is to be set if license matching accuracy is desired (Default is 0, and increasing this means a more accurate match). Also, using `--license-text` includes the matched text to the result.
2. `-n` `INTEGER` option can be used to speed up the scan using multiple parallel processes.
3. `--timeout` `FLOAT` option can be used to skip a file taking a lot of time to scan.
4. `--ignore` `<pattern>` can be used to skip certain group of files.
5. `<OUTPUT FORMAT OPTION(s)>` is also a very important decision when you want to use the output for specific tasks/have requirements. Here we are using `json` as ScanCode Workbench imports `json` files only.

For the complete list of options, refer [All Available Options](#).

Running The Scan

Now, run the scan with the options decided:

```
./scancode -clpeui -n 2 --ignore "*.java" --json-pp sample.json samples
```

A Progress report is shown:

```
Setup plugins...
Collect file inventory...
Scan files for: info, licenses, copyrights, packages, emails, urls with 2 process(es).
↪...
[#####] 29
Scanning done.
Summary:      info, licenses, copyrights, packages, emails, urls with 2 process(es)
Errors count: 0
Scan Speed:   1.09 files/sec. 40.67 KB/sec.
Initial counts: 49 resource(s): 36 file(s) and 13 directorie(s)
Final counts:  42 resource(s): 29 file(s) and 13 directorie(s) for 1.06 MB
Timings:
  scan_start: 2019-09-24T203514.573671
  scan_end:   2019-09-24T203545.649805
  setup_scan:licenses: 4.30s
  setup: 4.30s
  scan: 26.62s
  total: 31.14s
Removing temporary files...done.
```

Other Important Documentation

1. *Type of Options*
2. *How to Run a Scan*
3. *Basic Tutorials*
4. *How-To Guides*
5. *How it all Works*
6. *Contributing to Code Development*
7. *Contributing to the Documentation*
8. *Plugin Architecture*
9. *FAQ*
10. *Support*

How to Visualize Scan results

In this simple tutorial example, we import results from a basic scan performed on the `samples` directory distributed by default with Scancode, and visualize the outputs through Scancode Workbench.

Warning: This tutorial uses the 3.1.1 version of Scancode Toolkit, and Scancode Workbench 3.1.0 (This beta version of ScanCode Workbench is compatible with scans from any ScanCode Toolkit develop version/branch at or after v3.0.2). If you are using an older version of Scancode Toolkit, check respective versions of this documentation. Also refer the Scancode Workbench [release highlights](#).

Warning: This tutorial is for Linux based systems presently. Additional Help for Windows/MacOS will be added.

Setting up Scancode Workbench

According to the Install *Building Requirements*, we have to install Node.js 6.x or later. Refer to Node.js install [instructions](#) here.

You can also run the following commands:

```
sudo apt-get install -y nodejs
sudo npm install npm@5.2.0 -g
```

After Node.js and npm is installed and get the Scancode Workbench 3.1.0 tarball from the [Workbench Release Page](#). Extract the package and then launch Scancode Workbench:

```
./ScanCode-Workbench
```

This opens the Workbench.

Note: You can also build Scancode Toolkit and Scancode Workbench from source. Clone the repository, don't forget to checkout to the specific release using `git checkout <release>`, and follow the build instructions. You'll also have to create a Python 2.7 Virtual Environment, or use the same venv-3.1.1 created here at [How to Run a Scan](#).

Importing Data into Scancode Workbench

1. Click on the File -> Import JSON File or Press Ctrl + I.
2. Select the file from the pop-up window.
3. Select a Name and Location (where you want it later) for the .sqlite output file.

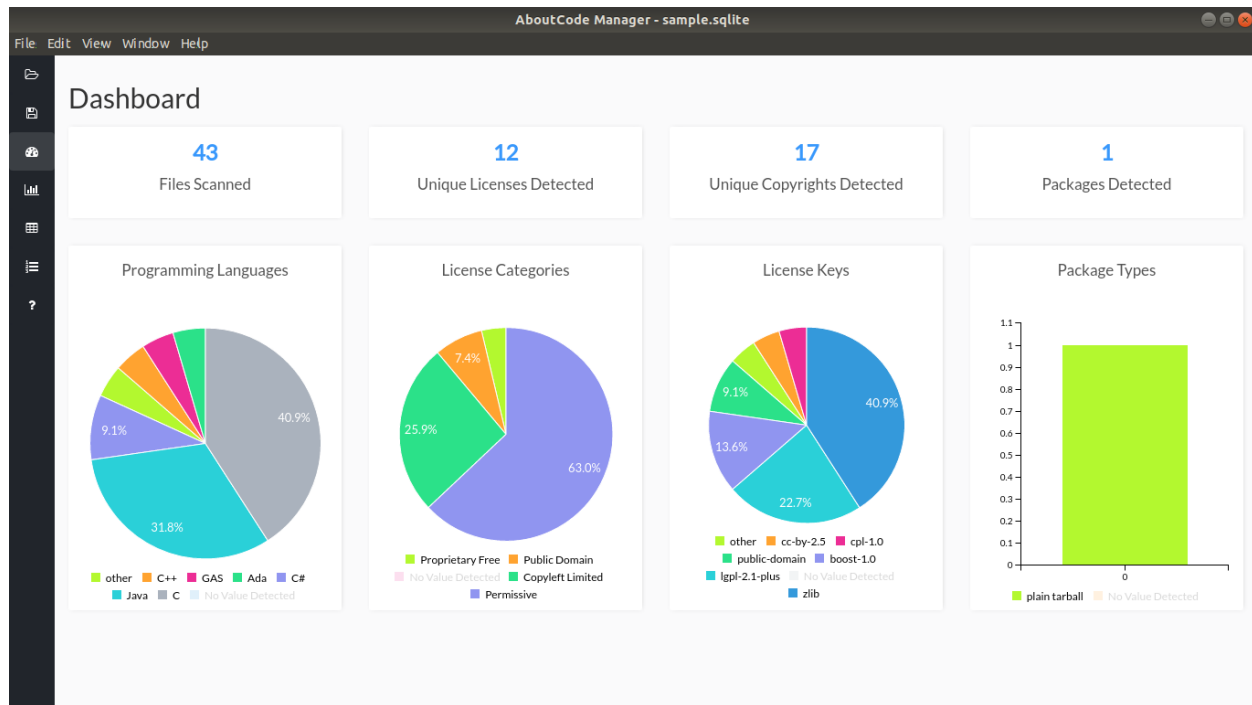
Note: You can also import a .sqlite file you've saved in the past to load scan results. As it is much faster, once you've imported the JSON file and a corresponding SQLite file has been created, you shouldn't repeat this. Instead, import the SQLite file next time you want to visualize the same scan result.

Visualization

Views

Refer *Scancode Workbench Views* for more information on Visualization.

The dashboard has a general overview.



There are 3 principal views (They appear in the same order in the GIFs):

- Chart Summary View,
- Table View,
- Components Summary View.

Filters

You can also click any file/directory on the file list located on the right, to filter the results such that it only contains results from that File/Directory.

Components

Refer [Creating Conclusions](#) for more information on Components.

In the table view,

1. Apply filters by selecting Files/Directories
2. Right Click on the Left Panel
3. Select `Edit Component`
4. A pop-up opens with fields, make necessary edits and Save.
5. Go to the Component Summary View to see the Component.

How To Extract Archives

ScanCode Toolkit provides archive extraction. This command can be used before running a scan over a codebase in order to ensure all archives are extracted. Archives found inside an extracted archive are extracted recursively. Extraction is done in-place in a directory and named after the archive with '-extract' appended.

Name	Date Modified	Size	Kind
 zlib.tar.gz	Feb 8, 2016, 4:04 PM	28 KB	gzip compressed archive
 zlib.tar.gz-extract	Today, 4:18 PM	--	Folder

Usage:

```
./extractcode [OPTIONS] <input>
```

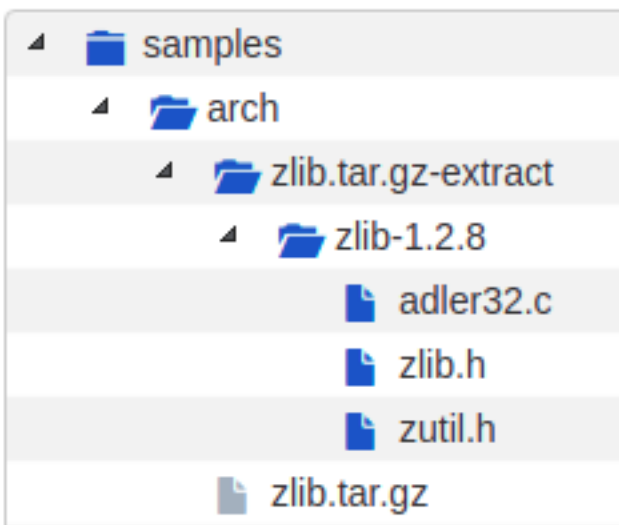
All Extractcode Options

This is intended to be used as an input preparation step, before running the scan. Archives found in an extracted archive are extracted **recursively** by default. Extraction is done in-place in a directory named '-extract' side-by-side with an archive.

To extract the packages in the `samples` directory

```
./extractcode samples
```

This extracts the `zlib.tar.gz` package:



--shallow	Do not extract recursively nested archives (e.g. Not archives in archives).
--verbose	Print verbose file-by-file progress messages.
--quiet	Do not print any summary or progress message.
-h, --help	Show the extractcode help message and exit.
--about	Show information about ScanCode and licensing and exit.

--version Show the version and exit.

How to specify Scancode Output Format

A basic overview of formatting Scancode Output is presented here.

More information on *Scancode Output Formats*.

JSON

If you want JSON output of ScanCode results, you can pass the `--json` argument to ScanCode. The following commands will output scan results in a formatted json file:

- `./scancode --json /path/to/output.json /path/to/target/dir`
- `./scancode --json-pp /path/to/output.json /path/to/target/dir`
- `./scancode --json-lines /path/to/output.json /path/to/target/dir`

To compare the JSON output in different formats refer *Comparing Different json Output Formats*.

Print to stdout (Terminal)

If you want to format the output in JSON and print it at stdout, you can replace the JSON filename with a “-“, like `--json-pp -` instead of `--json-pp output.json`.

The following command will output the scan results in JSON format to stdout (In the Terminal):

```
./scancode -clpieu --jsonlines - samples/
```

HTML

If you want HTML output of ScanCode results, you can pass the `--html` argument to ScanCode. The following commands will output scan results in a formatted HTML page or simple web application:

- `./scancode --html /path/to/output.html /path/to/target/dir`
- `./scancode --html-app /path/to/output.html /path/to/target/dir`

For more details on the HTML output format refer *-html FILE*.

Warning: The `--html-app` option has been deprecated, use Scancode Workbench instead.

Custom Output Format

While the three built-in output formats are convenient for a verity of use-cases, one may wish to create their own output template, using the following arguments:

```
`--custom-output FILE --custom-template TEMP_FILE`
```

ScanCode makes this very easy, as it uses the popular Jinja2 template engine. Simply pass the path to the custom template to the `--custom-template` argument, or drop it in a folder to `src/scancode/templates` directory.

For example, if I wanted a simple CLI output I would create a `template2.html` with the particular data I wish to see. In this case, I am only interested in the license and copyright data for this particular scan.

```
## template.html:
[
    {% if results.license_copyright %}
        {% for location, data in results.license_copyright.items() %}
            {% for row in data %}
location:"{{ location }}",
            {% if row.what == 'copyright' %}copyright:"{{ row.value|escape }}",{% endif %}
                {% endfor %}
            {% endfor %}
        {% endif %}
]

.. note::

    File name and extension does not matter for the template file.
```

Now I can run ScanCode using my newly created template:

```
$ ./scancode -clpeui --custom-output sample.json --custom-template sample.html samples
Scanning files...
[#####] 46
Scanning done.
```

Now are results are saved in `t.json` and we can easily view them with `head t.json`:

```
[
  location:"samples/JGroups/LICENSE",
  copyright:"Copyright (c) 1991, 1999 Free Software Foundation, Inc.",

  location:"samples/JGroups/LICENSE",
  copyright:"copyrighted by the Free Software Foundation",
]
```

How to set what will be detected in Scan

ScanCode allows you to scan a codebase for license, copyright and other interesting information that can be discovered in files. The following options are available for detection when using ScanCode Toolkit:

All “Basic” Scan Options

Option lists are two-column lists of command-line options and descriptions, documenting a program’s options. For example:

-c, --copyright	Scan <input> for copyrights.
	Sub-Options:
	• <code>--consolidate</code>
-l, --license	Scan <input> for licenses.
	Sub-Options:

	• <code>--consolidate</code> • <code>--license-score INT</code> • <code>--license-text</code> • <code>--license-url-template TEXT</code> • <code>--license-text-diagnostics</code> • <code>--is-license-text</code>
-p, --package	Scan <input> for packages. Sub-Options: • <code>--consolidate</code>
-e, --email	Scan <input> for emails. Sub-Options: • <code>--max-email INT</code>
-u, --url	Scan <input> for urls. Sub-Options: • <code>--max-url INT</code>
-i, --info	Include information such as: • Size, • Type, • Date, • Programming language, • sha1 and md5 hashes, • binary/text/archive/media/source/script flags • Additional options through more CLI options Sub-Options: • <code>--mark-source</code>

Note: Unlike previous 2.x versions, `-c`, `-l`, and `-p` are not default. If any of combination of these options are used, ScanCode only performs that specific task, and not the others. `./scancode -e` only scans for emails, and doesn't scan for copyright/license/packages/general information.

Note: These options, i.e. `-c`, `-l`, `-p`, `-e`, `-u`, and `-i` can be used together. As in, instead of `./scancode -c -l -p`, you can write `./scancode -cip` and it will be the same.

--generated	Classify automatically generated code files with a flag.
--max-email INT	Report only up to INT emails found in a file. Use 0 for no limit. [Default: 50]
	Sub-Option of <code>--email</code>

- max-url INT** Report only up to INT urls found in a file. Use 0 for no limit. [Default: 50]
Sub-Option of - --url
- license-score INTEGER** Do not return license matches with scores lower than this score. A number between 0 and 100. [Default: 0] Here, a bigger number means a better match, i.e. Setting a higher license score translates to a higher threshold (with equal or less number of matches).
Sub-Option of - --license
- license-text** Include the matched text for the detected licenses in the output report.
Sub-Option of - --license
Sub-Options:
- --license-text-diagnostics
 - --is-license-text
- license-url-template TEXT** Set the template URL used for the license reference URLs.
In a template URL, curly braces ({}) are replaced by the license key. [Default: Sub-Option of - --license
- license-text-diagnostics** In the matched license text, include diagnostic highlights surrounding with square brackets [] words that are not matched.
Sub-Option of - --license and --license-text

Different Scans

The following examples will use the `samples` directory that is provided with the [ScanCode Toolkit code](#). All examples will be saved in the JSON format, which can be loaded into Scancode Workbench for visualization. See [How to Visualize Scan results](#) for more information. Another output format option is a static html file. See [Scancode Output Formats](#) for more information.

Scan for all clues:

To scan for licenses, copyrights, urls, emails, package information, and file information

```
./scancode -clpeu --json output.json samples
```

Scan for license and copyright clues:

```
./scancode -cl --json-pp output.json samples
```

Scan for emails and URLs:

```
./scancode -eu --json-pp output.json samples
```

Scan for package information:

```
./scancode -p --json-pp output.json samples
```

Scan for file information:

```
./scancode -i --json-pp output.json samples
```

To see more example scans:

```
./scancode --examples
```

For more information, refer [All Available Options](#).

1.1.4 How-To Guides

How To Add a New License for Detection

How to add a new license for detection?

To add new license, you first need to select a new and unique license key (mit and gpl-2.0 are some of the existing license keys). All licenses are stored as plain text files in the `src/licensedcode/data/licenses` directory using their key as part of the file names.

You need to create a pair of files:

- a file with the text of the license saved in a plain text file named `key.LICENSE`
- a small text data file (in YAML format) named `key.yml` that contains license information such as:

```
key: my-license
name: My License
```

The key name can contain only these symbols:

- lowercase letters from a to z,
- numbers from 0 to 9, and
- dash - and . period signs. No spaces.

Save these two files in the `src/licensedcode/data/licenses/` directory.

Done!

See the `src/licensedcode/data/licenses/` directory for examples.

How to Add New License Rules for Enhanced Detection

ScanCode relies on license rules to detect licenses. A rule is a simple text file containing a license text or notice or mention. And a small YAML text file that tells ScanCode which licenses to report when the text is detected.

See the [FAQ](#) for a high level description of [How to Add New License Rules for Enhanced Detection](#).

How to add a new license detection rule?

A license detection rule is a pair of files:

- a plain text rule file that is typically a variant of a license text, notice or license mention.
- a small text data file (in YAML format) documenting which license(s) should be detected for the rule text.

To add a new rule, you need to pick a unique base file name. As a convention, we like to include the license key(s) that should be detected in that name to make it more descriptive. For example: `mit_and_gpl-2.0` is a good base name. Add a suffix to make it unique if there is already a rule with this base name. Do not use spaces or special characters in that name.

Then create the rule file in the `src/licensedcode/data/rules/` directory using this name, replacing `selected_base_name` with the base name you selected:

```
selected_base_name.RULE
```

Save your rule text in this file.

Then create the YAML data file in the `src/licensedcode/data/rules/` directory using this name:

```
selected_base_name.yml
```

For a simple mit and gpl-2.0 detection license keys detection, the content of this file can be this YAML snippet:

```
licenses:
  - mit
  - gpl-2.0
```

Save these two files in the `src/licensedcode/data/licenses/` directory and you are done!

See the `src/licensedcode/data/rules/` directory for examples.

More (advanced) rules options:

- you can use a `notes: text` field to document this rule.
- if no license should be detected for your `.RULE` text, do not add a list of license keys, just add a note.
- `.RULE` text can contain special text regions that can be ignored when scanning for licenses. You can mark a template region in your rule text using `{{double curly braces}}` and up to five words can vary and still match this rule. You must add this field in your `.yml` data file to mark this rule as a template

```
template: yes
```

- By using a number after the opening braces, more than five words can be skipped. With `{{10 double curly braces}}` ten words would be skipped.
- To mark a rule as detecting a choice of licenses, add this field in your `.yml` file:

```
license_choice: yes
```

See the [#257 issue](#) and the related [#258 pull request](#) for an example: this adds a new rule to detect a combination of MIT or GPL.

1.1.5 How it all Works

Overview

How does ScanCode work?

For license detection, ScanCode uses a (large) number of license texts and license detection ‘rules’ that are compiled in a search index. When scanning, the text of the target file is extracted and used to query the license search index and find license matches.

For copyright detection, ScanCode uses a grammar that defines the most common and less common forms of copyright statements. When scanning, the target file text is extracted and ‘parsed’ with this grammar to extract copyright statements.

ScanCode-Toolkit performs the scan on a codebase in the following steps :

1. Collect an inventory of the code files and classify the code using file types,
2. Extract files from any archive using a general purpose extractor
3. Extract texts from binary files if needed
4. Use an extensible rules engine to detect open source license text and notices
5. Use a specialized parser to capture copyright statements
6. Identify packaged code and collect metadata from packages
7. Report the results in the formats of your choice (JSON, CSV, etc.) for integration with other tools

Scan results are provided in various formats:

- a JSON file simple or pretty-printed,
- SPDX tag value or XML, RDF formats,
- CSV,
- a simple unformatted HTML file that can be opened in browser or as a spreadsheet.

For each scanned file, the result contains:

- its location in the codebase,
- the detected licenses and copyright statements,
- the start and end line numbers identifying where the license or copyright was found in the scanned file, and
- reference information for the detected license.

For archive extraction, ScanCode uses a combination of Python modules, 7zip and libarchive/bsdtar to detect archive types and extract these recursively.

Several other utility modules are used such as libmagic for file and mime type detection.

1.1.6 Contribute

Contributing to Code Development

See [CONTRIBUTING.rst](#) for details.

Code layout and conventions

Source code is in `src/` Tests are in `tests/`.

There is one Python package for each major feature under `src/` and a corresponding directory with the same name under `tests` (but this is not a package by design).

Each test script is named `test_XXXX` and while we love to use `py.test` as a test runner, most tests have no dependencies on `py.test`, only on the `unittest` module (with the exception of some command line tests that depend on `pytest monkeypatching` capabilities).

When source or tests need data files, we store these in a `data` subdirectory.

We use PEP8 conventions with a relaxed line length that can be up to 90'ish characters long when needed to keep the code clear and readable.

We store pre-built bundled native binaries in `bin/` sub-directories of each `src/` packages. These binaries are organized by OS and architecture. This ensures that ScanCode works out of the box either using a checkout or a download, without needing a compiler and toolchain to be installed. The corresponding source code for the pre-built binaries are stored in a separate repository at <https://github.com/nexB/scancode-thirdparty-src>.

We store bundled thirdparty components and libraries in the `thirdparty` directory. Python libraries are stored as wheels, eventually pre-built if the corresponding wheel is not available in the Pypi repository. Some of these components may be advanced builds with bug fixes or advanced patches.

We write tests, a lot of tests, thousands of tests. Several tests are data-driven and use data files as test input and sometimes data files as test expectation (in this case using either JSON or YAML files). The tests should pass on Linux 64 bits, Windows 32 and 64 bits and on MacOSX 10.6.8 and up. We maintain two CI loops with Travis (Linux) at <https://travis-ci.org/nexB/scancode-toolkit> and Appveyor (Windows) at <https://ci.appveyor.com/project/nexB/scancode-toolkit>.

When finding bugs or adding new features, we add tests. See existing test code for examples.

More info:

- Source code and license datasets are in the `/src/` directory.
- Test code and test data are in the `/tests/` directory.
- Datasets and test data are in `/data/` sub-directories.
- Third-party components are vendored in the `/thirdparty/` directory. ScanCode is self contained and should not require network access for installation or configuration of third-party libraries.
- Additional pre-compiled vendored binaries are stored in `bin/` sub-directories of the `/src/` directory with their sources in this repo: <https://github.com/nexB/scancode-thirdparty-src/>
- Porting ScanCode to other OS (FreeBSD, etc.) is possible. Enter an issue for help.
- Bugs and pull requests are welcomed.
- See the wiki and `CONTRIBUTING.rst` for more info.

Running tests

ScanCode comes with over 13,000 unit tests to ensure detection accuracy and stability across Linux, Windows and macOS OSes: we kinda love tests, do we?

We use `pytest` to run the tests: call the `py.test` script to run the whole test suite. This is installed by `pytest`, which is bundled with a ScanCode checkout and installed when you run `./configure`.

If you are running from a fresh git clone and you run `./configure` and then `source bin/activate` the `py.test` command will be available in your path.

Alternatively, if you have already configured but are not in an activated “virtualenv” the `py.test` command is available under `<root of your checkout>/bin/py.test`

(Note: paths here are for POSIX, but mostly the same applies to Windows)

If you have a multiprocessor machine you might want to run the tests in parallel (and faster) For instance: `py.test -n4` runs the tests on 4 CPUs. We typically run the tests in verbose mode with `py.test -vvs -n4`.

You can also run a subset of the test suite as shown in the CI configs <https://github.com/nexB/scancode-toolkit/blob/develop/appveyor.yml#L6> e.g. `py.test -n 2 -vvs tests/scancode` runs only the test scripts present in the `tests/scancode` directory. (You can pass a path to a specific test script file there too).

See also <https://docs.pytest.org> for details or use the `py.test -h` command to show the many other options available.

One useful option is to run a select subset of the test functions matching a pattern with the `-k` option, for instance: `py.test -vvs -k tcpdump` would only run test functions that contain the string “tcpdump” in their name or their class name or module name .

Another useful option after a test run with some failures is to re-run only the failed tests with the `--lf` option, for instance: `py.test -vvs --lf` would only run only test functions that failed in the previous run.

pip requirements and the configure script

ScanCode use the `configure` and `configure.bat` (and `etc/configure.py` behind the scenes) scripts to install a `virtualenv` , install required packaged dependencies as `pip` requirements and more configure tasks such that ScanCode can be installed in a self-contained way with no network connectivity required.

Earlier unreleased versions of ScanCode where using `buildout` to install and configure eventually complex dependencies. We had some improvements that were merged in the upstream `buildout` to support bootstrapping and installing without a network connection and When we migrated to use `pip` and `wheels` as new, improved and faster way to install and configure dependencies we missed some of the features of `buildout` like the `recipes`, being able to invoke arbitrary Python or shell scripts after installing packages and have scripts or requirements that are operating system-specific.

ScanCode requirements and third-party Python libraries

In a somewhat unconventional way, all the required libraries are bundled aka. Copied in the repo itself in the `thirdparty/` directory. If ScanCode were only a library it would not make sense. But it is first an application and having a well defined frozen set of dependent packages is important for an app. The benefit of this approach (combined with the `configure` script) means that a mere checkout of the repository contains everything needed to run ScanCode except for a Python interpreter.

Using ScanCode as a Python library

ScanCode can be used alright as a Python library and is available as as a Python wheel in Pypi and installed with `pip install scancode-toolkit`.

How to cut a new release:

- run `bumpversion` with major, minor or patch to bump the version in:
 - `src/scancode/__init__.py`
 - `setup.py`
 - Update the `CHANGELOG.rst`
- commit changes and push changes to develop:

- `git commit -m "commit message"`
- `git push --set-upstream origin develop`
- merge develop branch in master and tag the release.
 - `git checkout master`
 - `git merge develop`
 - `git tag -a v1.6.1 -m "Release v1.6.1"`
 - `git push --set-upstream origin master`
 - `git push --set-upstream origin v1.6.1`
- draft a new release in GitHub, using the previous release blurb as a base. Highlight new and noteworthy changes from the `CHANGELOG.rst`.
- run `etc/release/release.sh` locally.
- upload the release archives created in the `dist/` directory to the GitHub release page.
- save the release as a draft. Use the previous release notes to create notes in the same style. Ensure that the link to third-party source code is present.
- test the downloads.
- publish the release on GitHub
- then build and publish the released wheel on Pypi. For this you need your own Pypi credentials (and get authorized to publish Pypi release: ask @pombredanne) and you need to have the `twine` package installed and configured.
 - Build a `.whl` with `python setup.py bdist_wheel`
 - Run `twine` with `twine upload dist/<path to the built wheel>`
 - Once uploaded check the published release at <https://pypi.python.org/pypi/scancode-toolkit/>
 - Then create a new fresh local virtualenv and test the wheel installation with: `pip install scancode-toolkit`

Contributing to the Documentation

Continuous Integration

The documentations are checked on every new commit through Travis-CI, so that common errors are avoided and documentation standards are enforced. Travis-CI presently checks for these 3 aspects of the documentation :

1. Successful Builds (By using `sphinx-build`)
2. No Broken Links (By Using `link-check`)
3. Linting Errors (By Using `Doc8`)

Style Checks Using Doc8

How To Run Style Tests

In the project root, run the following command:

```
$ doc8 --max-line-length 100 docs/source/scancode-toolkit
```

Note: Only the scancode-toolkit documentation style standards are enforced presently.

A sample output is:

```
Scanning...
Validating...
docs/source/scancode-toolkit/misc/licence_policy_plugin.rst:37: D002 Trailing
↪ whitespace
docs/source/scancode-toolkit/misc/faq.rst:45: D003 Tabulation used for indentation
docs/source/scancode-toolkit/misc/faq.rst:9: D001 Line too long
docs/source/scancode-toolkit/misc/support.rst:6: D005 No newline at end of file
=====
Total files scanned = 34
Total files ignored = 0
Total accumulated errors = 326
Detailed error counts:
  - CheckCarriageReturn = 0
  - CheckIndentationNoTab = 75
  - CheckMaxLineLength = 190
  - CheckNewlineEndOfFile = 13
  - CheckTrailingWhitespace = 47
  - CheckValidity = 1
```

Now fix the errors and run again till there isn't any style error in the documentation.

What is Checked

PyCQA is an Organization for code quality tools (and plugins) for the Python programming language. Doc8 is a sub-project of the same Organization. Refer this [README](#) for more details.

What is checked:

- invalid rst format - D000
- lines should not be longer than 100 characters - D001
 - RST exception: line with no whitespace except in the beginning
 - RST exception: lines with http or https URLs
 - RST exception: literal blocks
 - RST exception: rst target directives
- no trailing whitespace - D002
- no tabulation for indentation - D003
- no carriage returns (use UNIX newlines) - D004
- no newline at end of file - D005

Extra Style Checks

1. Headings

(Refer) Normally, there are no heading levels assigned to certain characters as the structure is determined from the succession of headings. However, this convention is used in Python's Style Guide for documenting which you may follow:

with overline, for parts

- with overline, for chapters

=, for sections

-, for subsections

^, for sub-subsections

“, for paragraphs

2. Heading Underlines

Do not use underlines that are longer/shorter than the title headline itself. As in:

```
Correct :

Extra Style Checks
-----

Incorrect :

Extra Style Checks
-----
```

Note: Underlines shorter than the Title text generates Errors on sphinx-build.

3. Internal Links

Using `:ref:` is advised over standard reStructuredText links to sections (like ``Section title`_`) because it works across files, when section headings are changed, will raise warnings if incorrect, and works for all builders that support cross-references. However, external links are created by using the standard ``Section title`_ method`.

4. Eliminate Redundancy

If a section/file has to be repeated somewhere else, do not write the exact same section/file twice. Use `.. include: ../README.rst` instead. Here, `../` refers to the documentation root, so file location can be used accordingly. This enables us to link documents from other upstream folders.

5. Using `:ref:` only when necessary

Use `:ref:` to create internal links only when needed, i.e. it is referenced somewhere. Do not create references for all the sections and then only reference some of them, because this created unnecessary references. This also generates ERROR in `restructuredtext-lint`.

6. Spelling

You should check for spelling errors before you push changes. [Aspell](#) is a GNU project Command Line tool you can use for this purpose. Download and install Aspell, then execute `aspell check <file-name>` for all the files changed. Be careful about not changing commands or other stuff as Aspell gives prompts for a lot of them. Also delete the temporary `.bak` files generated. Refer the [manual](#) for more information on how to use.

Roadmap

This is a high level list of what we are working on and what is completed.

Legend

✓ completed 🕒 In progress ☐ Planned, not started

Work in Progress

(see Completed features below)

Packages manifests and dependencies parsers

- 🕒 Docker images base (as part of: <https://github.com/pombredanne/conan>) #651
- 🕒 RubyGems base and dependencies #650 (code in <https://github.com/nexB/scancode-toolkit-contrib/>)
- 🕒 Perl, CPAN (basic in <https://github.com/nexB/scancode-toolkit-contrib/>)
- 🕒 Go : parsing for Godep in <https://github.com/nexB/scancode-toolkit-contrib/>
- 🕒 Windows PE #652
- ☐ RPMs dependencies #649
- ☐ Windows Nuget dependencies #648
- ☐ Bower packages #654
- ☐ Python dependencies #653
- ☐ CRAN
- ✓ Plain packages
- ☐ other Java-related meta files (SBT, Ivy, Gradle, etc.)
- ☐ Debian debs
- ☐ other JavaScript (jspm, etc.)
- ☐ other Linux distro packages

License Detection

- ✓ support and detect license expressions (code in <https://github.com/nexB/license-expression>)
- 🕒 support and detect composite licenses
- ☐ support custom licenses

-  move licenses data set to external separate repository
-  Improved unknown license detection
-  sync with external sources (DejaCode, SPDX, etc.)

Copyrights

-  speed up copyright detection
-  improved detected lines range
-  streamline grammar of copyright parser
-  normalize holders and authors for summarizing
-  normalize and streamline results data format

Core features

-  pre scan filtering (ignore binaries, etc)
-  pre/post/output plugins! (worked as part of the GSoC by @yadsharaf)
-  scan plugins (e.g. plugins that run a scan to collect data)
-  support Python 3 #295
-  transparent archive extraction (as opposed to on-demand with extractcode)
-  scancode.yml configuration file for exclusions, defaults, scan failure conditions, etc.
-  support scan pipelines and rules to organize more complex scans
-  scan baselining, delta scan and failure conditions (such as license change, etc) (will be spawned as its own DeltaCode project)
-  dedupe and similarities to avoid re-scanning. For now only identical files are scanned only once.
-  Improved logging, tracing and error diagnostics
-  native support for ABC Data (See [AboutCode Data : ABCD](#))

Classification, summarization and deduction

-  File classification #426
-  summarize and aggregate data #377 at the top level

Source code support (some will be spawned as their own tool)

-  symbols : parsing complete in <https://github.com/nexB/scancode-toolkit-contrib/>
-  metrics : some elements in <https://github.com/nexB/scancode-toolkit-contrib/>

Compiled code support (will be spawned as their own tool)

-  ELFs : parsing complete in <https://github.com/nexB/scancode-toolkit-contrib/>
-  Java bytecode : parsing complete in <https://github.com/nexB/scancode-toolkit-contrib/>
-  Windows PE : parsing complete in <https://github.com/nexB/scancode-toolkit-contrib/>
-  Mach-O : parsing complete in <https://github.com/nexB/scancode-toolkit-contrib/>
-  Dalvik/dex

Data exchange

-  SPDX data conversion #338

Packaging

-  simpler installation, automated installer
-  distro-friendly packaging
-  unbundle and package as multiple libraries (commoncode, extractcode, etc)

Documentation

-  integration in a build/CI loop
-  end to end guide to analyze a codebase
-  hacking guides
-  API doc when using ScanCode as a library

CI integration

-  Plugins for CI (Jenkins, etc)
-  Integration for CI (Travis, Appveyor, Drone, etc)

Other work in progress

- ScanCode server: Spawned as its own project: <https://github.com/nexB/scancode-server>. Will include Integration / webhooks for Github, Bitbucket.
- VulnerableCode: NVD and CVE lookups: Spawned as its own project: <https://github.com/nexB/vulnerablecode>
- ScanCode Workbench: desktop app for scan review: Spawned as its own project: <https://github.com/nexB/scancode-workbench>
- DependentCode: dynamic dependencies resolutions: Spawned as its own project: <https://github.com/nexB/dependentcode>

Package mining and matching

(Note that this will be spawned in its project) Some code is in <https://github.com/nexB/scancode-toolkit-contrib/>

-  exact matching
-  attribute-based matching
-  fuzzy matching
-  peer-reviewed meta packages repo
-  basic mining of package repositories

Other

-  Crypto code detection

Completed features

Core scans

-  exact license detection
-  approximate license detection
-  copyright detection
-  file information (size, type, etc.)
-  URLs, emails, authors

Outputs and UI

-  JSON compact and pretty
-  plain HTML tables, also usable in a spreadsheet

- ✓ fancy HTML 'app' with a file tree navigation, and scan results filtering, search and sorting
- ✓ improved scans GUI now its own project: <https://github.com/nexB/aboutcode-manager>
- ✓ simple scan summary
- ✓ SPDX output

Package and dependencies

- ✓ common model for packages data
- ✓ basic support for common packages format
- ✓ RPM packages base
- ✓ NuGet packages base
- ✓ Python packages base
- ✓ PHP Composer packages support with dependencies
- ✓ Java Maven POM packages support with dependencies
- ✓ npm packages support with dependencies

Speed!

- ✓ accelerate license detection indexing and scanning; include caching
- ✓ scan using multiple processes to speed up overall scan
- ✓ cache per-file scan to disk and stream final results

Other

- ✓ archive extraction with extractcode
- ✓ conversion of scan results to CSV
- ✓ improved error handling, verbose and diagnostic output

Google Summer of Code 2017 - Final report

Project: Plugin architecture for ScanCode

Yash D. Saraf yashdsaraf@gmail.com

This project's purpose was to create a decoupled plugin architecture for [ScanCode](#) such that it can handle plugins at different stages of a scan and can be coupled at runtime. These stages were,

1. Format :

In this stage, the plugins are supposed to run **after** the scanning is done and `post-scan` plugins are called. These plugins could be used for:

- **converting the scanned output to the given format (say csv, json, etc.)**

HOWTO

Here, a plugin needs to add an entry in the `scancode_output_writers` entry point in the following format :
'<format> = <module>:<function>'.

- <format> is the format name which will be used as the command line option name (e.g `csv` or `json`).
- <module> is a python module which implements the `output` hook specification.
- <function> is the function to which the scan output will be passed if this plugin is called.

The <format> name will be automatically added to the `--format` command line option and (if called) the scanned data will be passed to the plugin.

2. Post-scan :

In this stage, the plugins are supposed to run **after** the scanning is done. Some uses for these plugins were:

- **summarization of scan outputs**
e.g A post-scan plugin for marking `is_source` to true for directories with ~90% of source files.
- **simplification of scan outputs**
e.g The `--only-findings` option to return files or directories with findings for the requested scans. Files and directories without findings are omitted (not considering basic file information as findings)).

This option already existed, I just ported it to a post-scan plugin.

HOWTO

Here, a plugin needs to add an entry in the `scancode_post_scan` entry point in the following format '`<name> = <module>:<function>`'

- <name> is the command line option name (e.g **only-findings**).
- <module> is a python module which implements the `post_scan` hook specification.
- <function> is the function to which the scanned files will be passed if this plugin is called

The command line option for this plugin will be automatically created using the <function> 's doctring as its help text and (if called) the scanned files will be passed to the plugin.

3. Pre-scan :

In this stage, the plugins are supposed to run **before** the scan starts. So the potential uses for these types of plugins were to:

- **ignore files based on a given pattern (glob)**
- **ignore files based on their info i.e size, type etc.**
- **extract archives before scanning**

HOWTO

Here, a plugin needs to add an entry in the `scancode_pre_scan` entry point in the following format : '`<name> = <module>:<class>`'

- `<name>` is the command line option name (e.g **ignore**).
- `<module>` is a python module which implements the `pre_scan` hook specification.
- `<class>` is the class which is instantiated and its appropriate method is invoked if this plugin is called. This needs to extend the `plugincode.pre_scan.PreScanPlugin` class.

The command line option for this plugin will be automatically created using the `<class>` 's doctring as its help text. Since there isn't a single spot where `pre-scan` plugins can be plugged in, more methods to `PreScanPlugin` class can be added which can represent different hooks, say to add or delete a scan there might be a method called `process_scan`.

If a plugin's option is passed by the user, then the `<class>` is instantiated with the user input and its appropriate aforementioned methods are called.

4. Scan (proper):

In this stage, the plugins are supposed to run **before** the scan starts and **after** the `pre-scan` plugins are called. These plugins would have been used for

- **adding or deleting scans**
- **adding dependency scans (whose data could be used in other scans)**

No development has been done for this stage, but it will be quite similar to `pre-scan`.

5. Other work:

Group cli options in cli help

Here, the goal was to add command line options to pre-defined groups such that they are displayed in their respective groups when `scancode -h` or `scancode --help` is called. This helped to better visually represent the command line options and determine more easily what context they belong to.

Add a Resource class to hold all scanned info * Ongoing *

Here, the goal was to create a `Resource` class, such that it holds all the scanned data for a resource (i.e a file or a directory). This class would go on to eventually encapsulate the caching logic entirely. For now, it just holds the `info` and `path` of a resource.

6. What's left?

- Pre-scan plugin for archive extractions
- Scan (proper) plugins
- More complex post-scan plugins
- Support plugins written in languages other than python

Additionally, all my commits can be found [here](#).

1.1.7 Miscellaneous

FAQ

Why ScanCode?

We could not find an existing tool (open source or commercial) meeting our needs:

- usable from the command line or as library
- running on Linux, Mac and Windows
- written in a higher level language such as Python
- easy to extend and evolve

Can licenses be synchronized with the DejaCode license library?

The license keys are the same that are used in DejaCode. They are kept in sync by hand in the short term. There is also a ticket to automate that sync with DejaCode and possibly other sources. See <https://github.com/nexB/scancode-toolkit/issues/41>

How is ScanCode different from licensecheck?

At a high level, ScanCode detects more licenses and copyrights than licensecheck does, reporting more details about the matches. It is likely slower.

In more details: ScanCode is a Python app using a data-driven approach (as opposed to carefully crafted regex):

- for license scan, the detection is based on a (large) number of license full texts (~900) and license notices/rules (~1800) and is data driven as opposed to regex-driven. It detects exactly where in a file a license text is found. Just throw in more license texts to improve the detection.
- for copyright scan, the approach is natural language parsing (using NLTK) with POS tagging and a grammar; it has a few thousand tests.
- licenses and copyrights are detected in texts and binaries

Licensecheck (available here for reference: [/https://metacpan.org/release/App-Licensecheck](https://metacpan.org/release/App-Licensecheck)) is a Perl script using hand-crafted regex patterns to find typical copyright statements and about 50 common licenses. There are about 50 license detection tests.

A quick test (in July 2015, before a major refactoring, but for this notice still valid) shows several things that are not detected by licensecheck that are detected by ScanCode.

How can I integrate ScanCode in my application?

More specifically, does this tool provide an API which can be used by us for the integration with my system to trigger the license check and to use the result?

In terms of API, there are two stable entry points:

#. The JSON output when you use it as a command line tool from any language or when you call the `scan-code.cli.scan-code` function from a Python script. #. Otherwise the `scan-code.cli.api` module provides a simple function if you are only interested in calling a certain service on a given file (such as license detection or copyright detection)

Can I install ScanCode in a Unicode path?

Not for now. See <https://github.com/nexB/scancode-toolkit/issues/867> There is a bug in virtualenv on Python2 <https://github.com/pypa/virtualenv/issues/457> At this stage and until we completed the migration to Python 3 there is no way out but to use a path that contains only ASCII characters.

The line numbers for a copyright found in a binary are weird. What do they mean?

When scanning binaries, the line numbers are just a relative indication of where a detection was found: there is no such thing as lines in a binary. The numbers reported are based on the strings extracted from the binaries, typically broken as new lines with each NULL character. They can be safely ignored.

Support

Documentation

The ScanCode toolkit documentation lives at aboutcode.readthedocs.io/en/latest/scancode-toolkit/.

Issue Tracker

Post questions and bugs as GitHub tickets at: <https://github.com/nexB/scancode-toolkit/issues>

StackOverflow

Ask question on StackOverflow using the [scancode] tag.

Talk to the Developers

Join our [Gitter Channel](#) to talk with the developers of ScanCode Toolkit.

Documentation

For more information on Documentation or to leave feedback mail at aboutCode@groups.io, or leave a message at our [Docs Channel](#).

Runtime Performance Reports

These are reports of runtimes for real life scans:

2015-09-03 by @rrjohnston

- On Ubuntu 12.04 x86_64 Python 2.7.3 and ScanCode Version 1.3.1
- Specs: 40 threads (2 processors, 10 cores each, with hyperthreading) 3.1 GHz 128GB RAM 8TB controller RAID5
- scanned 195676 files in about 16.7 hours or about 3.25 file per second (using defaults licenses and copyrights)
- notes: this version of ScanCode runs on a single thread so it does not make good use of extra processing power.

Plugin Architecture

Abstract:

This project's purpose is to create a decoupled plugin architecture for scancode such that it can handle plugins at different stages of a scan and can be coupled at runtime. These stages would be

- Pre - scan: Before starting the scan

E.g Plugins to handle extraction of different archive types or instructions on how to handle certain types of files.

- Scan proper: During the scan

E.g Plugins to add more options for the scan, maybe to ignore certain files or add some command line arguments, create new scans (alternative or as a dependency for further scanning) etc.

- Post - scan: After the scan

E.g Plugins for output deduction, formatting or converting output to other formats (such as json, spdx, csv, xml, etc.)

Upside of building a pluggable system would be to allow easier additions and rare modifications to code, without having to really fiddle around with core codebase. This will also provide a level of abstraction between the plugins and scancode so that any erroneous plugin would not affect the functioning of scancode as a whole.

Description:

This project aims at making scancode a “pluggable” system, where new functionalities can be added to scancode at runtime as “plugins”. These plugins can be hooked into scancode using some predefined hooks. I would consider pluggy as the way to go for a plugin management system.

Why pluggy?

Pluggy is well documented and maintained regularly, and has proved its worth in projects such as py.test. Pluggy relies on hook specifications and hook implementations (callbacks) instead of the conventional subclassing approach which may encourage tight-coupling in the overlying framework. Basically a hook specification contains method signatures (no code), these are defined by the application. A hook implementation contains definitions for methods declared in the corresponding hook specification implemented by a plugin.

As mentioned in the abstract, the plugin architecture will have 3 hook specifications (can be increased if required)

1. Pre - scan hook

- Structure -

```
prescan_hookspec = HookspecMarker('prescan')

@prescan_hookspec
def extract_archive(args):
```

Here the path of the archive to be extracted will be passed as an argument to the `extract_archive` function which will be called before scan, at the time of extraction. This will process the archive type and extract the contents accordingly. This functionality can be further extended by calling this function if any archive is found inside the scanning tree.

2. Scan proper hook

- Structure

```
scanproper_hookspec = HookspecMarker('scanproper')

@scanproper_hookspec
def add_cmdline_option(args):
```

This function will be called before starting the scan, without any arguments, it will return a dict containing the click extension details and possibly some help text. If this option is called by the user then the call will be rerouted to the callback defined by the click extension. For instance say a plugin implements functionality to add regex as a valid ignore pattern, then this function will return a dict as:

```
{
    'name': '--ignore-regex',
    'options': {
        'default': None,
        'multiple': True,
        'metavar': <pattern>
    },
    'help': 'Ignore files matching regex <pattern>'
    'call_after': 'is_ignored'
}
```

According to the above dict, if the option `--ignore-regex` is supplied, this function will be called after the `is_ignored` function and the data returned by the `is_ignored` function will be supplied to this function as its argument(s). So if the program flow was:

```
scancode()  scan()  resource_paths()  is_ignored()
```

It will now be edited to

```
scancode()  scan()  resource_paths()  is_ignored()  add_cmdline_option()
```

Options such as **call_after**, **call_before**, **call_first**, **call_last** can be defined to determine when the function is to be executed.

```
@scanproper_hookspec
def dependency_scan(args):
```

This function will be called before starting the scan without any arguments, it will return a list of file types or attributes which if encountered in the scanned tree, will call this function with the path to the file as an argument. This function can do some extra processing on those files and return the data to be processed as a dependency for the normal scanning process. E.g. It can return a list such as:

```
[ 'debian/copyright' ]
```

Whenever a file matches this pattern, this function will be called and the data returned will be supplied to the main `scancode` function.

3. Post - scan hook

- Structure -

```
postscan_hookspec = HookspecMarker('postscan')

@postscan_hookspec
def format_output(args):
```

This function will be called after a scan is finished. It will be supplied with path to the ABC data generated from the scan, path to the root of the scanned code and a path where the output is expected to be stored. The function will store the processed data in the output path supplied. This can be used to convert output to other formats such as CSV, SPDX, JSON, etc.

```
@postscan_hookspec
def summarize_output(args):
```

This function will be called after a scan is finished. It will be supplied the data to be reported to the user as well as a path to the root of the scanned node. The data returned can then be reported to the user. This can be used to summarize output, maybe encapsulate the data to be reported or omit similar file metadata or even classify files such as tests, code proper, licenses, readme, configs, build scripts etc.

- **Identifying or configuring plugins**

For python plugins, pluggy supports loading modules from setuptools entrypoints, E.g.

```
entry_points = {
    'scancode_plugins': [
        'name_of_plugin = ignore_regex',
    ]
}
```

This plugin can be loaded using the PluginManager class's `load_setuptools_entrypoints('scancode_plugins')` method which will return a list of loaded plugins.

For non python plugins, all such plugins will be stored in a common directory and each of these plugins will have a manifest configuration in YAML format. This directory will be scanned at startup for plugins. After parsing the config file of a plugin, the data will be supplied to the plugin manager as if it were supplied using setuptools entrypoints.

In case of non python plugins, the plugin executables will be spawned in their own processes and according to their config data, they will be passed arguments and would return data as necessary. In addition to this, the desired hook function can be called from a non python plugin using certain arguments, which again can be mapped in the config file.

Sample config file for a `ignore_regex` plugin calling `scanproper` hook would be:

```
name: ignore_regex
hook: scanproper
hookfunctions:
  add_cmdline_option: '-aco'
  dependency_scan: '-dc'
data:
  add_cmdline_option':
    - name: '--ignore-regex'
    - options:
      - default: None
      - multiple: True
      - metavar: <pattern>
    - help: 'Ignore files matching regex <pattern>'
    - call_after: 'is_ignored'
```

Existing solutions:

An alternate solution to a “pluggable” system would be the more conventional approach of adding functionalities directly to the core codebase, which removes the abstraction layer provided by a plugin management and hook calling system.

License Policy Plugin

This plugin allows the user to apply policy details to a scancode scan, depending on which licenses are detected in a particular file. If a license specified in the Policy file is detected by scancode, this plugin will apply that policy information to the Resource as a new attribute: `license_policy`.

Policy File Specification

The Policy file is a YAML (`.yaml`) document with the following structure:

```
license_policies:
-   license_key: mit
    label: Approved License
    color_code: '#00800'
    icon: icon-ok-circle
-   license_key: agpl-3.0
    label: Approved License
    color_code: '#008000'
    icon: icon-ok-circle
-   license_key: broadcom-commercial
    label: Restricted License
    color_code: '#FFcc33'
    icon: icon-warning-sign
```

The only required key is `license_key`, which represents the scancode license key to match against the detected licenses in the scan results.

In the above example, a descriptive label is added along with a color code and CSS `id` name for potential visual display.

Using the Plugin

To apply License Policies during a ScanCode scan, specify the `--license-policy` option.

For example, use the following command to run a File Info and License scan on `/path/to/codebase/`, using a License Policy file found at `~/path/to/policy-file.yml`:

```
$ scancode -clipecu /path/to/codebase/ --license-policy ~/path/to/policy-file.yml --
→ json-pp
  ~/path/to/scan-output.json
```

Example Output

Here is an example of the ScanCode output after running `--license-policy`:

```
{
  "path": "samples/zlib/deflate.c",
  "type": "file",
  "licenses": [
    {
      "key": "zlib",
      ...
      ...
    }
  ],
  "license_policy": {
    "license_key": "zlib",
    "label": "Approved License",
    "color_code": "#008000",
    "icon": "icon-ok-circle"
  },
  "scan_errors": []
}
```

1.2 Scancode-Workbench Documentation

ScanCode Workbench allows you take the scan results from the ScanCode Toolkit and create a software inventory annotated with your summaries or conclusions (we call these Conclusions) at any levels of the codebase you choose.

The attributes you add (e.g., Name, Version, Owner, License Expression, Copyright) to your Conclusion about a single package or file – or a higher-level group of packages and/or files – can then be exported to a JSON or SQLite file. In addition, Conclusions created in ScanCode Workbench can be exported to [DejaCode](#).

1.2.1 Basics

Scancode Workbench Views

Directory Tree

An interactive directory tree is always present on the left side of the application. The tree is expandable and collapsible. This allows the user to navigate the codebase structure. If a directory is selected, only that directory and its sub-files and folders will be shown in the view. Similarly, if a single file is selected, only information for that selected file will be shown.

Table View

In the table view, the available clues detected by [ScanCode](#) are shown in a tabular format. A user can see provenance clues such as license and copyright information detected by ScanCode. A user can also see the file information (e.g. file type, file size, etc) and package information (package type, primary language of package) that was detected. The columns can be sorted as well as shown or hidden based on what the user's preferences. Searching for specific clues (license names, copyrights, etc.) is also available in this view.

Chart Summary View

With the chart summary view, a user can select a node in the directory tree (i.e., a directory, folder or file) and display a horizontal bar chart listing the values identified in the scanned codebase – that is, the clues detected by ScanCode Toolkit – for a number of different attributes. The attributes are a subset of the columns displayed in the table view, and can be selected by clicking the dropdown at the top of the view. The chart displays the full range of values for the selected directory tree node and attribute and the number of times each value occurs in the scanned codebase.

Building Requirements

Linux

- Python 2.7
- [Node.js version 6.x](#) or later
- npm 3.10.x or later but <= 5.2.0 (run `npm install npm@5.2.0 -g`)

MacOS

- Python 2.7
- [Node.js](#) >=6.x or later but <=8.9.4
- npm 3.10.x or later but <= 5.2.0 (run `npm install npm@5.2.0 -g`)
- Command Line Tools for [Xcode](#) (run `xcode-select --install` to install)

Windows

- [Node.js](#) 6.x or later
- npm 3.10.x or later but <= 5.2.0 (run `npm install npm@5.2.0 -g`)
- Python v2.7.x
 - Make sure your Python path is set. To verify, open a command prompt and type `python --version`. Then, the version of python will be displayed.
- Visual C++ Build Environment:
 - Either:
 - * Option 1: Install [Visual C++ Build Tools 2015](#) (or modify an existing installation) and select Common Tools for Visual C++ during setup. This also works with the free Community and Express for Desktop editions.
 - * Option 2: [Visual Studio 2015](#) (Community Edition or better)
 - Note: Windows 7 requires [.NET Framework 4.5.1](#)
 - Launch cmd, `npm config set msvs_version 2015`

ScanCode Workbench Platform Support

Our approach for platform support is to focus on one primary release for each of Linux, MacOS and Windows. The Priority definitions are:

1. Primary - These are the primary platforms for build/test/release on an ongoing basis.
2. Secondary - These are platforms where the primary ScanCode Workbench release for the corresponding OS Group should be forward-compatible, e.g., Windows 7 build should work on Windows 10. Issues reported and traced to a Secondary platform may not be fixed.
3. Tertiary - These are any other platforms not listed as Primary or Secondary. In these cases, we will help users help themselves, but we are likely not to fix Issues that only surface on a Tertiary platform.

OS Group	Desktop OS Version	Arch	Pri- ority	Notes
Win-dows	Windows 7 SP1	x64	1	
Win-dows	Windows 10 SP?	x64	2	
Ma-cOS	10.9 Mavericks	x64	1	
Ma-cOS	10.10 Yosemite	x64	2	
Ma-cOS	10.11 El Capitan	x64	2	
Ma-cOS	10.12 Sierra	x64	2	
Linux Deb	Ubuntu 12.04	x64	1	From Electron Docs: The prebuilt ia32 (i686) and x64 (amd64) binaries of Electron are built on Ubuntu 12.04.
Linux Deb	Ubuntu 14.xx	x64	2	Verified to be able to run the prebuilt binaries of Electron.
Linux Deb	Ubuntu 16.xx	x64	2	Verified to be able to run the prebuilt binaries of Electron.
Linux	Fedora 21	x64	2	Verified to be able to run the prebuilt binaries of Electron.
Linux	Debian 8	x64	2	Verified to be able to run the prebuilt binaries of Electron.
Linux RH	CentOS 7.xx	x64	?	
Linux RH	RHEL 7.xx	x64	?	

Electron Supported Platforms

<https://electronjs.org/docs/tutorial/support#supported-platforms>

The following platforms are supported by Electron:

MacOS

Only 64-bit binaries are provided for MacOS, and the minimum MacOS version supported is MacOS 10.9.

Windows

Windows 7 and later are supported, while older operating systems are not supported (and do not work). Both ia32 (x86) and x64 (amd64) binaries are provided for Windows. Please note: the ARM version of Windows is not supported for now.

Linux

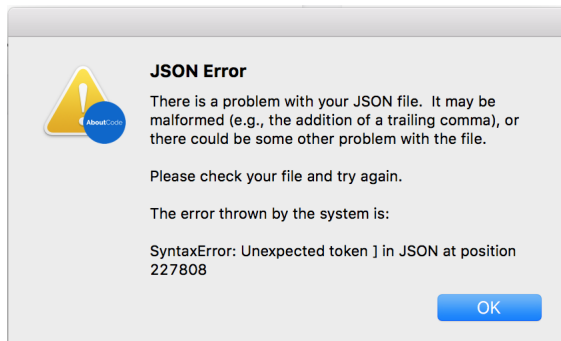
The prebuilt ia32 (i686) and x64 (amd64) binaries of Electron are built on Ubuntu 12.04, and the ARM binary is built against ARM v7 with hard-float ABI and NEON for Debian Wheezy.

Whether the prebuilt binary can run on a distribution depends on whether the distribution includes the libraries that Electron is linked to on the building platform, so only Ubuntu 12.04 is guaranteed to work, but the following platforms are also verified to be able to run the prebuilt binaries of Electron:

- Ubuntu 12.04 and later
- Fedora 21
- Debian 8

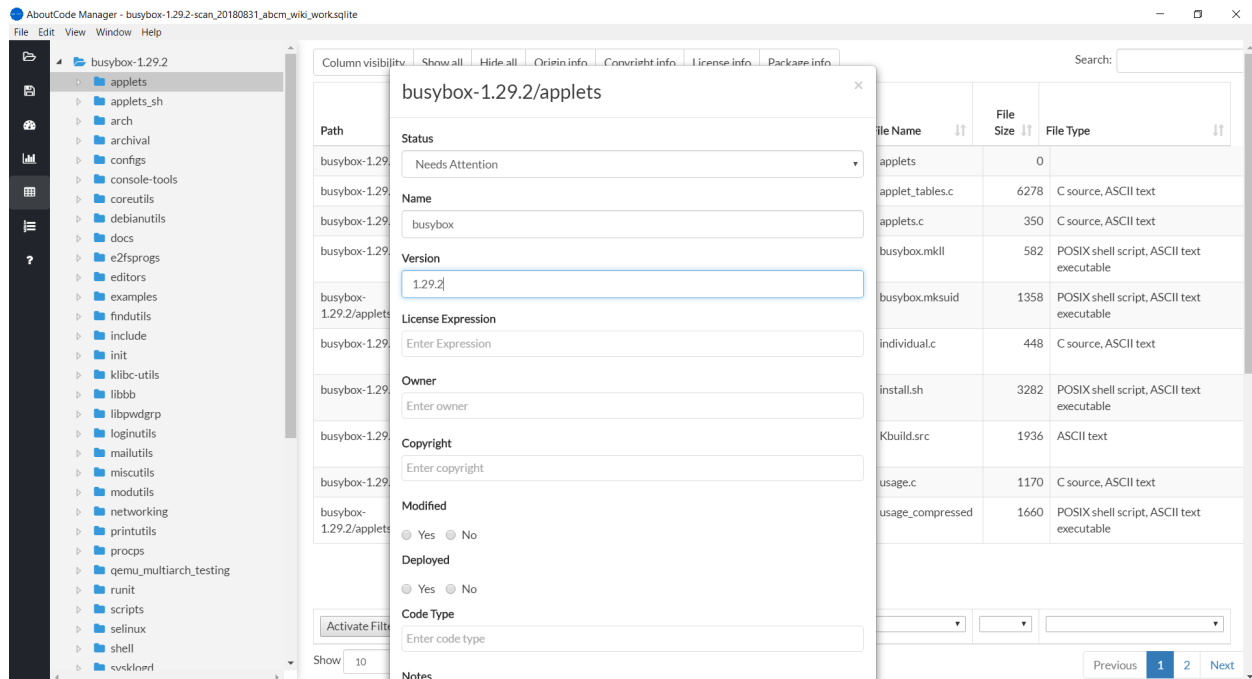
Check for Errors in the Developer Tools

When an unexpected error occurs in ScanCode Workbench, you will normally see a dialog message which provides details about the error and allows you to create an issue.



If you can reproduce the error, use this approach to get the stack trace and report the issue. Open the Developer Tools with `Ctrl+Shift+I` or `Alt+Cmd+I`. From there, click the Console tab. Include the error that is logged in the issue in a code block or a file attachment.

select **Edit Conclusion** in the menu that appears. This will display a form with the path to that node displayed at the top of the form, and a series of attribute names (e.g., Status, Name, Version, License Expression, Owner, Copyright) and associated textboxes, dropdowns or radio buttons to record your input.



Conclusion Definitions

The following fields are available when creating a Conclusion:

Conclusion Field	Description
Status	Used to document status of Conclusion creation. The dropdown choices: Analyzed - A Conclusion has been created, Needs Attention - A Conclusion is flagged for further review, Original Code - A Conclusion references code from your organization, Not Reporting - A Conclusion that will not be reported and can be ignored.
Name	The primary name for your Conclusion (usually a file, directory or library name). A Conclusion can represent any software-related object. Any Conclusion can contain one or more sub-Conclusions. The combined Conclusion Name and Version must be unique.
Version	The Conclusion version number.
License Expression	This is the overall license (an individual license or combination of several licenses) for the Conclusion. The Conclusion form will populate a dropdown with any License Expression data detected by ScanCode when the imported scan was run, using the ScanCode License Expression syntax (e.g., <code>gpl-2.0</code> represents the GPL 2.0 license). The user can also manually add one or more License Expressions by typing in the textbox and then hitting the <code>Enter</code> key. The License Expression is intended to capture the facts of a license (primarily the text, as provided by its owner), as well as an organization's interpretation and policy regarding that license.
Owner	An Owner identifies the original creator (copyright holder) of the code covered by the Conclusion. If this Conclusion code is in its original, unmodified state, the Conclusion owner is associated with the original author/publisher. If this Conclusion code has been copied and modified, the Conclusion owner should be the owner that has copied and modified it.
Copyright	The Copyright notice that applies to the Conclusion code under the License Expression.
Modified	A Yes/No choice indicating whether the Conclusion code has been modified.
Deployed	A Yes/No choice indicating whether the Conclusion code has been deployed.
Code Type	The default choices are Source , Binary , Mixed and Document .
Notes	Any notes or comments the user wants to record.
Feature	The name of a product feature or codebase module that applies to the code covered by the Conclusion.
Purpose	The type of code covered by the Conclusion, e.g., Core, Test, Build, Documentation.
Programming Language	The primary language of the Conclusion code.
Homepage URL	The homepage URL for the Conclusion code.
Download URL	The download URL for the original Conclusion code.
License URL	The URL for the primary license represented by the License Expression.
Notice URL	The URL for the license notice that applies to the code covered by the Conclusion.

Importing and Exporting a JSON File

Import a ScanCode JSON File

- We have provided a set of sample scans that you can quickly review in ScanCode Workbench in order to get a sense of its functionality and the types of information captured by a scan. The samples are located at <https://github.com/nexB/scancode-workbench/tree/develop/samples>.
- To import a ScanCode JSON file:
 - Open the `File` menu and select `Import JSON File` (keyboard shortcut: `Ctrl+I` or `+I`).
 - In the dialog window that opens, navigate to the JSON file you want to import, select the file and click `Open`.
 - You will then be prompted to choose a filename and location to save the JSON file as a SQLite database file. Add a filename, select the folder in which you want to save the SQLite database file, and click `Save`.
 - ScanCode Workbench will then create a SQLite database file from your JSON file, indicated by the status message “Creating Database ...”
 - Once the process has finished, the status message will be replaced by an expandable code tree and, to the right of the tree, a table displaying provenance information generated by ScanCode.

Export a JSON file

- To export a JSON file:
 - Select the `File` menu and then select `Export JSON File` (keyboard shortcut: `Ctrl+E` or `+E`).
 - In the dialog window that opens, add a name for the file, navigate to the directory in which you want to save the file and click `Save`.

License Policy support in ScanCode Workbench

ScanCode Workbench now has basic support for tracking and viewing license policies that have been applied to a `scancode-toolkit` scan. In order for things to work, your initial `scancode` scan must be run with the `--license-policy` option. You can read more about that here: [License Policy Plugin](#).

The basics

While the [License Policy Plugin](#) can be customized with any number of custom fields and values, ScanCode Workbench currently only supports a pre-defined set of policy labels.

license_key	label
scancode_license_key	Approved License
scancode_license_key	Prohibited License
scancode_license_key	Recommended License
scancode_license_key	Restricted License

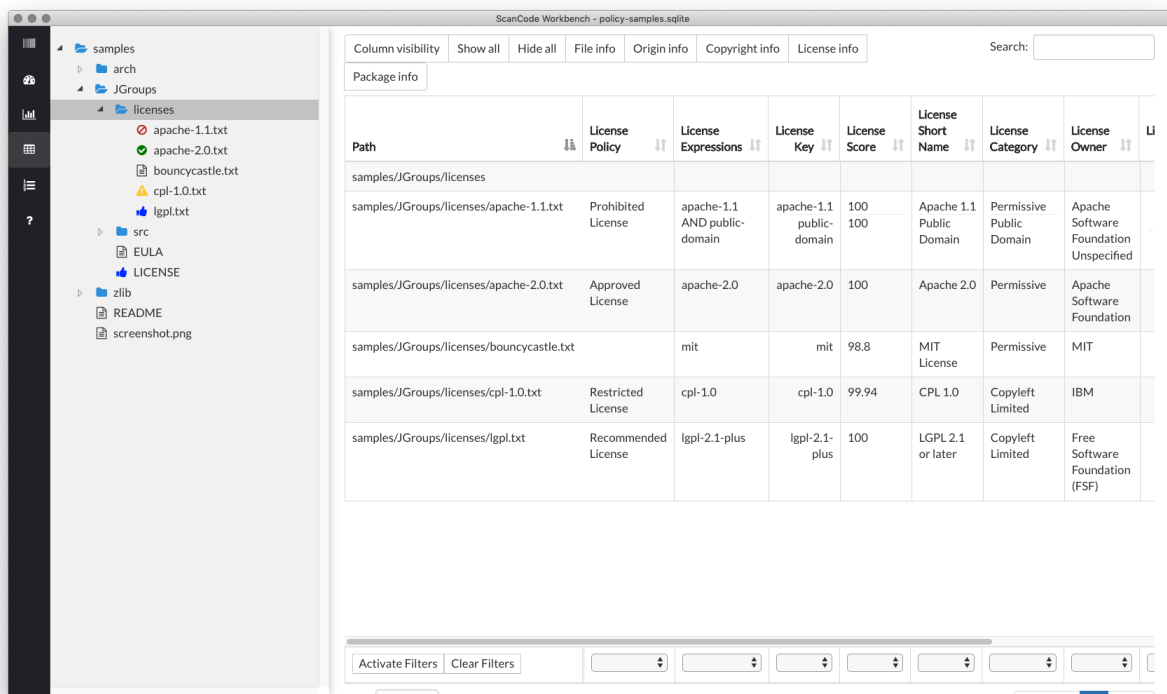
This means in order to take advantage of ScanCode Workbench’s policy features, your `license-policy.yml` needs to have `license_key` and `label` fields at the very least.

Additionally, in order to take advantage of policy visualizations, `label` values must be one of the 4 above values: Approved License, Prohibited License, Recommended License or Restricted License. Later versions of ScanCode Workbench will eventually evolve to support more dynamic policy values.

Here is a simple example of a valid `license-policy.yml` file:

```
license_policies:
- license_key: apache-2.0
  label: Approved License
- license_key: apache-1.1
  label: Prohibited License
- license_key: lgpl-2.1-plus
  label: Recommended License
- license_key: cpl-1.0
  label: Restricted License
```

After running a scan with that particular `license-policy.yml` file, viewing the scan in ScanCode Workbench will look like the following:



As you can see, files which have detected licenses that fall under a particular policy will be shown in the JSTree view with specific icons. This way, you are able to quickly see what files fall under a specific policy.

Additionally, policy details can be found in the scan data view in their own column: License Policy. This column has been added to both the “Origin” column set and “License info” column set.

Navigating the Chart Summary View

Display the view

Once you have a SQLite file loaded into ScanCode Workbench, displaying the Chart Summary View is easy:

1. Select a file or directory in the Tree View on the left.
2. Click the chart icon in the sidebar or open the View menu and select Chart Summary View (keyboard shortcut: `Ctrl+Shift+D` or `+Shift+D`).

Select an attribute

Use the dropdown at the top of the view to select the attribute you want to examine (e.g., `Copyright Statements`, `License Key`). These attribute values are detected from `ScanCode`, and can also be viewed in the Table View.

When you select an attribute, the Chart Summary View will automatically refresh to display a horizontal bar chart showing – in descending order of frequency – each value identified in the scanned codebase for the selected attribute and the number of times it occurs in the codebase. You can also see the value for a particular entry in the bar chart in a tooltip that appears when you move your cursor over the text on the left or the bar on the right.

Filter Chart Summary

You can further filter the summary results by choosing a specific directory or file in the Tree View. The chart will then only show results for that selected directory or file.

Opening and Saving a SQLite File

Open a SQLite File

- To open a SQLite File:
 - Select the `File` menu and then select `Open SQLite File` (keyboard shortcut: `Ctrl+O` or `+O`).
 - In the dialog window that opens, navigate to the SQLite file you want to open, select the file and click `Open`.

Save as a New SQLite File

- To save as a new SQLite file:
 - Select the `File` menu and then select `Save As New SQLite File` (keyboard shortcut: `Ctrl+S` or `+S`).
 - In the dialog window that opens, add a name for the file, navigate to the directory in which you want to save the file and click `Save`.

1.3 Deltacode Documentation

Welcome to Deltacode Documentation.

1.3.1 Comprehensive Installation

DeltaCode requires Python 2.7.x and is tested on Linux, Mac, and Windows. Make sure Python 2.7 is installed first.

System Requirements

- Hardware : DeltaCode will run best with a modern X86 processor and at least 1GB of RAM and 250MB of disk.
- Supported operating systems : DeltaCode should run on these OSes:
 1. Linux: on most recent 64-bit Linux distributions (32-bit distros are only partially supported),
 2. Mac: on recent Mac OSX (10.6.8 and up),
 3. Windows: on Windows 7 and up (32- or 64-bit) using a 32-bit Python.

Prerequisites

DeltaCode needs a Python 2.7 interpreter.

- **On Linux:**

Use your package manager to install `python2.7`. If Python 2.7 is not available from your package manager, you must compile it from sources.

For instance, visit <https://github.com/dejacode/about-code-tool/wiki/BuildingPython27OnCentos6> for instructions to compile Python from sources on Centos.

- **On Windows:**

Use the Python 2.7 32-bit (e.g. the Windows x86 MSI installer) for X86 regardless of whether you run Windows on 32-bit or 64-bit. **DO NOT USE Python X86_64 installer** even if you run 64 bit Windows.

Download Python from this url: <https://www.python.org/ftp/python/2.7.14/python-2.7.14.msi>

Install Python on the c: drive and use all default installer options. See the Windows installation section for more installation details.

- **On Mac:**

Download and install Python from this url:

<https://www.python.org/ftp/python/2.7.14/python-2.7.14-macosx10.6.pkg>

Installation on Linux and Mac

Download and extract the latest ScanCode release from: <https://github.com/nexB/deltacode/releases/latest>

Open a terminal in the extracted directory and run:

```
./deltacode --help
```

This will configure DeltaCode and display the command line help.

Installation on Windows

Download the latest ScanCode release zip file from: <https://github.com/nexB/deltacode/releases/latest>

- In Windows Explorer, select the downloaded DeltaCode zip and right-click.
- In the pop-up menu select 'Extract All...'
- In the pop-up window 'Extract zip folders' use the default options to extract.

- Once the extraction is complete, a new Windows Explorer window will pop-up.
- In this Explorer window, select the new folder that was created and right-click.
- In the pop-up menu select 'Properties'
- In the pop-up window 'Properties', select the Location value. Copy this in clipboard.
- Press the start menu button.
- In the search box type

```
cmd
```

- Select 'cmd.exe' listed in the search results.
- A new 'cmd.exe' window pops-up.
- In this window (aka. a command prompt), type this (this is 'cd' followed by a space)

```
cd
```

- then right-click in this window and select Paste. This will paste the path where you extracted DeltaCode.
- Press Enter.
- This will change the current location of your command prompt to the root directory where DeltaCode is installed.
- Then type

```
deltacode --help
```

- Press enter. This will configure your DeltaCode installation.
- Several messages are displayed followed by the deltacode command help.
- The installation is complete.

Un-installation

- Delete the directory in which you extracted DeltaCode.
- Delete any temporary files created in your system temp directory under a deltacode directory.

1.3.2 Deltacode Output: Format, Fields and Structure

```
Usage: deltacode [OPTIONS]
```

```
Identify the changes that need to be made to the 'old' scan file (-o or --old)
in order to generate the 'new' scan file (-n or --new). Write the results to
a .json file (-j or --json-file) at a user-designated location. If no file
option is selected, print the JSON results to the console.
```

```
Options:
```

```
-h, --help          Show this message and exit.
--version          Show the version and exit.
-n, --new PATH      Identify the path to the "new" scan file [required]
-o, --old PATH      Identify the path to the "old" scan file [required]
-j, --json-file FILENAME Identify the path to the .json output file
-a, --all-delta-types Include unmodified files as well as all changed
```

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```
files in the .json output. If not selected, only
changed files are included.
```

Output Formats

DeltaCode provides two output formats for the results of a DeltaCode codebase comparison: JSON and CSV.

The default output format is JSON. If the command-line input does not include an output flag (`-j` or `--json-file`) and the path to the output file, the results of the DeltaCode comparison will be displayed in the console in JSON format. Alternatively, the results will be saved to a `.json` file if the user includes the `-j` or `--json-file` flag and the output file's path, e.g.:

```
deltacode -n [path to the 'new' codebase] -o [path to the 'old' codebase] -j [path to
↳the JSON output file]
```

Once a user has generated a DeltaCode JSON output file, he or she can convert that JSON output to CSV format by running a command with this structure::

```
python etc/scripts/json2csv.py [path to the JSON input file] [path to the CSV output
↳file]
```

See also *JSON to CSV Conversion*.

Overall Structure

JSON

Top-Level JSON

DeltaCode's JSON output comprises the following six fields/keys and values at the top level:

- `deltacode_notice` – A string of the terms under which the DeltaCode output is provided.
- `deltacode_options` – A JSON object containing three key/value pairs:
 - `--new` – A string identifying the path to the JSON file containing the ScanCode output of the codebase the user wants DeltaCode to treat as the 'new' codebase.
 - `--old` – A string identifying the path to the JSON file containing the ScanCode output of the codebase the user wants DeltaCode to treat as the 'old' codebase.
 - `--all-delta-types` – A true or false value. - This value will be true if the command-line input includes the `-a` or `--all-delta-types` flag, in which case the `deltas` field described below will include details for unmodified files as well as all changed files. - If the user does not include the `-a` or `--all-delta-types` flag, the value will be false and unmodified files will be omitted from the DeltaCode output.
- `deltacode_version` – A string representing the version of DeltaCode on which the codebase comparison was run.
- `deltacode_errors` – A list of one or more strings identifying errors (if any) that occurred during the codebase-comparison process.
- `deltas_count` – An integer representing the number of 'Delta' objects – the file-level comparisons of the two codebases (discussed in the next section) – contained in the DeltaCode output's `deltas` key/value pair.

- If the user’s command-line input does not include the `-a` or `--all-delta-types` flag (see the discussion above of the `--all-delta-types` field/key), the DeltaCode output will omit details for unmodified files and consequently the `deltas_count` field will not include unmodified files.
- `deltas` – A list of ‘Delta’ objects, each of which represents a file-level comparison (i.e., the “delta”) of the ‘new’ and ‘old’ codebases. The Delta object is discussed in further detail in the next section.

This is the top-level JSON structure of the key/value pairs described above:

```
{
  "deltacode_notice": "",
  "deltacode_options": {
    "--new": "",
    "--old": "",
    "--all-delta-types": false
  },
  "deltacode_version": "",
  "deltacode_errors": [],
  "deltas_count": 0,
  "deltas": [one or more Delta objects]
}
```

The Delta Object

Each Delta object consists of four key/value pairs:

- `factors`: A list of one or more strings representing the factors that characterize the file-level comparison and are used to calculate the resulting score, e.g.

```
"factors": [
  "added",
  "license info added",
  "copyright info added"
],
```

The possible values for the `factors` field are discussed in some detail in DeltaCode Scoring [Deltacode Scoring](#).

- `score`: An integer representing the magnitude/importance of the file-level change – the higher the `score`, the greater the change. For further details about the DeltaCode scoring system, see DeltaCode Scoring [Deltacode Scoring](#).
- `new`: A ‘File’ object containing key/value pairs of certain ScanCode-based file attributes (`path`, `licenses`, `copyrights` etc.) for the file in the codebase designated by the user as `new`. If the Delta object represents the removal of a file (the `factors` value would be `removed`), the value of `new` will be `null`.
- `old`: A ‘File’ object containing key/value pairs of certain ScanCode-based file attributes for the file in the codebase designated by the user as `old`. If the Delta object represents the addition of a file (the `factors` value would be `added`), the value of `old` will be `null`.

The JSON structure of a Delta object looks like this::

```
{
  "factors": [],
  "score": 0,
  "new": {
    "path": "",
    "type": "",
    "name": "",
    "size": 0,
    "sha1": "",

```

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```
    "original_path": "",
    "licenses": [],
    "copyrights": []
  },
  "old": {
    "path": "",
    "type": "",
    "name": "",
    "size": 0,
    "sha1": "",
    "original_path": "",
    "licenses": [],
    "copyrights": []
  }
}
```

The File Object

As you saw in the preceding section, the File object has the following JSON structure::

```
{
  "path": "",
  "type": "",
  "name": "",
  "size": 0,
  "sha1": "",
  "original_path": "",
  "licenses": [],
  "copyrights": []
}
```

A File object consists of eight key/value pairs:

- **path**: – A string identifying the path to the file in question. In processing the ‘new’ and ‘old’ codebases to be compared, DeltaCode may modify the codebases’ respective file paths in order to properly align them for comparison purposes. As a result, a File object’s `path` value may differ to some extent from its `original_path` value (see below).
- **type**: – A string indicating whether the object is a `file` or a `directory`.
- **name**: – A string reflecting the name of the file.
- **size**: – An integer reflecting the size of the file in KB.
- **sha1**: – A string reflecting the file’s sha1 value.
- **original_path**: – A string identifying the file’s path as it exists in the codebase, prior to any processing by DeltaCode to modify the path for purposes of comparing the two codebases.
- **licenses**: – A list of License objects reflecting all licenses identified by ScanCode as associated with the file. This list can be empty.
- **copyrights**: – A list of Copyright objects reflecting all copyrights identified by ScanCode as associated with the file. This list can be empty.

Example of Detailed JSON output

Here is an example of the detailed DeltaCode output in JSON format displaying one Delta object in the `deltas` key/value pair – in this case, an excerpt from the JSON output of a DeltaCode comparison of `zlib-1.2.11` and `zlib-1.2.9`::

```

{
  "deltacode_notice": "Generated with DeltaCode and provided on an \"AS IS\" BASIS,
  ↳ WITHOUT WARRANTIES\\NOR CONDITIONS OF ANY KIND, either express or implied. No
  ↳ content created from\\nDeltaCode should be considered or used as legal advice.
  ↳ Consult an Attorney\\nfor any legal advice.\\nDeltaCode is a free software codebase-
  ↳ comparison tool from nexB Inc. and others.\\nVisit https://github.com/nexB/deltacode/
  ↳ for support and download.",
  "deltacode_options": {
    "--new": "C:/scans/zlib-1.2.11.json",
    "--old": "C:/scans/zlib-1.2.9.json",
    "--all-delta-types": false
  },
  "deltacode_version": "1.0.0.post49.e3ff7be",
  "deltacode_errors": [],
  "deltas_count": 40,
  "deltas": [
    {
      "factors": [
        "modified"
      ],
      "score": 20,
      "new": {
        "path": "trees.c",
        "type": "file",
        "name": "trees.c",
        "size": 43761,
        "shal": "ab030a33e399e7284b9ddf9bba64d0dd2730b417",
        "original_path": "zlib-1.2.11/trees.c",
        "licenses": [
          {
            "key": "zlib",
            "score": 60.0,
            "short_name": "ZLIB License",
            "category": "Permissive",
            "owner": "zlib"
          }
        ]
      },
      "copyrights": [
        {
          "statements": [
            "Copyright (c) 1995-2017 Jean-loup Gailly"
          ],
          "holders": [
            "Jean-loup Gailly"
          ]
        }
      ]
    },
    {
      "old": {
        "path": "trees.c",
        "type": "file",
        "name": "trees.c",
        "size": 43774,
        "shal": "1a554d4edfaecfd377c71b345adb647d15ff7221",
        "original_path": "zlib-1.2.9/trees.c",
        "licenses": [
          {

```

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```

        "key": "zlib",
        "score": 60.0,
        "short_name": "ZLIB License",
        "category": "Permissive",
        "owner": "zlib"
    }
],
"copyrights": [
    {
        "statements": [
            "Copyright (c) 1995-2016 Jean-loup Gailly"
        ],
        "holders": [
            "Jean-loup Gailly"
        ]
    }
]
},
[additional Delta objects if any]
]
}

```

CSV

Compared with DeltaCode's JSON output, the CSV output is relatively simple, comprising the following seven fields as column headers, with each row representing one Delta object:

- **Score** – An integer representing the magnitude/importance of the file-level change.
- **Factors** – One or more strings – with no comma or other separators – representing the factors that characterize the file-level comparison and are used to calculate the resulting score.
- **Path** – A string identifying the file's path in the 'new' codebase unless the Delta object reflects a `removed` file, in which case the string identifies the file's path in the 'old' codebase. As noted above, this path may vary to some extent from the file's actual path in its codebase as a result of DeltaCode processing for codebase comparison purposes.
- **Name** – A string reflecting the file's name in the 'new' codebase unless the Delta object reflects a `removed` file, in which case the string reflects the file's name in the 'old' codebase.
- **Type** – A string reflecting the file's type ('file' or 'directory') in the 'new' codebase unless the Delta object reflects a `removed` file, in which case the string reflects the file's type in the 'old' codebase.
- **Size** – An integer reflecting the file's size in KB in the 'new' codebase unless the Delta object reflects a `removed` file, in which case the string reflects the file's size in the 'old' codebase.
- **Old Path** – A string reflecting the file's path in the 'old' codebase if the Delta object reflects a `moved` file. If the Delta object does not involve a `moved` file, this field is empty. As with the `Path` field/column header above, this path may differ to some extent from the file's actual path in its codebase due to DeltaCode processing for codebase comparison purposes.

1.3.3 Deltacode Scoring

Delta Objects

A File-Level Comparison of Two Codebases

A Delta object represents the file-level comparison (i.e., the “delta”) of two codebases, typically two versions of the same codebase, using ScanCode-generated JSON output files as input for the comparison process.

Based on how the user constructs the command-line input, DeltaCode’s naming convention treats one codebase as the “new” codebase and the other as the “old” codebase::

```
deltacode -n [path to the 'new' codebase] -o [path to the 'old' codebase] [...]
```

Basic Scoring

A DeltaCode codebase comparison produces a collection of file-level Delta objects. Depending on the nature of the file-level change between the two codebases, each Delta object is characterized as belonging to one of the categories listed below. Each category has an associated score intended to convey its potential importance – from a license/copyright compliance perspective – to a user’s analysis of the changes between the `new` and `old` codebases.

In descending order of importance, the categories are:

1. `added`: A file has been added to the `new` codebase.
2. `modified`: The file is contained in both the `new` and `old` codebase and has been modified (as reflected, among other things, by a change in the file’s `sha1` attribute).
3. `moved`: The file is contained in both the `new` and `old` codebase and has been moved but not modified.
4. `removed`: A file has been removed from the `old` codebase.
5. `unmodified`: The file is contained in both the `new` and `old` codebase and has not been modified or moved.

The score of a Delta object characterized as `added` or `modified` may be increased based on the detection of license- and/or copyright-related changes. See [License Additions and Changes](#) and [Copyright Holder Additions and Changes](#) below.

Delta Object Fields and Values

Each Delta object includes the following fields and values:

- `factors`: One or more strings representing the factors that characterize the file-level comparison and resulting score, e.g., in JSON format::

```
"factors": [
  "added",
  "license info added",
  "copyright info added"
],
```

- `score`: A number representing the magnitude/importance of the file-level change – the higher the score, the greater the change.
- `new`: The ScanCode-based file attributes (`path`, `licenses`, `copyrights` etc.) for the file in the codebase designated by the user as `new`.
- `old`: The ScanCode-based file attributes for the file in the codebase designated by the user as `old`.

Note that an `added` Delta object will have a `new` file but no `old` file, while a `removed` Delta object will have an `old` file but not a `new` file. In each case, the `new` and `old` keys will be present but the value for the missing file will be `null`.

License Additions and Changes

Certain file-level changes involving the license-related information in a Delta object will increase the object's score.

- An added Delta object's score will be increased:
 - If the new file contains one or more licenses (factors will include `license info added`).
 - If the the new file contains any of the following Commercial/Copyleft license categories (factors will include, e.g., `copyleft added`):
 - * 'Commercial'
 - * 'Copyleft'
 - * 'Copyleft Limited'
 - * 'Free Restricted'
 - * 'Patent License'
 - * 'Proprietary Free'
- A modified Delta object's score will be increased:
 - If the old file has at least one license and the new file has no licenses (factors will include `license info removed`).
 - If the old file has no licenses and the new file has at least one license (factors will include `license info added`).
 - If both the old file and new file have at least one license and the license keys are not identical (e.g., the old file includes an `mit` license and an `apache-2.0` license and the new file includes only an `mit` license) (factors will include `license change`).
 - If any of the Commercial/Copyleft license categories listed above are found in the new file but not in the old file (factors will include, e.g., `proprietary free added`).

Copyright Holder Additions and Changes

- An added Delta object's score will be increased if the new file contains one or more copyright holders (factors will include `copyright info added`).
- A modified Delta object's score will be increased:
 - If the old file has at least one copyright holder and the new file has no copyright holders (factors will include `copyright info removed`).
 - If the old file has no copyright holders and the new file has at least one (actors will include `copyright info added`).
 - If both the old file and new file have at least one copyright holder and the holders are not identical (factors will include `copyright change`).

Moved, Removed and Unmodified

As noted above in Basic Scoring *Basic Scoring*, from a license/copyright compliance perspective, the three least significant Delta categories are moved, removed and unmodified.

In the current version of DeltaCode, each of these three categories is assigned a score of 0, with no options to increase that score depending on the content of the Delta object.

However, it is possible that both `moved` and `removed` will be assigned some non-zero score in a future version. In particular, `removed` could be significant from a compliance viewpoint where, for example, the removal of a file results in the removal of a Commercial/Copyleft license obligation.

1.3.4 Development

See `CONTRIBUTING.rst` for details: <https://github.com/nexB/deltacode/blob/develop/CONTRIBUTING.rst>

Code layout and conventions

Source code is in `src/`. Tests are in `tests/`.

Each test script is named `test_XXXX` and while we love to use `py.test` as a test runner, most tests have no dependencies on `py.test`, only on the `unittest` module (with the exception of some command line tests that depend on `pytest monkeypatching` capabilities).

When source or tests need data files, we store these in a `data` subdirectory.

We use PEP8 conventions with a relaxed line length that can be up to 90'ish characters long when needed to keep the code clear and readable.

We store pre-built **bundled** native binaries in `bin/` sub-directories of each `src/` packages. These binaries are organized by OS and architecture. This ensure that DeltaCode works out of the box either using a checkout or a download, without needing a compiler and toolchain to be installed.

We store **bundled** thirdparty components and libraries in the `thirdparty` directory. Python libraries are stored as wheels, eventually pre-built if the corresponding wheel is not available in the Pypi repository. Some of these components may be advanced builds with bug fixes or advanced patches.

We write tests, a lot of tests, thousands of tests. Several tests are data-driven and use data files as test input and sometimes data files as test expectation (in this case using either JSON or YAML files). The tests should pass on Linux 64 bits, Windows 32 and 64 bits and on MacOSX 10.6.8 and up. We maintain two CI loops with Travis (Linux) at <https://travis-ci.org/nexB/deltacode> and Appveyor (Windows) at <https://ci.appveyor.com/project/nexB/deltacode>

When finding bugs or adding new features, we add tests. See existing test code for examples.

Running tests

DeltaCode comes with over 130 unit tests to ensure detection accuracy and stability across Linux, Windows and macOS OSes: we kinda love tests, do we?

We use `pytest` to run the tests: call the `py.test` script to run the whole test suite. This is installed by `pytest` which is bundled with a DeltaCode checkout and installed when you run `./configure`.

If you are running from a fresh git clone and you run `./configure` and then `source bin/activate` the `py.test` command will be available in your path.

Alternatively if you have already configured but are not in an activated “virtualenv” the `py.test` command is available under `<root of your checkout>/bin/py.test`

(Note: paths here are for POSIX, but mostly the same applies to Windows)

If you have a multiprocessor machine you might want to run the tests in parallel (and faster) For instance: `py.test -n4` runs the tests on 4 CPUs. We typically run the tests in verbose mode with `py.test -vvs -n4`

See also <https://docs.pytest.org> for details or use the `py.test -h` command to show the many other options available.

One useful option is to run a select subset of the test functions matching a pattern with the `-k` option for instance: `py.test -vvs -k tcpdump` would only run test functions that contain the string “tcpdump” in their name or their class name or module name .

Another useful option after a test run with some failures is to re-run only the failed tests with the `--lf` option for instance: `py.test -vvs --lf` would only run only test functions that failed in the previous run.

pip requirements and the configure script

DeltaCode use the `configure` and `configure.bat` (and `etc/configure.py` behind the scenes) scripts to install a [virtualenv](#), install required packaged dependencies as [pip](#) requirements and more configure tasks such that DeltaCode can be installed in a self-contained way with **no network connectivity** required.

DeltaCode requirements and third-party Python libraries

In a somewhat unconventional way, all the required libraries are bundled aka. copied in the repo itself in the `thirdparty/` directory. If DeltaCode were only a library it would not make sense. But its is first an application and having a well defined frozen set of dependent packages is important for an app. The benefit of this approach (combined with the `configure` script) means that a mere checkout of the repository contains **everything** needed to run DeltaCode except for a Python interpreter.

Using DeltaCode as a Python library

(Coming Soon) DeltaCode can be used alright as a Python library and is available as as a Python wheel in Pypi and installed with `pip install deltacode`.

1.3.5 JSON to CSV Conversion

The default output format for a DeltaCode codebase comparison is JSON. If the `-j` or `--json-file` option is included in the `deltacode` command, the output will be written to a `.json` file at the user-designated location. For example:

```
deltacode -n [path to the 'new' codebase] -o [path to the 'old' codebase] -j [path to ↵  
↵the JSON output file]
```

We have also created an easy-to-use script for users who want to convert their JSON output to CSV format. Located at `etc/scripts/json2csv.py`, the conversion can be run with this command template:

```
python etc/scripts/json2csv.py [path to the JSON input file] [path to the CSV output ↵  
↵file]
```

1.3.6 Release Process

Steps to cut a new release:

run `bumpversion` with major, minor or patch to bump the version in:

```
src/deltacode/__init__.py  
setup.py  
deltacode.ABOUT
```

Update the CHANGELOG.rst commit changes and push changes to develop:

```
git commit -m "commit message"
git push --set-upstream origin develop
```

merge develop branch in master and tag the release.

```
git checkout master
git merge develop
git tag -a v1.6.1 -m "Release v1.6.1"
git push --set-upstream origin master
git push --set-upstream origin v1.6.1
```

Draft a new release in GitHub, using the previous release blurb as a base. Highlight new and noteworthy changes from the CHANGELOG.rst.

Run etc/release/release.sh locally.

Upload the release archives created in the dist/ directory to the GitHub release page.

Save the release as a draft. Use the previous release notes to create notes in the same style. Ensure that the link to thirdparty source code is present.

Test the downloads.

Publish the release on GitHub

Then build and publish the released wheel on Pypi. For this you need your own Pypi credentials (and get authorized to publish Pypi release: ask @pombredanne) and you need to have the twine package installed and configured.

Build a .whl with `python setup.py bdist_wheel` Run twine with `twine upload dist/<path to the built wheel>` Once uploaded check the published release at <https://pypi.python.org/pypi/deltacode/> Then create a new fresh local virtualenv and test the wheel installation with: `pip install deltacode`

1.4 AboutCode Docs

Welcome to the AboutCode wiki!

If you are interested in the Google Summer of Code 2019, check out this page. [Google Summer of Code 2019](#)

If you are interested in the Google Season of Documents 2019, go through this page. [Google Season of Docs 2019](#)

1.4.1 Contributor Project Ideas

Welcome to AboutCode!

AboutCode is a project to uncover data ... about software code:

- where does the code come from? which software package?
- what's its license? copyright?
- is the code secure, maintained, well coded?

All these are questions that are important to find answers to: there are million of free and open source software components available on the web.

Knowing where a software package comes from, if it is vulnerable and what's its licensing should be a problem of the past such that everyone can safely consume more free and open source software.

Join us to make it so!

Our tools are used to help detect and report the origin and license of source code, packages and binaries as well as discover software and package dependencies, and track security vulnerabilities, bugs and other important software package attributes. This is a suite of command line tools, web-based and API servers and desktop applications.

Table of Contents

- *Welcome to AboutCode!*
- *AboutCode projects are...*
- *Contact*
- *Technology*
- *About your project application*
- *Our Project ideas*
 - *AboutCode data server*
 - *VulnerableCode Package security vulnerability data feed (and scanner)*
 - *Integrate the license expression library in ScanCode (Python) and AboutCode Manager (JavaScript)*
 - *High volume matching automaton and data structures*
 - *ScanCode scan deduction*
 - *License and copyright detection benchmark*
 - *Improved copyright parsing and speed in ScanCode*
 - *Transparent archive extraction in ScanCode*
 - *Port ScanCode to Python 3*
 - *Automated Docker, containers and VM images static package analysis*
 - *Static analysis of binaries for build tracing in TraceCode*
 - *Create Linux distro packages for ScanCode*
 - *Package URL implementations in many programming languages*
 - *DependentCode: a mostly universal Package dependencies resolver*

AboutCode projects are...

- **ScanCode Toolkit** a popular command line tool to scan code for licenses, copyrights and packages, used by many organizations and FOSS projects, small and large.
- **AboutCode Manager** a JavaScript, Electron-based desktop application to review scan results and document your conclusions
- **AboutCode Toolkit** a set of command line tools to document and inventory known packages and licenses and generate attribution docs
- **TraceCode Toolkit**: a set of command line tools to find which source code is used to create a compiled binary
- **DeltaCode Toolkit**: a new command line tool to compare codebases based on scan and determine if and where there are material differences that affect licensing
- **VulnerableCode Server**: a new server-side application to track package vulnerabilities

- AboutCode Server: a new server-side application to run and organize scans and ABC data (formerly ScanCode server)
- ConAn: a command line tool to analyze the code in Docker and container images
- license-expression: a library to parse and render boolean license expression (such as SPDX)
- Other new tools for source and binary code matching/search and package inventories.

We also work closely with other orgs and projects:

- purl aka. Package URLs <https://github.com/package-url> which is an emerging standard to reference software packages of all types.
- SPDX.org aka. Software Package Data Exchange, a spec to document the origin and licensing of packages

Contact

Join the chat online or by IRC at <https://gitter.im/aboutcode-org/discuss> introduce yourself and start the discussion!

For personal issues, you can contact the primary org admin directly: @pombredanne and pombredanne@gmail.com

Please ask questions the smart way: <http://www.catb.org/~esr/faqs/smart-questions.html>

Technology

Discovering the origin of code is a vast topic. We primarily use Python for this and some C/C++ (and eventually Rust) for performance sensitive code and Electron/JavaScript for GUI. We are open to using any other language within reason.

Our domain includes text analysis and processing (for instance for copyrights and licenses), parsing (for package manifest formats), binary analysis (to detect the origin and license of binaries, which source code they come from, etc) as well as web based tools and APIs (to expose the tools and libraries as web services) and low-level data structures for efficient matching (such as Aho- Corasick and other automata)

About your project application

We expect your application to be in the range of 1000 words. Anything less than that will probably not contain enough information for us to determine whether you are the right person for the job. Your proposal should contain at least the following information, plus anything you think is relevant:

- Your name
- Title of your proposal
- Abstract of your proposal
- Detailed description of your idea including explanation on why is it innovative and what it will contribute
- hint: explain your data structures and the main processing flows in details.
- Description of previous work, existing solutions (links to prototypes, bibliography are more than welcome)
- Mention the details of your academic studies, any previous work, internships
- Relevant skills that will help you to achieve the goal (programming languages, frameworks)?
- Any previous open-source projects (or even previous GSoC) you have contributed to and links.

- Do you plan to have any other commitments during GSoC that may affect your work? Any vacations/holidays? Will you be available full time to work on your project? (Hint: do not bother applying if this is not a serious full time commitment)

Join the chat online or by IRC at <https://gitter.im/aboutcode-org/discuss> introduce yourself and start the discussion!

You need to understand something about open source licensing or package managers or code and binaries static analysis or low level data structures. The best way to demonstrate your capability would be to submit a small patch ahead of the project selection for an existing issue or a new issue.

We will **always** consider and prefer a project submissions where you have submitted a patch over any other submission without a patch.

Our Project ideas

Here is a list of candidate project ideas for your consideration. Your own ideas are welcomed too! Please chat about them to increase your chances of success!

Note that there is NO specific order in this list!

AboutCode data server

This project is to further and evolve the ScanCode server (was started last year as a 2017 GSoC project) and rename it as the AboutCode server.

The features of this updated server would be:

- Store any ABC data including ScanCode scans See *AboutCode Data : ABCD*
- Organize the data in projects (including possibly user-private projects)
- Execute selectively AboutCode tools such as ScanCode-toolkit, AboutCode-toolkit, etc.
- Integrate the storage and retrieval of scans and ABC data with the AboutCode Manager app through the JSON API.
- Add a Github integration to scan/run an ABC tool on commit with webhooks.
 - Bonus feature is to scan based on a received tweet of similar IRC or IM integration.
- **Tech**
 - Python 2, Django, PostgreSQL, DRF, JavaScript, Electron
- **URLS**
 - <https://github.com/nexB/scancode-server>
 - <https://github.com/nexB/aboutcode-manager>
 - <https://github.com/nexB/aboutcode-toolkit>
 - <https://github.com/nexB/scancode-toolkit>
- **Mentors**
 - @majurg <https://github.com/majurg>
 - @tdruez <https://github.com/tdruez>

VulnerableCode Package security vulnerability data feed (and scanner)

This project is to further and evolve the VulnerableCode server and software package vulnerabilities data aggregator.

VulnerableCode was started last year as a 2017 GSoC project. Its goal is to collect and aggregate vulnerabilities data and provide semi-automatic correlation. In the end it should provide the basis to report vulnerabilities alerts found in packages identified by ScanCode.

This is not trivial as there are several gaps in the CVE data and how they relate to packages as they are detected by ScanCode or else.

The features and TODO for this updated server would be:

- Aggregate more and new packages vulnerabilities feeds,
- Automating correlation: add smart relationship detection to infer new relationships between available packages and vulnerabilities from mining the graph of existing relations.
- Create a ScanCode plugin to report vulnerabilities with detected packages using this data.
- Integrate API lookup on the server with the AboutCode Manager UI
- Create a UI and model for community curation of vulnerability to package mappings, correlations and enhancements.
- **Tech**
 - Python 2, Django, PostgreSQL, DRF, JavaScript, Electron
- **URLS**
 - <https://github.com/nexB/vulnerablecode>
 - <https://github.com/nexB/aboutcode-manager>
 - <https://github.com/nexB/scancode-toolkit>
 - Other interesting pointers:
 - * <https://github.com/cve-search/cve-search>
 - * <https://github.com/jeremylong/DependencyCheck/>
 - * <https://github.com/victims/victims-cve-db>
 - * <https://github.com/rubysec/ruby-advisory-db>
 - * <https://github.com/future-architect/vuls>
 - * <https://github.com/coreos/clair>
 - * <https://github.com/anchore/anchore/>
 - * <https://github.com/pyupio/safety-db>
 - * <https://github.com/RetireJS/retire.js>
 - * and many more including Linux distro feeds
- **Mentors**
 - @majurg <https://github.com/majurg>
 - @JonoYang <https://github.com/JonoYang>
 - @pombredanne <https://github.com/pombredanne>

Integrate the license expression library in ScanCode (Python) and AboutCode Manager (JavaScript)

In GSoC 2017, this Python library was ported to JavaScript using Transcrypt.

The goal of this project is to add support for license expressions in multiple projects and evolve the license expression library as needed:

- in Python:
 - the SPDX Python library
 - the ScanCode toolkit. This also include the proper detection of license expressions in SPDX-License-Identifier tags.
 - the AboutCode toolkit
- in JavaScript:
 - the AboutCode Manager
- in both languages in the core license expression proper, add support for a built-in mode for strict SPDX expressions
- **Tech**
 - Python, JavaScript
- **URLS**
 - <https://github.com/nexB/license-expression>
 - <https://github.com/bastikr/boolean.py>
 - <https://github.com/nexB/aboutcode-manager>
 - <https://github.com/nexB/aboutcode-toolkit>
 - <https://github.com/nexB/scancode-toolkit>
 - <https://github.com/spdx/tools-python>
- **Mentors**
 - @JonoYang <https://github.com/JonoYang>
 - @majurg <https://github.com/majurg>

High volume matching automaton and data structures

MatchCode will provide ways to efficiently match actual code against a large stored indexes of open source code.

To enable this, we need to research and create efficient and compact data structures that are specialized for the type of data we lookup. Given the volume to consider (typically multi billion values indexed) there are special considerations to have compact and memory efficient dedicated structures (rather than using a general purpose DB or Key/value pair store) that includes looking at automata, and memory mapping. This types of data structures should be implemented in Rust as a preference (though C/C++ is OK) and include Python bindings.

There are several areas to research and implement:

- A data structure to match efficiently a batch of fix-width checksums (e.g. SHA1) against a large index of such checksums, where each checksum points to one or more files or packages. A possible direction is to use finite state transducers or specialized B-tree indexes. Since when a codebase is being matched there can be millions of lookups to do, the batch matching is preferred.

- A data structure to match efficiently a batch of fix-width byte strings (e.g. LSH) against a large index of such LSH within a fixed hamming distance, where each points to one or more files or packages. A possible direction is to use finite state transducers (possibly weighted), specialized B-tree indexes or multiple hash-like on-disk tables.
- A memory-mapped Aho-Corasick automaton to build large batch tree matchers. Available Aho-Corasick automaton may not have a Python binding or may not allow memory-mapping (like pyahocorasick we use in ScanCode). The volume of files we want to handle requires to reuse, extend or create aspecialized tree/paths matching automatons that can handle eventually billions of nodes and are larger than the available RAM. A possible direction is to use finite state transducers (possibly weighted).
- Feature hashing research: we deal with manyt “features” and hashing to limit the number and size of the each features seems to be a valuable thing. The goal is to research feature hashing with short hashes (15, 16 and 32 bits) and evaluate if this leads to acceptable fasle-positive and loss of accuracy in the context of the data structures mentioned above.

Then using these data structures, the project should create a system for matching code as a Python-based server exposing a simple API. This is a green field project.

- **Tech**
 - Rust, Python
- **URLS**
 - <https://github.com/nexB/scancode-toolkit-contrib> for samecode fingerprints drafts.
 - <https://github.com/nexB/scancode-toolkit> for commoncode hashes
- **Mentors**
 - @pombredanne <https://github.com/pombredanne>

ScanCode scan deduction

The goal of this project is to take existing scan and match results and infer summaries and deduction at a higher level, such as the licensing or origin of a whole directory tree. This should be implemented as a set of ScanCode plugins

- **Tech**
 - Python
- **URLS**
 - <https://github.com/nexB/scancode-toolkit/issues/426>
 - <https://github.com/nexB/scancode-toolkit/issues/377>
- **Mentors**
 - @pombredanne <https://github.com/pombredanne>
 - @JonoYang <https://github.com/JonoYang>

License and copyright detection benchmark

Compare ScanCode runtimes with Fossology, licensee, LicenseFinder, license- check, ninka, slic, LiD and others. This project is to create a comprehensive test suite and a benchmark for several FOSS open source license and copyright detection engines, establish mappings between the different conventions they use for license identification and evaluate and publish the results of detection accuracy and precision.

Note that this not only about the speed of scanning: the performance and time taken is accessory and a nice to have as a result. What matters is benchmarking the accuracy of the license detection:

1. is the right license detected and how correct is this detection?
2. when a license is detected is the correct exact text matched and returned?

So what is needed is a (large) test set of files.

Then establishing a ground truth for reference e.g. detecting then reviewing manually possibly with ScanCode to set up the baseline that will be used to compare all the scanners.

Then run the other tools and ScaCode to see how well they perform and of course establish a mapping of license identifiers: each tool may use different license ids so we need to map these to the ids used in the test baseline (e.g. the scancode license keys): all this has to be built, possibly reusing some or all of the scancode tests and lacing in all the tests from the other tools and adding more as needed.

- **Tech**
 - Python
- **Mentors**
 - @mjherzog <https://github.com/mjherzog>
 - @pombredanne <https://github.com/pombredanne>

Improved copyright parsing and speed in ScanCode

Copyright detection is the slowest scanner in ScanCode. It is based on NLTK part of speech tagging and a copyright grammar.

The goal of this project is to refactor Copyright detection for speed and simplicity possibly implementaing a new parser (PEG?, etc) or reimplementing core elements in Rust with a Python binding.

This would include also keeping track of line numbers and offsets where copyrights are found.

This would likely require either replacing or enhancing NLTK which is used as a natural language parser.

- **Tech**
 - Python, Rust
- **URLS**
 - <https://github.com/nexB/scancode-toolkit/tree/develop/src/cluecode>
- **Mentor**
 - @JonoYang <https://github.com/JonoYang>

Transparent archive extraction in ScanCode

ScanCode archive extraction is currently done with a separate command line invocation. The goal of this project is to integrate archive extraction transparently into the ScanCode scan loop. This would be using the new plugins architecture.

- **Tech**
 - Python
- **URLS**

- <https://github.com/nexB/scancode-toolkit/issues/14>

- **Mentor**

- @pombredanne <https://github.com/pombredanne>

Port ScanCode to Python 3

ScanCode runs only on Python 2.7 today. The goal of this project is to port ScanCode to support both Python 2 and Python 3.

- **Tech**

- Python

- **URLS**

- <https://github.com/nexB/scancode-toolkit/issues/295>

- **Mentor**

- @pombredanne <https://github.com/pombredanne>

Automated Docker, containers and VM images static package analysis

The goal of this project is to further the Conan container static analysis tool to effectively support proper inventory of installed packages without running the containers.

This includes determining which packages are installed in Docker layers for RPMs, Debian or Alpine Linux. And this would eventually require the integration of ScanCode.

- **Tech**

- Python, Go?

- **URLS**

- <https://github.com/pombredanne/conan>
- <https://github.com/nexB/scancode-toolkit>

- **Mentor**

- @pombredanne <https://github.com/pombredanne>

Static analysis of binaries for build tracing in TraceCode

TraceCode does system call tracing only today.

- The primary goal of this project is to do the same using symbol, debug symbol or string matching to accomplish something similar using static analysis.
- This project also would cover updating TraceCode to use the Click command line toolkit (like for ScanCode).
- Finally this project should improve the tracing of the lifecycle of file descriptors in TraceCode build. We need to improve how TraceCode does system call tracing by improving the way we track open/close file descriptors in the trace to reconstruct the lifecycle of a traced file.

- **Tech**

- Python, Linux

- **URLS**

- <https://github.com/nexB/tracecode-toolkit> for the existing non-static tool
- <https://github.com/nexB/scancode-toolkit-contrib> for the work in progress on binaries/symbols parsers/extractors

- **Mentor**

- @pombredanne <https://github.com/pombredanne>

Create Linux distro packages for ScanCode

The goal of this project is to ensure that we have proper packages for Linux distros for ScanCode.

The first step is to debundle pre-built binaries that exist in ScanCode such that they come either from system-packages or pre-built Python wheels. This covers libarchive, libmagic and a few other native libraries.

The next step is to ensure that all the dependencies from ScanCode are also available as distro packages.

The last step is to create proper distro packages for RPM, Debian, Nix and GUIX, Alpine, Arch and Gentoo and also an AppImage.org package as well as a proper Docker image and eventually submit these package to the distros.

As a bonus, the same could then be done for AboutCode toolkit and TraceCode.

This requires a good understanding of packaging and Python.

- **Tech**

- Python, Linux

- **URLS**

- <https://github.com/nexB/scancode-toolkit/issues/487>
- <https://github.com/nexB/scancode-toolkit/issues/469>

- **Mentor**

- @pombredanne <https://github.com/pombredanne>

Package URL implementations in many programming languages

We have a purl implementation in Python, Go and possibly Java today.

The goal of this project is to create multiple parsers and builders in several programming languages:

- JavaScript, Rust, R, Perl, Ruby, C/C++, Racket, etc.

- **Tech**

- Many!

- **URLS**

- <https://github.com/package-url>
- <https://fosdem.org/2018/schedule/event/purl/>

- **Mentors**

- @pombredanne <https://github.com/pombredanne>

DependentCode: a mostly universal Package dependencies resolver

The goal of this project is to create a tool for mostly universal package dependencies resolution using a SAT solver that should leverage the detected packages from ScanCode and the Package URLs and could provide a good enough way to resolve package dependencies for many system and application package formats. This is a green field project.

- **Tech**
 - Python, C/C++, Rust, SAT
- **URLS**
 - <https://github.com/package-url>
 - <https://fosdem.org/2018/schedule/event/purl/>
- **Mentors**
 - @pombredanne <https://github.com/pombredanne>

1.4.2 Google Season of Docs 2019

AboutCode has been accepted as a participant in the Google Season of Documents in 2019 as a mentoring org, and is looking for people with technical writing skills. This page contains information for technical writers and anyone else interested in helping.

AboutCode is a family of FOSS projects to uncover data about software code:

- Where does the code come from? which software package?
- What is its license? copyright?
- Is the code secure, maintained, well coded?

All these questions are important, and are relevant to millions of free and open source software components available on the web for reuse. The answers are critical to ensure that everyone can safely consume free and open source software.

Join us to make it so!

Our tools are used to help detect and report the origin and license of source code, packages and binaries as well as to discover software and package dependencies, and in the future track security vulnerabilities, bugs and other important software package attributes. This is a suite of command line tools, web-based and API servers and desktop applications.

Table of Contents

- *List of AboutCode projects*
- *Contact*
- *Technology*
- *Technical Writing Skills Needed*
- *About your project application*
- *Our Documentation Project ideas*
- *Tutorial ideas*
 - *Scan a Codebase and Analyze the Results*

- *How-To ideas*
 - *How To Get the License Clarity Score of a Package*
 - *How To Discover Licensing Issues in a Software Project*
- *Reference ideas*
 - *ScanCode Output Formats*
- *Discussion ideas*
 - *Integrating ScanCode into a Software Development Lifecycle*
- *Your Documentation Project ideas*
- *Mentoring*

List of AboutCode projects

Note that the AboutCode focus for GSOD 2019 is on **ScanCode Toolkit** and **ScanCode Workbench**, although proposals to improve the documents of other AboutCode projects are welcome.

- **ScanCode Toolkit** is a popular command line tool to scan code for licenses, copyrights and packages, used by many organizations and FOSS projects, small and large.
- **ScanCode Workbench** (formerly AboutCode Manager) is a JavaScript, Electron-based desktop application to review scan results and document your origin and license conclusions.
- Other AboutCode projects are described at <https://www.aboutcode.org> and <https://github.com/nexB/aboutcode>
We also work closely with, contribute to and have co-started several other orgs and projects:
- **Package URL** is an emerging standard to reference software packages of all types with simple, readable and concise URLs.
- **SPDX** is the Software Package Data Exchange, a specification to document the origin and licensing of software packages.
- **ClearlyDefined** is a project to review FOSS software and help FOSS projects to improve their licensing and documentation clarity.

Contact

Join the chat online or by IRC at <https://gitter.im/aboutcode-org/discuss> Introduce yourself and start the discussion!

For personal issues, you can contact the primary org admin directly: @pombredanne and pombredanne@gmail.com or the GSOD coordinator directly at dmclark@nexb.com

Please ask questions the smart way: <http://www.catb.org/~esr/faqs/smart-questions.html>

Technology

We primarily use Python (and some C/C++) for code analysis. We use Electron/JavaScript for GUI.

Our domain includes text analysis and processing (for instance for copyright and license detection), parsing (for package manifest formats), binary analysis (to detect the origin and license of binaries, which source code they come from, etc.) as well as web based tools and APIs (to expose the tools and libraries as web services) and low-level data structures for efficient matching (such as Aho-Corasick and other automata).

Our documentation is provided in text files that support the help function of our command line tools. We also have begun to provide documentation in the Wiki section of some AboutCode projects.

Technical Writing Skills Needed

Incoming technical writers will need the following skills:

- Ability to install and configure open source code from GitHub.
- Ability to understand and run programs from the command line in a terminal window.
- Familiarity with the four document functions described at <https://www.divio.com/blog/documentation/>
- Ability to create and edit wiki pages with multiple markdown languages.
- An interest in FOSS licensing and software code and origin analysis.

We are happy to help you get up to speed, and the more you are able to demonstrate ability and skills in advance, the more likely we are to choose your application!

About your project application

Your application should be in the range of 1000 words, and should contain the following information, plus anything else that you think is relevant:

- Your name and contact details
- Title of your proposal
- Abstract of your proposal
- Description of your idea including an explanation of what it will contribute to the project, such as the software development life cycle requirements that you expect to help with the documentation improvements.
- Description of previous work, existing solutions, open-source projects, preferably with links.
- Details of your academic studies and any previous internships.
- Descriptions of your relevant skills.
- Do you plan to have any other commitments during GSOD that may affect your work? Any vacations/holidays? Will you be available full time to work on your project? Please apply only if this is a serious full time commitment during the GSOD time frame.

Join the chat online or by IRC at <https://gitter.im/aboutcode-org/discuss> Introduce yourself and start the discussion!

An excellent, competitive way to demonstrate your capability would be to submit a documentation improvement to an AboutCode project, especially to ScanCode Toolkit or ScanCode Workbench.

You can pick any project idea from the list below. You can also submit *Your Documentation Project ideas*.

Our Documentation Project ideas

Here is a list of candidate project ideas for your consideration, organized by documentation function: **Tutorial** , **How-To** , **Reference** , **Discussion**.

Note that the AboutCode focus for GSOD 2019 is on ScanCode Toolkit and ScanCode Workbench, although proposals to improve the documents of other AboutCode projects are welcome.

Your Documentation Project ideas are welcome too! Please chat about them to increase your chances of success!

Tutorial ideas

Scan a Codebase and Analyze the Results

Provide specific instructions to guide a new user to:

- Scan a somewhat complex sample codebase using scancode-toolkit.
- Import the results into ScanCode Workbench.
- Analyze the scan results.
 - **Level**
 - * Intermediate
 - **Tech**
 - * Command line processing in a Linux-compatible terminal window
 - **URLS**
 - * <https://github.com/nexB/scancode-toolkit/blob/develop/README.rst>
 - * <https://github.com/nexB/scancode-toolkit/wiki>
 - * <https://github.com/nexB/scancode-workbench/blob/develop/README.md>
 - * <https://github.com/nexB/scancode-workbench/wiki>
 - **Mentors**
 - * <https://github.com/DennisClark>

How-To ideas

How To Get the License Clarity Score of a Package

Explain the recommended scancode-toolkit options to get a license clarity score.

- **Level**
 - Intermediate
- **Tech**
 - Command line processing in a Linux-compatible terminal window
- **URLS**
 - <https://github.com/nexB/scancode-toolkit/blob/develop/README.rst>
 - <https://github.com/nexB/scancode-toolkit/wiki>
 - <https://github.com/nexB/scancode-workbench/blob/develop/README.md>
 - <https://github.com/nexB/scancode-workbench/wiki>
- **Mentors**
 - <https://github.com/DennisClark>

How To Discover Licensing Issues in a Software Project

- Explain the recommended scancode-toolkit options to discover licenses.
- Explain how to take advantage of license policy support.
 - **Level**
 - * Intermediate
 - **Tech**
 - * Command line processing in a Linux-compatible terminal window
 - **URLS**
 - * <https://github.com/nexB/scancode-toolkit/blob/develop/README.rst>
 - * <https://github.com/nexB/scancode-toolkit/wiki>
 - * <https://github.com/nexB/scancode-workbench/blob/develop/README.md>
 - * <https://github.com/nexB/scancode-workbench/wiki>
 - **Mentors**
 - * <https://github.com/DennisClark>

Reference ideas

ScanCode Output Formats

Explain the various ScanCode output formats and their business purposes.

- **Level**
 - Intermediate
- **Tech**
 - Command line processing in a Linux-compatible terminal window
- **URLS**
 - <https://github.com/nexB/scancode-toolkit/blob/develop/README.rst>
 - <https://github.com/nexB/scancode-toolkit/wiki>
 - <https://github.com/nexB/scancode-workbench/blob/develop/README.md>
 - <https://github.com/nexB/scancode-workbench/wiki>
- **Mentors**
 - <https://github.com/DennisClark>

Discussion ideas

Integrating ScanCode into a Software Development Lifecycle

Discuss options and techniques to integrate ScanCode into a software development lifecycle workflow:

- During software creation and maintenance.

- During software check-out/check-in.
- During software build and test.
 - **Level**
 - * Intermediate
 - **Tech**
 - * Command line processing in a Linux-compatible terminal window
 - **URLS**
 - * <https://github.com/nexB/scancode-toolkit/blob/develop/README.rst>
 - * <https://github.com/nexB/scancode-toolkit/wiki>
 - * <https://github.com/nexB/scancode-workbench/blob/develop/README.md>
 - * <https://github.com/nexB/scancode-workbench/wiki>
 - **Mentors**
 - * <https://github.com/DennisClark>

Your Documentation Project ideas

Download and install ScanCode Toolkit and ScanCode Workbench and try them out. For example, you may try scanning an open source software package in a technology with which you are familiar. What are the documentation weak points?

- Is it difficult to get started? A **Tutorial** document opportunity.
- Is it difficult to accomplish a specific objective? A **How-To** document opportunity.
- Are the capabilities of the tool too mysterious? Do you want to know more about what you can do with it? A **Reference** document opportunity.
- Do you feel that you need to understand its concepts better in order to use it and trust it? Do you want to know more about how the code scanning actually works? A **Discussion** document opportunity.

Feel free to propose and describe your own documentation ideas.

Mentoring

We welcome new mentors to help with the program. We require some understanding of the project domain to join as a mentor. Contact the team on Gitter at <https://gitter.im/aboutcode-org/discuss>

1.4.3 Google Summer of Code 2017

Welcome to AboutCode! This year AboutCode is a mentoring Organization for the Google Summer of Code 2017 edition.

AboutCode is a project to uncover data ... about software code:

- where does it come from?
- what is its license? copyright?
- is it secure, maintained, well coded?

All these are questions that are important to find answers to when there are million of free and open source software components available on the web.

Where software comes from and what is its license should be a problem of the past, such that everyone can safely consume more free and open source software. Come and join us to make it so!

Our tools are used to help detect and report the origin and license of source code, packages and binaries, as well as discover software and package dependencies, track vulnerabilities, bugs and other important software component attributes.

Contact

Subscribe to the mailing list at <https://lists.sourceforge.net/lists/listinfo/aboutcode-discuss> and introduce yourself and start the discussion! The mailing list is usually the better option to avoid timezone gaps.

The list archive have also plenty of interesting information. Someone may have asked your question before. Search and browse the archives at <https://sourceforge.net/p/aboutcode/mailman/aboutcode-discuss/> !

For short chats, you can also join the #aboutcode IRC channel on Freenode or the Gitter channel at <https://gitter.im/aboutcode-org/discuss>

For personal issues, you can contact the org admin directly: @pombredanne and pombredanne@gmail.com

Please ask questions the smart way: <http://www.catb.org/~esr/faqs/smart-questions.html>

Technology

Discovering the origin of code is a vast topic. We primarily use Python for this and some C/C++ and JavaScript, but we are open to using any other language within reason.

Our domain includes text analysis and processing (for instance for copyrights and licenses), parsing (for package manifest formats), binary analysis (to detect the origin and license of binaries, which source code they come from, etc) as well as web based tools and APIs (to expose the tools and libraries as web services).

About your project application

We expect your application to be in the range of 1000 words. Anything less than that will probably not contain enough information for us to determine whether you are the right person for the job. Your proposal should contain at least the following information, plus anything you think is relevant:

- Your name
- Title of your proposal
- Abstract of your proposal
- Detailed description of your idea including explanation on why is it innovative and what it will contribute
 - hint: explain your data structures and the main processing flows in details.
- Description of previous work, existing solutions (links to prototypes, bibliography are more than welcome)
- Mention the details of your academic studies, any previous work, internships
- Relevant skills that will help you to achieve the goal (programming languages, frameworks)?
- Any previous open-source projects (or even previous GSoC) you have contributed to and links.

- Do you plan to have any other commitments during GSoC that may affect your work? Any vacations/holidays? Will you be available full time to work on your project? (Hint: do not bother applying if this is not a serious full time commitment)

Subscribe to the mailing list at <https://lists.sourceforge.net/lists/listinfo/aboutcode-discuss> or join the #aboutcode IRC channel on Freenode and introduce yourself and start the discussion!

You need to understand something about open source licensing or package managers or code and binaries static analysis. The best way to demonstrate your capability would be to submit a small patch ahead of the project selection for an existing issue or a new issue.

Project ideas

ScanCode live scan server :

This project is to use ScanCode as a library in a web and REST API application that allows you to scan code on demand by entering a URL and then store the scan results. It could also be made available as a Travis or Github integration to scan on commit with webhooks. Bonus feature is to scan based on a received tweet of similar IRC or IM integration.

- **URLS :**
 - <https://github.com/nexB/scancode-toolkit>
- **Mentors :**
 - @majurg <https://github.com/majurg>
 - @tdruez <https://github.com/tdruez>

Package security vulnerability data feed (and scanner) :

The end goal for this project is to build on existing projects to match packages identified by ScanCode to existing vulnerability alerts. This is not trivial as there are several gaps in the CVE data and how they relate to packages as they are detected by ScanCode or else. This is a green field project.

The key points to tackle are:

1. create the tools to build a free and open source structured and curate security feed
 - the aggregation of packages vulnerabilities feeds in a common and structured model (CVE, distro trackers, etc),
 - the aggregation of additional security data (CWE, CPE, and more) in that model,
 - the correlation of the different data items, creating accurate relationships and matching of actual package identifiers to vulnerabilities,
 - an architecture for community curation of vulnerabilities, correlation and enhancement of the data.
 2. as a side bonus, build the tools in ScanCode to match detected packages to this feed. Note there is no FOSS tool and DB that does all of this today (only proprietary solutions such as vfeed or vulndb).
- **Some Related URLS for other projects in the same realm :**
 - <https://github.com/cve-search/cve-search>
 - <https://github.com/jeremylong/DependencyCheck/>
 - <https://github.com/victims/victims-cve-db>

- <https://github.com/rubysec/ruby-advisory-db>
- <https://github.com/future-architect/vuls>
- <https://github.com/coreos/clair>
- <https://github.com/anchore/anchore/>
- <https://github.com/pyupio/safety-db>
- <https://github.com/RetireJS/retire.js>
- and many more including Linux distro feeds

• **Mentors :**

- @majurg <https://github.com/majurg>
- @JonoYang <https://github.com/JonoYang>
- @pombredanne <https://github.com/pombredanne>

Port the Python license expression library to JavaScript and prepare and publish an NPM package :

Use automated code translation (for JS) for the port. Add license expression support to AboutCodeMgr with this library. As a bonus, create a web server app and API service to parse and normalize ScanCode and SPDX license expressions either in Python or JavaScript.

• **URLS :**

- <https://github.com/nexB/license-expression>
- <https://github.com/bastikr/boolean.py>
- <https://github.com/nexB/aboutcode-manager>
- <https://github.com/jashkenas/coffeescript/wiki/list-of-languages-that-compile-to-js>

• **Mentors :**

- @JonoYang <https://github.com/JonoYang>
- @majurg <https://github.com/majurg>

MatchCode :

Create a system for matching code using checksums and fingerprints against a repository of checksums and fingerprints. Create a basic repository for storing these fingerprints and expose a basic API. Create a client that can collect fingerprints on code and get matches using API calls to this repository or package manager APIs (Maven, Pypi, etc), or search engines APIs such as searchcode.com, debsources, or Github or Bitbucket commit hash searches/API or the SoftwareHeritage.org API.

• **URLS :**

- <https://github.com/nexB/scancode-toolkit-contrib> for samecode fingerprints drafts.
- <https://github.com/nexB/scancode-toolkit> for commoncode hashes

• **Mentors :**

- @pombredanne <https://github.com/pombredanne>

ScanCode scan deduction :

The goal of this project is to take existing scan and match results and infer summaries and deduction at a higher level, such as the licensing of a whole directory tree.

- **URLS :**
 - <https://github.com/nexB/scancode-toolkit/issues/426>
 - <https://github.com/nexB/scancode-toolkit/issues/377>
- **Mentors :**
 - @pombredanne <https://github.com/pombredanne>
 - @JonoYang <https://github.com/JonoYang>

DeltaCode :

A new tool to help determine at a high level if the licensing for two codebases or versions of code has changed, and if so how. This is NOT a generic diff tool that identifies all codebase differences, rather it focuses on changes in licensing based on differences between ScanCode files.

- **Mentor :**
 - @majurg <https://github.com/majurg>

License and copyright detection benchmark :

Compare ScanCode runtimes with Fossology, licensee, LicenseFinder, license-check, ninka, slic, LiD and others. This project is to create a comprehensive test suite and a benchmark for several FOSS open source license and copyright detection engines, establish mappings between the different conventions they use for license identification and evaluate and publish the results of detection accuracy and precision.

Note that this not about the speed of scanning: the performance and time taken is accessory and a nice to have result only. What matters is the accuracy of the license detection:

1. is the right license detected and how correct is this detection?
2. when a license is detected is the correct exact text matched and returned?

So what is needed is a (large) test set of files.

Then establishing a ground truth for reference e.g. detecting then reviewing manually possibly with scancode to set up the baseline that will be used to compare all the scanners.

Then run the other tools and scancode to see how well they perform and of course establish a mapping of license identifiers: each tool may use different license ids so we need to map these to the ids used in the test baseline (e.g. the scancode license keys): all this has to be built, possibly reusing some or all of the scancode tests and lacing in all the tests from the other tools and adding more as needed.

- **Mentors :**
 - @mjherzog <https://github.com/mjherzog>
 - @pombredanne <https://github.com/pombredanne>

Improved copyright parsing in ScanCode :

by keeping track of line numbers and offsets where copyrights are found. This would likely require either replacing or enhancing NLTK which is used as a natural language parser to add support for tracking where a copyright has been detected in a scanned text.

- **URLS :**
 - <https://github.com/nexB/scancode-toolkit/tree/develop/src/cluecode>
- **Mentor :**
 - @JonoYang <https://github.com/JonoYang>

Support full JSON and ABCD formats in AttributeCode

- **URLS :**
 - <https://github.com/nexB/attributecode/issues/277>
- **Mentor :**
 - @chinyeungli <https://github.com/chinyeungli>

Transparent archive extraction in ScanCode :

ScanCode archive extraction is currently done with a separate command line invocation. The goal of this project is to integrate archive extraction transparently into the ScanCode scan loop.

- **URLS :**
 - <https://github.com/nexB/scancode-toolkit/issues/14>
- **Mentor :**
 - @pombredanne <https://github.com/pombredanne>

Automated docker and VM images static package analysis :

to determine which packages are installed in Docker layers for RPMs, Debian or Alpine Linux. This is for the conan Docker image analysis tool.

- **URLS :**
 - <https://github.com/pombredanne/conan>
- **Mentor :**
 - @pombredanne <https://github.com/pombredanne>

Plugin architecture for ScanCode :

Create ScanCode plugins for outputs to multiple formats (CSV, JSON, SPDX, Debian Copyright)

- **URLS :**
 - <https://github.com/nexB/scancode-toolkit/issues/552>
 - <https://github.com/nexB/scancode-toolkit/issues/381>

- **Mentor :**
 - @pombredanne <https://github.com/pombredanne>

Static analysis of binaries for build tracing in TraceCode :

TraceCode does system call tracing. The goal of this project is to do the same using symbol, debug symbol or string matching to accomplish something similar,

- **URLS :**
 - <https://github.com/nexB/tracecode-build> for the existing non-static tool
 - <https://github.com/nexB/scancode-toolkit-contrib> for the work in progress on binaries/symbols parsers/extractors
- **Mentor :**
 - @pombredanne <https://github.com/pombredanne>

Better support tracing the lifecycle of file descriptors in TraceCode build :

TraceCode does system call tracing. The goal of this project is to improve the way we track open/close file descriptors in the trace to reconstruct the life of a file.

- **URLS :**
 - <https://github.com/nexB/tracecode-build>
- **Mentor :**
 - @pombredanne <https://github.com/pombredanne>

Create Debian and RPM packages for ScanCode, AttributeCode and TraceCode.

Consider also including an AppImage.org package. If you think this may not fill in a full three months project, consider also adding some extras such as submitting the packages to Debian and Fedora.

- **URLS :**
 - <https://github.com/nexB/scancode-toolkit/issues/487>
 - <https://github.com/nexB/scancode-toolkit/issues/469>
- **Mentor :**
 - @pombredanne <https://github.com/pombredanne>

AboutCode Manager test suite and Ci :

Create an extensive test suite for the Electron app and setup the CI to run unit, integration and smoke tests on Ci for Windows, Linux and Mac.

- **URLS :**
 - <https://github.com/nexB/aboutcode-manager>
- **Mentors :**

- @jdaguil <https://github.com/jdaguil>
- @pombredanne <https://github.com/pombredanne>

DependentCode :

Create a tool for mostly universal package dependencies resolution.

- **URLS :**
 - <https://github.com/nexB/dependentcode>
- **Mentors :**
 - @pombredanne <https://github.com/pombredanne>

FetchCode :

Create a tool for mostly universal package and code download from VCS, web, ftp, etc.

- **Mentors :**
 - @pombredanne <https://github.com/pombredanne>

1.4.4 Google Summer of Code 2018

See *Contributor Project Ideas*.

1.4.5 Google Summer of Code 2019

AboutCode is participating in the Google Summer of Code in 2019 as a mentoring org. This page contain all the information for students and anyone else interested in helping.

AboutCode is a family of FOSS projects to uncover data ... about software code:

- where does the code come from? which software package?
- what is its license? copyright?
- is the code secure, maintained, well coded?

All these are questions that are important to answer: there are million of free and open source software components available on the web for reuse.

Knowing where a software package comes from, what is its license and if it is vulnerable and what's its licensing should be a problem of the past such that everyone can safely consume more free and open source software.

Join us to make it so!

Our tools are used to help detect and report the origin and license of source code, packages and binaries as well as discover software and package dependencies, and in the future track security vulnerabilities, bugs and other important software package attributes. This is a suite of command line tools, web-based and API servers and desktop applications.

Table of Contents

- *AboutCode projects are...*
- *Contact*
- *Technology*
- *Skills*
- *About your project application*
- *Our Project ideas*
 - *Improve Copyright detection accuracy and speed in ScanCode*
 - *Port ScanCode to Python 3*
 - *Improve Programming language detection and classification in ScanCode*
 - *Improve License detection accuracy and speed in ScanCode*
 - *Improve ScanCode scan summarization and deduction*
 - *Create Linux distros and FreeBSD packages for ScanCode.*
 - *DeltaCode projects*
 - *TraceCode projects*
 - *Conan and Other projects*
- *Mentoring*

AboutCode projects are...

- **ScanCode Toolkit** is a popular command line tool to scan code for licenses, copyrights and packages, used by many organizations and FOSS projects, small and large.
- **Scancode Workbench** (formerly AboutCode Manager) is a JavaScript, Electron-based desktop application to review scan results and document your origin and license conclusions.
- **AboutCode Toolkit** is a command line tool to document and inventory known packages and licenses and generate attribution docs, typically using the results of analyzed and reviewed scans.
- **TraceCode Toolkit** is a command line tool to find which source code file is used to create a compiled binary and trace and graph builds.
- **DeltaCode** is a command line tool to compare scans and determine if and where there are material differences that affect licensing.
- **ConAn** : a command line tool to analyze the code in Docker and container images
- **VulnerableCode** : an emerging server-side application to collect and track known package vulnerabilities.
- **license-expression** : a library to parse, analyze, simplify and render boolean license expression (such as SPDX)

We also work closely, contribute and co-started several other orgs and projects:

- **Package URL** which is an emerging standard to reference software packages of all types with simple, readable and concise URLs.
- **SPDX** aka. Software Package Data Exchange, a spec to document the origin and licensing of packages.
- **ClearlyDefined** to review and help FOSS projects improve their licensing and documentation clarity.

Contact

Join the chat online or by IRC at <https://gitter.im/aboutcode-org/discuss> Introduce yourself and start the discussion!

For personal issues, you can contact the primary org admin directly: @pombredanne and pombredanne@gmail.com

Please ask questions the smart way: <http://www.catb.org/~esr/faqs/smart-questions.html>

Technology

Discovering the origin of code is a vast topic. We primarily use Python for this and some C/C++ (and eventually some Rust and Go) for performance sensitive code and Electron/JavaScript for GUI.

Our domain includes text analysis and processing (for instance for copyrights and licenses detection), parsing (for package manifest formats), binary analysis (to detect the origin and license of binaries, which source code they come from, etc.) as well as web based tools and APIs (to expose the tools and libraries as web services) and low-level data structures for efficient matching (such as Aho- Corasick and other automata).

Skills

Incoming students will need the following skills:

- Intermediate to strong Python programming. For some projects, strong C/C++ and/or Rust is needed too.
- Familiarity with git as a version control system
- Ability to set up your own development environment
- An interest in FOSS licensing and software code and origin analysis

We are happy to help you get up to speed, but the more you are able to demonstrate ability and skills in advance, the more likely we are to choose your application!

About your project application

We expect your application to be in the range of 1000 words. Anything less than that will probably not contain enough information for us to determine whether you are the right person for the job. Your proposal should contain at least the following information, plus anything you think is relevant:

- Your name
- Title of your proposal
- Abstract of your proposal
- Detailed description of your idea including explanation on why is it innovative and what it will contribute to the project
 - hint: explain your data structures and you planned main processing flows in details.
- Description of previous work, existing solutions (links to prototypes, bibliography are more than welcome)
- Mention the details of your academic studies, any previous work, internships
- Relevant skills that will help you to achieve the goal (programming languages, frameworks)?
- Any previous open-source projects (or even previous GSoC) you have contributed to and links.
- Do you plan to have any other commitments during GSoC that may affect your work? Any vacations/holidays? Will you be available full time to work on your project? (Hint: do not bother applying if this is not a serious full time commitment during the GSoC time frame)

Join the chat online or by IRC at <https://gitter.im/aboutcode-org/discuss> introduce yourself and start the discussion!

The best way to demonstrate your capability would be to submit a small patch ahead of the project selection for an existing issue or a new issue.

We will **always** consider and prefer a project submissions where you have submitted a patch over any other submission without a patch.

You can pick any project idea from the list below. If you have other ideas that are not in this list, contact the team first to make sure it makes sense.

Our Project ideas

Here is a list of candidate project ideas for your consideration. Your own ideas are welcomed too! Please chat about them to increase your chances of success!

ScanCode ideas

Improve Copyright detection accuracy and speed in ScanCode

Copyright detection is reasonably good by the slowest scanner in ScanCode. It is based on NLTK part of speech (PoS) tagging and a copyright grammar. The exact start and end lines where a copyright is found are approximate.

The goal of this project is to refactor Copyright detection for speed and simplicity possibly implementing a new parser (PEG?, etc.) or re-implementing core elements in Rust with a Python binding for speed or using a fork of NLTK or any other tool to be faster and more accurate.

This would include also keeping track of line numbers and offsets where copyrights are found.

Also we detect copyrights that are part of a standard license text (e.g. FSF copyright in a GPL text) and we should be able to filter these out.

- **Level**
 - Advanced
- **Tech**
 - Python, Rust, Go?
- **URLS**
 - <https://github.com/nexB/scancode-toolkit/tree/develop/src/cluecode>
- **Mentors**
 - @JonoYang <https://github.com/JonoYang>

Port ScanCode to Python 3

ScanCode runs only on Python 2.7 today. The goal of this project is to port ScanCode to support both Python 2 and Python 3.

- **Level**
 - Intermediate to Advanced
- **Tech**
 - Python, C/C++, Go (for native code)

- **URLS**
 - <https://github.com/nexB/scancode-toolkit/issues/295>
- **Mentors**
 - @majurg <https://github.com/majurg>

Improve Programming language detection and classification in ScanCode

ScanCode programming language detection is not as accurate as it could be and this is important to get this right to drive further automation. We also need to automatically classify each file in facets when possible.

The goal of this project is to improve the quality of programming language detection (which is using only Pygments today and could use another tool, e.g. some Bayesian classifier like Github linguist, enry ?). And to create and implement a flexible framework of rules to automate assigning files to facets which could use some machine learning and classifier.

- **Level**
 - Intermediate to Advanced
- **Tech**
 - Python
- **URLS**
 - <https://github.com/nexB/scancode-toolkit/issues/426>
 - <https://github.com/nexB/scancode-toolkit/issues/1012>
 - <https://github.com/nexB/scancode-toolkit/issues/1036>
- **Mentors**
 - @pombredanne <https://github.com/pombredanne>

Improve License detection accuracy and speed in ScanCode

ScanCode license detection is using a sophisticated set of techniques base on automatons, inverted indexes and sequence matching. There are some cases where license detection accuracy could be improved (such as when scanning long notices). Other improvements would be welcomed to ensure the proper detected license text is collected in an improved way. Dealing with large files sometimes trigger a timeout and handling these cases would be needed too (by breaking files in chunks). The detection speed could also be improved possibly by porting some critical code sections to C or Rust and that would need extensive profiling.

- **Level**
 - Advanced
- **Tech**
 - Python, C/C++, Rust, Go
- **Mentors**
 - @mjherzog <https://github.com/mjherzog>
 - @pombredanne <https://github.com/pombredanne>

Improve ScanCode scan summarization and deduction

The goal of this project is to take existing scan results and infer summaries and perform some deduction of license and origin at a higher level, such as the licensing or origin of a whole directory tree. The ultimate goal is to automate the conclusion of a license and origin based on scans. This could include using statistics and machine learning techniques such as classifiers where relevant and efficient.

This should be implemented as a set of ScanCode plugins and further the summarycode module plugins.

- **Level**
 - Advanced
- **Tech**
 - Python (Rust and Go welcomed too)
- **URLS**
 - <https://github.com/nexB/scancode-toolkit/issues/426>
 - <https://github.com/nexB/scancode-toolkit/issues/377>
- **Mentors**
 - @pombredanne <https://github.com/pombredanne>
 - @JonoYang <https://github.com/JonoYang>

Create Linux distros and FreeBSD packages for ScanCode.

The goal of this project is to ensure that we have proper packages for Linux distros and FreeBSD for ScanCode.

The first step is to debundle pre-built binaries that exist in ScanCode such that they come either from system-packages or pre-built Python wheels. This covers libarchive, libmagic and a few other native libraries and has been recently completed.

The next step is to ensure that all the dependencies from ScanCode are also available as distro packages.

The last step is to create proper distro packages for RPM, Debian, FreeBSD and as many other distros such as Nix and GUIX, Alpine, Arch and Gentoo (and possibly also AppImage.org packages and Docker images) and submit these package to the distros.

As a bonus, the same could then be done for AboutCode toolkit and TraceCode.

This requires a good understanding of packaging and Python.

- **Level**
 - Intermediate to Advanced
- **Tech**
 - Python, Linux, C/C++ for native code
- **URLS**
 - <https://github.com/nexB/scancode-toolkit/issues/487>
 - <https://github.com/nexB/scancode-toolkit/issues/469>
- **Mentor**
 - @pombredanne <https://github.com/pombredanne>

DeltaCode projects

Approximately Similar file detection in DeltaCode

DeltaCode is a tool to compare and report scan differences. When comparing files, it only uses exact comparison. The goal of this project is to improve the usefulness of the delta by also finding files that are mostly the same (e.g. quasi or near duplicates) vs. files that are completely different. Then the DeltaCode comparison core should be updated accordingly to detect and report material changes to scans (such as new, update or removed licenses, origins and packages) when changes are also material in the code files (e.g. such that small changes may be ignored)

- **Level**
 - Intermediate to Advanced
- **Tech**
 - Python
- **URLS**
 - <https://github.com/nexB/deltacode/>
- **Mentors**
 - @majurg <https://github.com/majurg>
 - @johnmhoran <https://github.com/johnmhoran>

TraceCode projects

Static analysis of binaries for build tracing in TraceCode

TraceCode does system call tracing only today. The primary goal of this project is to create a tool that provides the same results as the trace-based tracing but would be using ELF symbols, DWARF debug symbols, signatures or string matching to determine when and how a source code file is built in a binary using only a static analysis. The primary target should be Linux executables, though the code should be designed to be extensible to Windows PE and macOS Dll and exes.

- **Level**
 - Advanced
- **Tech**
 - Python, Linux, ELF, DWARF, symbols, reversing
- **URLS**
 - <https://github.com/nexB/tracecode-toolkit> for the existing non-static tool
 - <https://github.com/nexB/scancode-toolkit-contrib> for some work in progress on binaries/symbols parsers/extractors
- **Mentor**
 - @pombredanne <https://github.com/pombredanne>

Improve dynamic build tracing in TraceCode

TraceCode does system call tracing and relies on kernel-space system calls and in particular tracing file descriptors. This project should improve the tracing of the lifecycle of file descriptors when tracing a build with strace. We need to improve how TraceCode does system call tracing by improving the way we track open/close file descriptors in the trace to reconstruct the lifecycle of a traced file. This requires to understand and dive if the essence of system calls and file lifecycle from a kernel point of view and build datastructure and code to reconstruct user-space file activity from the kernel traces along a timeline.

This project also would cover updating TraceCode to use the Click command line toolkit (like for ScanCode).

- **Level**
 - Advanced
- **Tech**
 - Python, Linux kernel, system calls
- **URLS**
 - <https://github.com/nexB/tracecode-toolkit> for the existing non-static tool
 - <https://github.com/nexB/scancode-toolkit-contrib> for the work in progress on binaries/symbols parsers/extractors
- **Mentor**
 - @pombredanne <https://github.com/pombredanne>

Conan and Other projects

Containers and VM images static package analysis

The goal of this project is to further the Conan container static analysis tool to effectively support proper inventory of installed packages without running the containers.

This includes determining which packages are installed in Docker layers for RPMs, Debian or Alpine Linux in a static way. And this may eventually require the integration with ScanCode.

- **Level**
 - Advanced
- **Tech**
 - Python, Go, containers, distro package managers, RPM, Debian, Alpine
- **URLS**
 - <https://github.com/nexB/conan>
- **Mentor**
 - @JonoYang <https://github.com/JonoYang>

DependentCode: a mostly universal Package dependencies resolver

The goal of this project is to create a tool for a universal package dependencies resolution using a SAT solver that should leverage the detected packages from ScanCode and the Package URLs and could provide a good enough way to resolve package dependencies for many system and application package formats. This is a green field project.

- **Level**
 - Advanced
- **Tech**
 - Python, C/C++, Rust, SAT
- **URLS**
 - <https://github.com/package-url>
 - <https://fosdem.org/2018/schedule/event/purl/>
 - <https://github.com/heremaps/oss-review-toolkit>
- **Mentors**
 - @pombredanne <https://github.com/pombredanne>

VulnerableCode Package security vulnerability correlated data feed

This project is to further and evolve the VulnerableCode server and software package vulnerabilities data aggregator.

VulnerableCode was started as a GSoC project in 2017. Its goal is to collect, aggregate and correlate vulnerabilities data and provide semi-automatic correlation. In the end it should provide the basis to report vulnerabilities alerts found in packages identified by ScanCode.

This is not trivial as there are several gaps in the CVE data and how they relate to packages as they are detected by ScanCode or else.

The features and TODO for this updated server would be:

- Aggregate more and new packages vulnerabilities feeds,
- Automating correlation: add smart relationship detection to infer new relationships between available packages and vulnerabilities from mining the graph of existing relations.
- Create a ScanCode plugin to report vulnerabilities with detected packages using this data.
- Integrate API lookup on the server with the AboutCode Manager UI
- Create a UI and model for community curation of vulnerability to package mappings, correlations and enhancements.
- **Level**
 - Advanced
- **Tech**
 - Python, Django
- **URLS**
 - <https://github.com/nexB/vulnerablecode>
 - <https://github.com/nexB/aboutcode-manager>
 - <https://github.com/nexB/scancode-toolkit>
 - Other interesting pointers:
 - * <https://github.com/cve-search/cve-search>
 - * <https://github.com/jeremylong/DependencyCheck/>

- * <https://github.com/victims/victims-cve-db>
- * <https://github.com/rubysec/ruby-advisory-db>
- * <https://github.com/future-architect/vuls>
- * <https://github.com/coreos/clair>
- * <https://github.com/anchore/anchore/>
- * <https://github.com/pyupio/safety-db>
- * <https://github.com/RetireJS/retire.js>
- * and many more including Linux distro feeds

- **Mentors**

- @majurg <https://github.com/majurg>
- @JonoYang <https://github.com/JonoYang>

High volume matching automaton and data structures

Finding similar code is a way to detect the origin of code against an index of open source code.

To enable this, we need to research and create efficient and compact data structures that are specialized for the type of data we lookup. Given the volume to consider (typically multi billion values indexed) there are special considerations to have compact and memory efficient dedicated structures (rather than using a general purpose DB or Key/value pair store) that includes looking at automata, and memory mapping. This types of data structures should be implemented in Rust as a preference (though C/C++ is OK) and include Python bindings.

There are several areas to research and prototype such as:

- A data structure to match efficiently a batch of fix-width checksums (e.g. SHA1) against a large index of such checksums, where each checksum points to one or more files or packages. A possible direction is to use finite state transducers, specialized B-tree indexes, blomm-like filters. Since when a codebase is being matched there can be millions of lookups to do, the batch matching is preferred.
- A data structure to match efficiently a batch of fix-width byte strings (e.g. LSH) against a large index of such LSH within a fixed hamming distance, where each points to one or more files or packages. A possible direction is to use finite state transducers (possibly weighted), specialized B-tree indexes or multiple hash-like on-disk tables.
- A memory-mapped Aho-Corasick automaton to build large batch tree matchers. Available Aho-Corasick automaton may not have a Python binding or may not allow memory-mapping (like pyahocorasick we use in ScanCode). The volume of files we want to handle requires to reuse, extend or create specialized tree/paths matching automaton that can handle eventually billions of nodes and are larger than the available memory. A possible direction is to use finite state transducers (possibly weighted).
- Feature hashing research: we deal with many “features” and hashing to limit the number and size of the each features seems to be a valuable thing. The goal is to research the validity of feature hashing with short hashes (15, 16 and 32 bits) and evaluate if this leads to acceptable false-positive and loss of accuracy in the context of the data structures mentioned above.

Then using these data structures, the project should create a system for matching code as a Python-based server exposing a simple API. This is a green field project.

- **Level**
 - Advanced
- **Tech**

- Rust, Python
- **URLS**
 - <https://github.com/nexB/scancode-toolkit-contrib> for samecode fingerprints drafts.
 - <https://github.com/nexB/scancode-toolkit> for commoncode hashes
- **Mentors**
 - @pombredanne <https://github.com/pombredanne>

Mentoring

We welcome new mentors to help with the program and require some good understanding of the project codebase and domain to join as a mentor. Contact the team on Gitter.

1.4.6 Writing good Commit Messages

What is good commit message? We want to avoid this: <https://xkcd.com/1296/>

Read these articles:

- by @cbeams [How to Write a Git Commit Message](#)
- this README from Linus Torvalds <https://github.com/torvalds/subsurface-for-dirk/blob/0f58510ce0244513521296b75281fcc32f72a931/README#L73>
- from the Git book: <https://git-scm.com/book/en/v2/Distributed-Git-Contributing-to-a-Project>

The main style points are these:

Subject:

- Add a issue number at the end of the line when available as in “#234”
- Limit the subject line to 50 characters
- Capitalize the subject line
- Do not end the subject line with a period
- Use the imperative mood in the subject line: you are giving orders to the codebase

Body:

- Separate subject from body with a blank line
- Wrap the body at 72 characters. Use only spaces for formatting, not tabs.
- Use the body to explain what and why vs. how
- use bullets with a * if needed
- Add a Reported-by: if needed
- End your message with a Signed-off-by: prefixed by a blank line

Other comments:

We like to suffix the subject line with an issue number. If this was a trivial change it may not have one though. If it had one a you would use #156 as a suffix to the first line.

We like to tell why the commit is there and use an imperative style, like if you were giving an order to the codebase with your commit:

e.g rather than : Minor fix for unnecessary operations. may be Remove unnecessary operations #123 or

```
Remove unnecessary operations #123
```

```
* If the ts timestamp does not exist, do not compare with old one.
```

You need to add a signoff to your commit. So the final message would have looked like this:

```
Remove unnecessary operations #123
```

```
* If the ts timestamp does not exist, do not compare with old one.
```

```
Signed-off-by: Philippe Ombredanne <pombredanne@nexb.com>
```

1.5 AboutCode-Toolkit Documentation

1.5.1 AboutCode Toolkit

Build and tests status

Branch	Linux/macOS	Windows
Master	build passing	 BUILD PASSING
Develop	build passing	 BUILD PASSING

The AboutCode Toolkit and ABOUT files provide a simple way to document the origin, license, usage and other important or interesting information about third-party software components that you use in your project.

You start by storing ABOUT files (a small YAML formatted text file with field/value pairs) side-by-side with each of the third-party software components you use. Each ABOUT file documents origin and license for one software. For more information on the ABOUT file format, visit <http://www.dejacode.org> There are many examples of ABOUT files (valid or invalid) in the testdata/ directory of the whole repository.

The current version of the AboutCode Toolkit can read these ABOUT files so that you can collect and validate the inventory of third-party components that you use.

In addition, this tool is able to generate attribution notices and identify redistributable source code used in your project to help you comply with open source licenses conditions.

This version of the AboutCode Toolkit follows the ABOUT specification version 3.0 at: <https://github.com/nexB/aboutcode-toolkit/blob/develop/SPECIFICATION.rst>

REQUIREMENTS

The AboutCode Toolkit is tested with Python 2.7 and 3.6 on Linux, Mac and Windows. You will need to install a Python interpreter if you do not have one already installed.

On Linux and Mac, Python is typically pre-installed. To verify which version may be pre-installed, open a terminal and type:

```
python --version
```

On Windows or Mac, you can download the latest Python here: <https://www.python.org/downloads/>

Download the .msi installer for Windows or the .dmg archive for Mac. Open and run the installer using all the default options.

INSTALLATION

Checkout or download and extract the AboutCode Toolkit from: <https://github.com/nexB/aboutcode-toolkit/>

To install all the needed dependencies in a virtualenv, run (on posix): `source configure`

or on windows: `configure`

REFERENCE

See <https://github.com/nexB/aboutcode-toolkit/blob/master/REFERENCE.rst> for reference on aboutcode-toolkit usage.

TESTS and DEVELOPMENT

To install all the needed development dependencies, run (on posix): `source configure etc/conf/dev`

or on windows: `configure etc/conf/dev`

To verify that everything works fine you can run the test suite with: `py.test`

HELP and SUPPORT

If you have a question or find a bug, enter a ticket at:

<https://github.com/nexB/aboutcode-toolkit>

For issues, you can use:

<https://github.com/nexB/aboutcode-toolkit/issues>

SOURCE CODE

The AboutCode Toolkit is available through GitHub. For the latest version visit: <https://github.com/nexB/aboutcode-toolkit>

HACKING

We accept pull requests provided under the same license as this tool. You agree to the <http://developercertificate.org/>

LICENSE

The AboutCode Toolkit is released under the Apache 2.0 license. See (of course) the about.ABOUT file for details.

1.5.2 Reference

about

Syntax

```
about [OPTIONS] [COMMANDS]
```

Options:

```
--version    Show the version and exit.
--help       Show this message and exit.
```

Commands:

```
attrib      LOCATION: directory, OUTPUT: output file
check       LOCATION: directory
gen         LOCATION: input file, OUTPUT: directory
inventory   LOCATION: directory, OUTPUT: csv file
```

attrib

Syntax

```
about attrib [OPTIONS] LOCATION OUTPUT
```

LOCATION: Path to an ABOUT file **or** a directory containing ABOUT files.
OUTPUT: Path to output file to write the attribution to.

Options:

```
--inventory PATH      Path to an inventory file.
--mapping              Use for mapping between the input keys and the ABOUT_
↳field.               names - mapping.config
--mapping-file         Use a custom mapping file with mapping between input
keys and ABOUT field names.
--template PATH       Path to a custom attribution template.
--vartext TEXT         Variable texts to the attribution template
--verbose             Show all the errors and warning.
-q, --quiet           Do not print any error/warning.
-h, --help            Show this message and exit.
```

Purpose

Generate an attribution file which contains the all license information from the LOCATION along with the license text.

Assume the following:

```
'/home/about_files/'** contains all the ABOUT files [LOCATION]
'/home/attribution/attribution.html' is the user's output path [OUTPUT]
'/home/project/component_list.csv' is the inventory that user want to be generated
```

```
$ about attrib /home/about_files/ /home/attribution/attribution.html
```

Options

```
--inventory

    This option allows you to define which ABOUT files should be used for attribution_
    ↪generation.
    For instance,
    '/home/project/component_list.csv' is the inventory that user want to be generated

$ about attrib --inventory /home/project/component_list.csv LOCATION OUTPUT

--mapping

    See mapping.config for details

--mapping-file

    Same behavior as `--mapping` but with custom mapping file

$ about attrib --mapping-file CUSTOM_MAPPING_FILE_PATH LOCATION OUTPUT

--template

    This option allows you to use your own template for attribution generation.
    For instance, if you have a custom template located at:
    /home/custom_template/template.html

$ about attrib --template /home/custom_template/template.html LOCATION OUTPUT

--vartext

    This option allow you to pass variable texts to the attribution template

$ about attrib --vartext "title=Attribution Notice" --vartext "header=Product 101" ↪
    ↪LOCATION OUTPUT

    Users can use the following in the template to get the vartext:
    {{ vartext_dict['title'] }}
    {{ vartext_dict['header'] }}

--verbose

    This option tells the tool to show all errors found.
    The default behavior will only show 'CRITICAL', 'ERROR', and 'WARNING'
```

The following data are passed to jinja2 and, therefore, can be used for a custom template:

- about object: the about objects
- common_licenses: a common license keys list in licenses.py
- license_key_and_context: a dictionary list with license_key as a key and license text as the value
- license_file_name_and_key: a dictionary list with license file name as a key and license key as the value
- license_key_to_license_name: a dictionary list with license key as a key and license file name as the value

check

Syntax

```
about check [OPTIONS] LOCATION
```

LOCATION: Path to an ABOUT file **or** a directory **with** ABOUT files.

Options:

<code>--verbose</code>	Show all the errors and warning
<code>-h, --help</code>	Show this message and exit.

Purpose

Validating ABOUT files at LOCATION.

Options

```
--verbose

    This option tells the tool to show all errors found.
    The default behavior will only show 'CRITICAL', 'ERROR', and 'WARNING'

$ about check --verbose /home/project/about_files/
```

gen

Syntax

```
about gen [OPTIONS] LOCATION OUTPUT
```

LOCATION: Path to a JSON **or** CSV inventory file.

OUTPUT: Path to a directory where ABOUT files are generated.

Options:

<code>--fetch-license KEY</code>	Fetch licenses text from a DejaCode API. and create <code><license>.LICENSE</code> side-by-side with the generated .ABOUT file using data fetched from a DejaCode License Library. The following additional options are required: api_url - URL to the DejaCode License Library API endpoint api_key - DejaCode API key Example syntax: about gen --fetch-license 'api_url' 'api_key'
<code>--license-notice-text-location PATH</code>	Copy the 'license_file' from the directory to the generated location.

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```

--mapping          Use for mapping between the input keys and
                   the ABOUT field names - mapping.config
--mapping-file     Use a custom mapping file with mapping between_
↳input            keys and ABOUT field names.
--verbose          Show all the errors and warning.
-q, --quiet        Do not print any error/warning.
-h, --help         Show this message and exit.

```

Purpose

Given an inventory of ABOUT files at location, generate ABOUT files in base directory.

Options

```

--fetch-license

Fetch licenses text from a DejaCode API. and create <license>.LICENSE side-by-side
with the generated .ABOUT file using data fetched from a DejaCode License Library.

This option requires 2 parameters:
    api_url - URL to the DJE License Library
    api_key - Hash key to authenticate yourself in the API.

In addition, the input needs to have the 'license_expression' field.
(Please contact nexB to get the api_* value to use for this feature)

$ about gen --fetch-license 'api_url' 'api_key' LOCATION OUTPUT

--license-notice-text-location

Copy the license files and notice files to the generated location based on the
'license_file' and 'notice_file' value in the input from the directory

For instance,
the directory, /home/licenses_notices/, contains all the licenses and notices_
↳that you want:
    /home/license/apache2.LICENSE
    /home/license/jquery.js.NOTICE

$ about gen --license-notice-text-location /home/licenses_notices/ LOCATION OUTPUT

--mapping

    See mapping.config for details

--mapping-file

    Same behavior as `--mapping` but with custom mapping file

$ about attrib --mapping-file CUSTOM_MAPPING_FILE_PATH LOCATION OUTPUT

--verbose

```

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This option tells the tool to show all errors found.
The default behavior will only show 'CRITICAL', 'ERROR', and 'WARNING'

inventory

Syntax

```
about inventory [OPTIONS] LOCATION OUTPUT
```

LOCATION: Path to an ABOUT file **or** a directory **with** ABOUT files.

OUTPUT: Path to the JSON **or** CSV inventory file to create.

Options:

<code>--filter TEXT</code>	Filter for the output inventory.
<code>-f, --format [json csv]</code>	Set OUTPUT file format . [default: csv]
<code>--mapping</code>	Use file mapping.config to collect the defined not_
<code>→supported fields in</code>	ABOUT files.
<code>--mapping-file</code>	Use a custom mapping file with mapping between input
	keys and ABOUT field names.
<code>--mapping-output FILE</code>	Use a custom mapping file with mapping between
	ABOUT field names and output keys
<code>--verbose</code>	Show all the errors and warning.
<code>-q, --quiet</code>	Do not print any error/warning.
<code>-h, --help</code>	Show this message and exit.

Purpose

Collect a JSON or CSV inventory of components from ABOUT files.

Options

```
-filter TEXT

    Filter for the output inventory.

$ about inventory --filter "license_expression=gnu-2.0" LOCATION OUTPUT

The above command will only inventory the ABOUT files which have the "license_
→expression: gnu-2.0"

-f, --format [json|csv]

    Set OUTPUT file format.  [default: csv]

$ about inventory -f json LOCATION OUTPUT

--mapping

    See mapping.config for details
```

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```
--mapping-file

    Same behavior as `--mapping` but with custom mapping file

$ about inventory --mapping-file CUSTOM_MAPPING_FILE_PATH LOCATION OUTPUT

--mapping-output

    Same behavior as `--mapping-file` but with custom mapping file
    In the custom mapping file, the left side is the custom key name where
    the right side is the ABOUT field name. For instance,
    Component: name

    The "Component" is a custom field name for the output
    The "name" is one of the default ABOUT field name that user want to convert

$ about inventory --mapping-output CUSTOM_MAPPING_FILE_PATH LOCATION OUTPUT

--verbose

    This option tells the tool to show all errors found.
    The default behavior will only show 'CRITICAL', 'ERROR', and 'WARNING'
```

Special Notes

Multiple licenses support format

The multiple licenses support format for CSV files are separated by line break

about_resource	name	license_key	license_file
test.tar.xz	test	apache-2.0 mit	apache-2.0.LICENSE mit.LICENSE

The multiple licenses support format for ABOUT files are by “grouping” with the keyword “licenses”

```
about_resource: test.tar.xz
name: test
licenses:
  - key: apache 2.0
    name: apache-2.0.LICENSE
  - key: mit
    name: mit.LICENSE
```

1.5.3 ABOUT File Specification v3.1.2

Purpose

An ABOUT file provides a simple way to document the provenance (origin and license) and other important or interesting information about a software component. An ABOUT file is a small YAML formatted text file stored in the codebase side-by-side with the software component file or archive that it documents. No modification of the documented software is needed.

The ABOUT format is plain text with field name/value pairs separated by a colon. It is easy to read and create by hand and is designed first for humans, rather than machines. The format is well-defined and structured just enough to make it easy to process with software as well. It contains enough information to fulfill key license requirements such as creating credits or attribution notices, collecting redistributable source code, or providing information about new versions of a software component.

Getting Started

A simple and valid ABOUT file named `httpd.ABOUT` may look like this:

```
about_resource: httpd-2.4.3.tar.gz
name: Apache HTTP Server
version: 2.4.3
homepage_url: http://httpd.apache.org
download_url: http://archive.apache.org/dist/httpd/httpd-2.4.3.tar.gz
license_expression: apache-2.0
licenses:
  - key: apache-2.0
  - file: apache-2.0.LICENSE
notice_file: httpd.NOTICE
copyright: Copyright (c) 2012 The Apache Software Foundation.
```

The meaning of this ABOUT file is:

- The file “`httpd-2.4.3.tar.gz`” is stored in the same directory and side-by-side with the ABOUT file “`httpd.ABOUT`” that documents it.
- The name of this component is “Apache HTTP Server” with version “2.4.3”.
- The home URL for this component is <http://httpd.apache.org>
- The file “`httpd-2.4.3.tar.gz`” was originally downloaded from <http://archive.apache.org/dist/httpd/httpd-2.4.3.tar.gz>
- In the same directory, “`apache-2.0.LICENSE`” and “`httpd.NOTICE`” are files that contain respectively the license text and the notice text for this component.
- This component is licensed under “`apache-2.0`”

Specification

An ABOUT file is an ASCII YAML formatted text file. Note that while Unicode characters are not supported in an ABOUT file proper, external files can contain UTF-8 Unicode.

ABOUT file name

An ABOUT file name can use a limited set of characters and is suffixed with a “.ABOUT” extension using any combination of uppercase and lowercase characters.

A file name can contain only these US-ASCII characters:

- digits from 0 to 9
- uppercase and lowercase letters from A to Z
- the following symbols: “_”, “-“, “+”, “:”, “(“, “)”, “~”, “[“, “]”, “{“, “}”
- The case of a file name is not significant. On case-sensitive file systems (such as on Linux), a tool must report an error if two ABOUT files stored in the same directory have the same lowercase file name. This is to ensure that ABOUT files can be used across file systems. The convention is to use a lowercase file name and an uppercase ABOUT extension.

Lines of text

An ABOUT file contains lines of US-ASCII text. Lines contain field names/values pairs. The standard line ending is the LF character. The line ending characters can be any LF, CR or CR/LF and tools must normalize line endings to LF when processing an ABOUT file. Empty lines and lines containing only white spaces that are not part of a field value continuation are ignored. Empty lines are commonly used to improve the readability of an ABOUT file.

Field name

A field name can contain only these US-ASCII characters:

- digits from 0 to 9
- uppercase and lowercase letters from A to Z
- the “_” underscore sign.
- Field names are not case sensitive. For example, “HOMEPAGE_URL” and “HomePage_url” represent the same field name.
- A field name must start at the beginning of a new line. It can be followed by one or more spaces that must be ignored. These spaces are commonly used to improve the readability of an ABOUT file.

Field value

The field value is separated from the field name by a “:” colon. The “:” colon can be followed by one or more spaces that must be ignored. This also applies to trailing white spaces: they must be ignored.

The field value is composed of one or more lines of plain US-ASCII printable text.

When a field value is a long string, additional continuation lines must start with at least one space. In this case, the first space of an additional continuation line is ignored and should be removed from the field value by tools.

For instance:

```
description: This is a long description for a
software component that additional continuation line is used.
```

```
When a field value contains more than one line of text, a 'literal block'
(using |) is need.
```

For instance:

```
description: |
  This is a long description for a software component that spans
  multiple lines with arbitrary line breaks.

  This text contains multiple lines.
```

Fields are mandatory or optional

As defined in this specification, a field can be mandatory or optional. Tools must report an error for missing mandatory fields.

Extension and ignored fields

An ignored field is a field with a name that is not defined in this specification. Custom extension fields are also supported and must be processed by tools as ignored fields unless a certain tool can process a certain extension field.

Fields validation

When processing an ABOUT file, tools must report a warning or error if a field is invalid. A field can be invalid for several reasons, such as invalid field name syntax or invalid content. Tools should report additional validation error details. The validation process should check that each field name is syntactically correct and that fields contain correct values according to its concise, common sense definition in this specification. For certain fields, additional and specific validations are relevant such as checksum verification, URL validation, path resolution and verification, and so forth. Tools should report a warning for ignored fields.

Fields order and multiple occurrences

The field order does not matter. Multiple occurrences of a field name is not supported.

The tool processing an ABOUT file or CSV/JSON input will issue an error when a field name occurs more than once in the input file (as for any other ignored field).

Field referencing a file

The actual value of some fields may be contained in another file. This is useful for long texts or to reference a common text in multiple ABOUT files such as a common license text. In this case the field name is suffixed with “_file” and the field value must be a path pointing to the file that contains the actual value of the field. This path must be a POSIX path relative to the path of the ABOUT file. The file content must be UTF-8-encoded text. This is in contrast with field values contained directly in an ABOUT file that must be US-ASCII- encoded text and allows to support non-ASCII text content.

For example, the full license text for a component is often stored in a separate file named COPYING:

```
licenses:
  - file: linux.COPYING
```

In this example, the README file is stored in a doc directory, one directory above the ABOUT file directory, using a relative POSIX path:

```
licenses:
  - file: ../docs/ruby.README
```

Field referencing a URL

The value of a field may reference URLs such as a homepage or a download. In this case the field name is suffixed with “_url” and the field value must be a valid absolute URL starting with `ftp://`, `http://` or `https://`. URLs are informational and the content they may reference is ignored. For example, a download URL is referenced this way:

```
download_url: http://www.kernel.org/pub/linux/kernel/v3.0/linux-3.4.20.tar.bz2
```

Flag fields

Flag fields have a “true” or “false” value. True, T, Yes or Y , x must be interpreted as “true” in any case combination. False, F, No or N must be interpreted as “false” in any case combination.

Referencing the file or directory documented by an ABOUT file

An ABOUT file documents one file or directory. The mandatory “about_resource” field reference the documented file or directory. The value of the “about_resource” field is the name or path of the referenced file or directory.

A tool processing an ABOUT file must report an error if this field is missing.

By convention, an ABOUT file is often stored in the same directory side-by-side to the file or directory that it documents, but this is not mandatory.

For example, a file named `django.ABOUT` contains the following field to document the `django-1.2.3.tar.gz` archive stored in the same directory:

```
about_resource: django-1.2.3.tar.gz
```

In this example, the ABOUT file documents a whole sub-directory:

```
about_resource: linux-kernel-2.6.23
```

In this example, the ABOUT file documents the current directory, using a “.” period to reference it:

```
about_resource: .
```

Other Mandatory fields

When a tool processes an ABOUT file, it must issue an error if these mandatory field are missing.

- `about_resource`: The resource this file referencing to.
- `name`: Component name.

Optional Information fields

- `version`: Component or package version. A component or package usually has a version, such as a revision number or hash from a version control system (for a snapshot checked out from VCS such as Subversion or Git). If not available, the version should be the date the component was provisioned, in an ISO date format such as ‘YYYY-MM-DD’.
- `spec_version`: The version of the ABOUT file format specification used for this file. This is provided as a hint to readers and tools in order to support future versions of this specification.

- **description:** Component description, as a short text.
- **download_url:** A direct URL to download the original file or archive documented by this ABOUT file.
- **homepage_url:** URL to the homepage for this component.
- **changelog_file:** Changelog file for the component.
- **notes:** Notes and comments about the component.

Optional Owner and Author fields

- **owner:** The name of the primary organization or person(s) that owns or provides the component.
- **owner_url:** URL to the homepage for the owner.
- **contact:** Contact information (such as an email address or physical address) for the component owner.
- **author:** Name of the organization(s) or person(s) that authored the component.
- **author_file:** Author file for the component.

Optional Licensing fields

- **copyright:** Copyright statement for the component.
- **notice_file:** Legal notice or credits for the component.
- **notice_url:** URL to a legal notice for the component.
- **license_file:** License file that applies to the component. For example, the name of a license file such as LICENSE or COPYING file extracted from a downloaded archive.
- **license_url:** URL to the license text for the component.
- **license_expression:** The license expression that apply to the component. You can separate each identifier using " or " and " and " to document the relationship between multiple license identifiers, such as a choice among multiple licenses.
- **license_name:** The license short name for the license.
- **license_key:** The license key(s) for the component.

Optional Boolean flag fields

- **redistribute:** Set this flag to yes if the component license requires source code redistribution. Defaults to no when absent.
- **attribute:** Set this flag to yes if the component license requires publishing an attribution or credit notice. Defaults to no when absent.
- **track_changes:** Set this flag to yes if the component license requires tracking changes made to a the component. Defaults to no when absent.
- **modified:** Set this flag to yes if the component has been modified. Defaults to no when absent.
- **internal_use_only:** Set this flag to yes if the component is used internal only. Defaults to no when absent.

Optional Extension fields

You can create extension fields by prefixing them with a short prefix to distinguish these from the standard fields. You should provide documentation for these extensions and create or extend existing tools to support these extensions. Other tools must ignore these extensions.

Optional Extension fields to reference files stored in a version control system (VCS)

These fields provide a simple way to reference files stored in a version control system. There are many VCS tools such as CVS, Subversion, Git, ClearCase and GNU Arch. Accurate addressing of a file or directory revision in each tool in a uniform way may not be possible. Some tools may require access control via user/password or certificate and this information should not be stored in an ABOUT file. This extension defines the ‘vcs’ field extension prefix and a few common fields to handle the diversity of ways that VCS tools reference files and directories under version control:

- `vcs_tool`: VCS tool such as git, svn, cvs, etc.
- `vcs_repository`: Typically a URL or some other identifier used by a VCS tool to point to a repository such as an SVN or Git repository URL.
- `vcs_path`: Path used by a particular VCS tool to point to a file, directory or module inside a repository.
- `vcs_tag`: tag name or path used by a particular VCS tool.
- `vcs_branch`: branch name or path used by a particular VCS tool.
- `vcs_revision`: revision identifier such as a revision hash or version number.

Some examples for using the `vcs_*` extension fields include:

```
vcs_tool: svn
vcs_repository: http://svn.code.sf.net/p/inkscape/code/inkscape_project/
vcs_path: trunk/inkscape_planet/
vcs_revision: 22886
```

or:

```
vcs_tool: git
vcs_repository: git://git.kernel.org/pub/scm/linux/kernel/git/stable/linux-stable.git
vcs_path: tools/lib/traceevent
vcs_revision: b59958d90b3e75a3b66cd311661535f94f5be4d1
```

Optional Extension fields for checksums

These fields support checksums (such as SHA1 and MD5) commonly provided with downloaded archives to verify their integrity. A tool can optionally use these to verify the integrity of a file documented by an ABOUT file.

- `checksum_md5`: MD5 for the file documented by this ABOUT file in the “about_resource” field.
- `checksum_sha1`: SHA1 for the file documented by this ABOUT file in the “about_resource” field.

Some examples:

```
checksum_md5: f30b9c173b1f19cf42ffa44f78e4b96c
```

1.6 AboutCode Data : ABCD

1.6.1 Summary

ABCD is an abbreviation for ABout Code Data. The AboutCode Data goal is to provide a simple, standardized and extensible way to document data about software code such that:

- It is a common way to exchange data about code between any nexB tools by import and export.
- It becomes the preferred way to exchange data between nexB tools and other tools.
- It could become a valuable structure to exchange data between any tools concerned with data about software.

ABCD is technology and programming language neutral, preferring JSON or YAML document formats.

ABC Data is structured around a few basic objects: Products, Components, Packages, Files, Parties and Licenses. It is extensible to other specific or future object types.

Objects have “attributes” that are simple name/value pairs. A value can be either a plain value or another object or a list of objects and attributes.

ABC Data is minimally specified by design: only a few basic objects and attributes are documented with conventions to name and structure data and how to define relationships between objects. There is only a small reference dictionary for some well known attributes documented here.

The planned benefit for tools using ABC Data is simplified data exchange and integration between multiple best-of-breed tools.

1.6.2 Context

There is currently no easy way to describe information about code and software in a simple and standardized way. There have been many efforts to provide this data in a more structured way such as:

- SPDX (focused on packages and licenses),
- DOAP (focused on projects),
- The original ABOUT metafile format, and
- The many different software package metadata formats (Maven, NPM, RPM, Deb, etc).

These data structures are fragmented and generally too purpose- or technology-specific.

Recently there have been efforts to collect and expose more data such as:

- libraries.io (a catalog of packages, AGPL-licensed) and dependencyci.com its companion commercial service,
- versioneye.com (a catalog of package versions updates, now MIT-licensed),
- softwarearchive.org (an effort to build an all-encompassing software source code archive),
- sources.debian.net (a Debian-focused code and metadata search facility),
- searchcode.com (an add-supported source code search engine exposing some metadata)
- appstream (a cross-distro effort to normalize desktop package metadata access to Linux desktops <https://www.freedesktop.org/software/appstream/docs/>).

These efforts are all useful, but they do not address how you can consistently exchange data about code in a user-centric and technology-neutral, normalized way.

Why does this matter? Software and code are everywhere. FLOSS code is exploding with millions of components and packages. The data about this code is out there somewhere but getting it is harder than needed. This a problem of data normalization, aggregation and exchange.

Whether you consume or produce software, accessing and creating normalized data about your code and the code you use should be made easier such that:

- You can efficiently make code selection and re-use decisions,
- You can discover what is in your code, and
- You can continuously track updates, bugs, licenses, liveliness, quality and security attributes of the code you use or consider using.

With the notable exceptions of SPDX and the earlier versions of the ABOUT format, available data formats about software have been designed first for a specific technology (e.g. Linux distros) or programming language (e.g. maven, npm, etc.) and documentation of code provenance and related attributes has been secondary and minimal. In most cases, the primary focus has been to provide first comprehensive support for package installation, dependency resolution or package building and provenance and licensing information is often treated with lesser details.

1.6.3 ABCD: the AboutCode Data structure

ABCD is an abbreviation for ABout Code Data. The goal is to provide a simple, standardized and extensible way to document things about software code.

In contrast with other approaches, the AboutCode Data structure is focused on providing data that is useful to users first and is not limited to software package data only. AboutCode Data need not be as strictly specified as traditional package manager data formats because its purpose is not to drive a software build, package creation or software installation nor is it to compute the resolution of dependencies. It only provides information (metadata) about the code.

The vision for the ABC Data structure is to provide a common way to exchange data about code between all nexB tools, such that these tools can all import and export data about code seamlessly (TraceCode, ScanCode, AboutCode Manager, AttributeCode, upcoming MineCode, etc.). The ABCD structure should also be the preferred way to exchange data about code between nexB tools and other tools. We may create small adapters to convert other data formats in and out of the ABCD structure and encourage other tool authors to natively support ABC Data, though the main focus is on our tools.

The ABCD structure is technology and programming language neutral and designed so that the parties exchanging data about code can do so reliably with some minimal conventions; and that the data is easily processed by machines and not hard to read by humans.

ABC Data is structured around “objects”. Objects have “attributes” that are simple name/value pairs. A value can be either a plain value or another object or a list of nested objects and attributes.

ABC Data is organized around:

- a few known object types,
- simple conventions to create lists of objects and describe object relationships,
- simple conventions to create attributes as name/value pairs, and
- a small dictionary or vocabulary of well-known attribute names that have a common definition across all tools.

ABC Data is “under-specified” by design: only a few essential objects and attributes are documented here with the conventions on how to structure the ABC Data.

1.6.4 Basic objects describing data about code

At the top level we have these main object types:

- Product(s): a software product, application or system such as a Cost Accounting application.
- Component(s): a software component, such as the PostgreSQL 9 database system, usually a significant or major version
- Package(s): a set of files that comprise a Component as used, such as a postgresql-9.4.5-linux-x86.zip archive. The version is exact and specific.
- File(s): any file and directory identified by a path, such as a binary package or a source code directory or file.

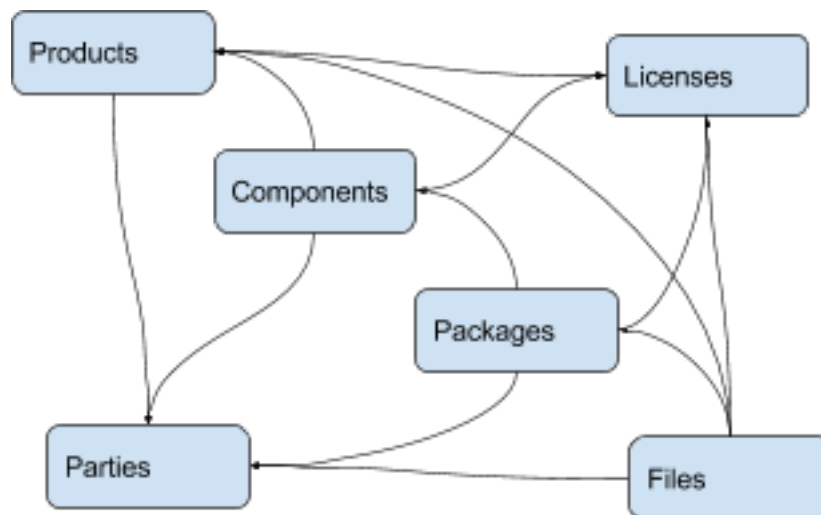
And these secondary, important but less prominent object types:

- Party(ies): a person or an organization. An organization can be a project, formally or informally organized, a company, a department within a company, etc. A Party typically has contact information (such as an email or physical address or home url). A Party may have defaults that apply to much of its software (for an org that creates software) such as a default Apache license for Apache Foundation projects. Parties often relate to other objects through a role relationship such as owner, author, maintainer, etc.
- License(s): information about the license of code. A License typically has a name, text and additional categories. (tags or attributes).

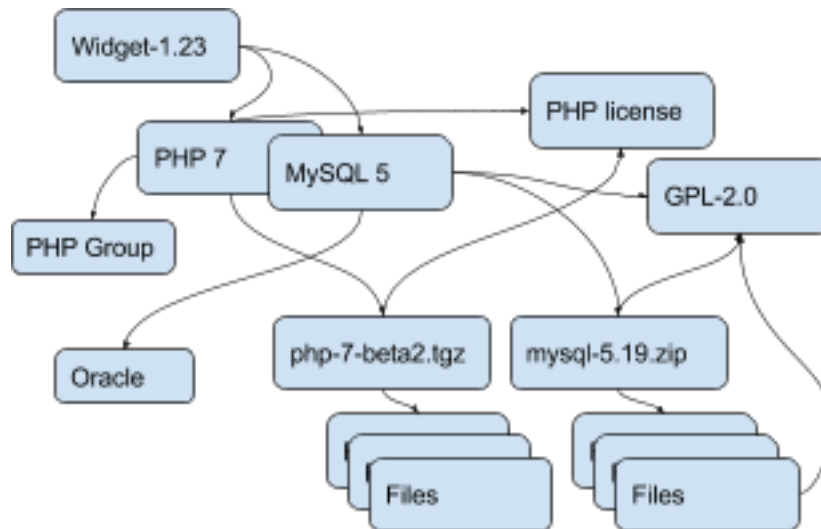
Each of these objects has a few identifying attributes and eventually many tool- or application-specific data attributes. Each tool defines and documents the attributes they can handle and care for. When some agreement is reached on the definition of new attributes or objects, the ABCD dictionary may be updated accordingly with new objects types such as for software security, quality or other interesting aspects.

Objects are interrelated with other objects. Objects can relate to each other via a reference using identifiers pointing to other objects or via an embedded list of objects. The nature of the relationship between two objects can also be specified with additional attributes as needed.

Here are typical relationships between objects:



Here is an example of relationships for a simple Widget product:



Tools can define any custom objects and some used more commonly may be promoted to be documented here over time.

1.6.5 Attribute Names and Values

By convention, a tool receiving ABCD Data should process only the data it knows and should ignore unknown attributes or objects. This is important to allow the data structure to evolve and provide some forward and backward compatibility. When an ABCD payload contains data elements that a receiver does not know about, the receiver should still be able to process the known objects and attributes.

- Attributes are name/value pairs.
- Attribute names are always strings, not numbers, not booleans, not any other data format. In these strings, leading and trailing white spaces (spaces, tabs, line returns, etc) are not significant and can be safely ignored or removed.
- Attribute values are one of the standard JSON types: string, number, boolean or null. In strings, leading and trailing white spaces (spaces, tabs, line returns, etc) are not significant and can be safely ignored or removed.
- Self-explicit names should be used rather than obscure names or abbreviations: names should be self-explicit and self-evident.

Except for the data organization conventions described here and the use of the well-known object and attribute names, nothing is mandatory in the ABCD format. This means that even partial, incomplete or sketchy data about code can be transferred in this format.

The meaning of well known object names such as Product, Component, Package, File, Party and License is defined in this document.

1.6.6 Name conventions

- Names are strings composed ONLY of ASCII letters, numbers or underscores. Names cannot start with a number. Names cannot contain spaces nor other punctuation, not even a dot or period.
- Names are NOT case sensitive: upper or lowercase does not matter and the standard is to use lowercase. It is a mistake to use upper or mixed case but this is something a parser receiving ABC Data should recover from nicely by converting the names to lowercase.

- Names are made of English words: there is no provision currently for non-English names. Tools that deal with multilingual content may define their own conventions to provide content in other languages. ABCD may add one of these conventions in the future.
- Parser implementation can be smarter and gentler: For names, anything that is not ASCII or number or underscore can be accepted by a parser and could be replaced by an underscore, including a starting digit if any. Or a parser may provide a warning if there is an unknown name that is very close to a well known name. Or a parser may accept CamelCase and transform names to underscore_case and perform another transformation to conventional ABC Data.
- Names are singular or plural: When a name refers to more than one item, the name of the field is plural and the value is a list of values. For instance “url” and “urls”.
- Top level known objects are ALWAYS plural and stored in lists: “parties” or “files” or “products” or “components”. This makes it easier to write tools because the top level types are always lists, even when there is a single object in that list.
- A value must not be used as a name: in an attribute name/value pair, the name is always a name, not a value and every value must have a name.
- For instance, this JSON snippet would not be correct where a URL is used as a name:

```
{ "http://someurl.com": "this is the home URL" }
```

- Use rather this form to specify a name for the URL attribute:

```
{ "url": "http://someurl.com", "note": "this is the home URL" }
```

- But this would be correct when using a list of plain values where “urls” is plural:

```
{ "urls": [ "http://someurl.com", "http://someurl2.com" ] }
```

- An attribute names without a value is not needed. Only names with values are needed, and attributes without values can be omitted: each tool may do what it wants for these cases. For instance it may be handy to provide all attributes even if not defined in an API payload. But when serializing data as YAML, meant for human editing, including all empty values may not help with reading and processing the YAML text. An undefined attribute without a set value should be assigned with the null JSON value: this has the same meaning as if the attribute was not specified and absent from the payload. If you want to specify that an attribute has an empty value and does not have a value (as opposed to have an unknown value) use an empty string instead.
- Avoid abbreviated names, with some exceptions. Names should always be fully spelled out except for:
 - url: uniform resource locator
 - uri: uniform resource identifier
 - urn: uniform resource name
 - vcs: version control system
 - uuid: universally unique identifier, used for uuid4 string <https://tools.ietf.org/html/rfc4122.html>
 - id: identifier
 - info: information
 - os: operating system
 - arch: architecture
- For some common names we use the common compound form such as:
 - codebase: and not code_base

- filename: and not file_name
- homepage: and not home_page

Well known attribute names include:

- name: the name of a product, component, license or package.
- version: the version of a product, component, package.
- description: description text.
- type: some type information about an object. For instance, a File type could be: directory, file or link.
- keywords: a list of keywords about an object. For example, the keywords of a component used to “tag” a component.
- path: the value is the path to a file or directory, either absolute or relative and using the POSIX convention (a forward slash as separator). For Windows paths, replace backslash with forward slashes. Directories should end with a slash in a canonical form.
- key: the value is some key string, slug-like, case-insensitive and composed only of ASCII letters and digits, dash, dot and underscore. No white spaces. For example: org.apache.maven-parent
- role: the value describes the role of a Party in a relationship with other objects. For instance a Party may be the “owner” or “author” of a Component or Package.
- uuid: a uuid4 string <https://tools.ietf.org/html/rfc4122.html>
- algorithms for checksums: to store checksums we use a name/value pairs where the name is an algorithm such as sha1 and the value is a checksum in hexadecimal such as “sha1”: “asasa231212” . The value is the standard/default string created by command line tools such as sha1sum. Supported algorithms may evolve over time. Common checksums include md5, sha1, sha256, sha512.
- notes: some text notes. This is an exception to the singular/plural rule for names: notes is a single text field and not a list.

As the usage of the ABCD structure matures, more well known names will be documented in a vocabulary.

1.6.7 Value conventions

- Attribute values are one of the standard JSON types: string, number, boolean or null. In strings, leading and trailing white spaces (spaces, tabs, line returns, etc) are not significant and can be safely ignored or removed.
- To represent a date/time use the ISO format such as 2016-08-15 defaulting to UTC time zone if the time zone is not specified in the date/time stamp.
- All string values are UTF-8 encoded.

Well known name prefixes or suffixes can be used to provide a type hint for the value type or meaning:

- xxx_count, xxx_number, xxx_level: the value is an integer number. Example: results_count or curation_level
- date_xxx or xxx_date: the value is a date/time stamp in ISO format such as 2016-08-16 (See <https://www.ietf.org/rfc/rfc3339.txt>). Examples: last_modified_date, date_created
- xxx_url: the value is a URL for web http(s) or ftp url that points to an existing valid web resource (that could possibly no longer exist on the web). Example: homepage_url or api_url
- xxx_uri: the value is a URI typically used as an identifier that may not point to an existing web resource. Example: git://github.com/nexb/scancode-toolkit
- xxx_file or xxx_path: the value is a file path. This can come handy for external files such as a license file. Example: notice_file

- `xxx_filename`: the value is a file name. Example: `notice_filename`
- `xxx_text`: the value is a long text. This is only a hint that it may be large and may span multiple lines. Example: `notice_text`
- `xxx_line`: such as `start_line` and `end_line`: the value is a line number. The first line number is 1.
- `xxx_status`: such as `configuration_status`. Indicates that the value is about some status.
- `xxx_name`: such as `short_name`. Indicates that the value is a name. Commonly used for `long_name`, `short_name`. The bare name should be preferred for the obvious and most common way an object is named.
- `xxx_flag`, `is_xxx`, `has_xxx`: such as `is_license_notice`. Indicates that the string value is a boolean.

1.6.8 Object identifiers

We like objects to be identifiable. There is a natural way to identify and name most objects: for instance, the full name of a person or organization or the name and version of a Component or Package or the path to a File, are all natural identifiers to an object.

However, natural names are not always enough to fully identify an object and may need extra context to reference an object unambiguously. There could be several persons or organizations with the same name at a different address. Or the `foo-1.4` Package could be available as a public RubyGem and also as an NPM; or a private Python package `foo-1.4` has been created by a company and is also available on Pypi. Or the “foo” Package is the name of a Linux Package, an NPM and a Ruby Package but these three packages are for unrelated components.

Hence each object may need several attributes to be fully identifiable.

For example, public package managers ensure that a name is unique within the confines of a source. “logging” is the unique name of a single Sourceforge project at <https://sourceforge.net/projects/logging/>. “logging” is the unique name of an Apache project at the Apache Foundation <http://logging.apache.org/>.

Yet, these two names point to completely different software. In most cases, providing information about the “source” where an identifier is guaranteed to be unique is enough to ensure proper identification. This “source” is easily identified by its internet source name, and an internet source name is guaranteed to be unique globally. The “source” of identifiers is not mandatory but it is strongly encouraged to use as an attribute to provide good unique identifiers. Still, tools exchanging ABC Data must be able to exchange under-specified and partially identified data and may sometimes rely on comparing many attributes of two objects to decide if they are the same.

The minimal way to identify top level objects is the combination of a “source” and a unique identifier within this source. The source can be implicit when two parties are exchanging data privately or explicit using the “source” attribute.

Within a source, we use the most obvious and natural identifies for an object. For example:

- For Products, Components and Packages we can use their name and version.
- For Files we use a path of a file or directory, possibly relative to a package or a product codebase; or a checksum of a file or archive such as a sha1.
- For Parties, we use a name possibly supplemented with a URL or email.
- For all object types we can use a “universally unique id” or UUID-4 (<https://tools.ietf.org/html/rfc4122.html>)
- For all object types, we can use a key, which is a slug-like string identifier such as a license key.
- For all object types, we can use a URN (https://en.wikipedia.org/wiki/Uniform_resource_name) Tools may also define their own URNs, namespaces and names such as a DejaCode urn is, `urn:dje:component:16fusb:1.0`

Beyond direct identification, an object may have several alternative identifiers, aka “external references”. For instance a Package may have different names and slightly different versions in the Linux, Debian or Fedora distros and a Pypi

Package with yet another name where all these Packages are for the same Component and the same code. Or a Party such as the Eclipse Foundation may be named differently in DejaCode and the NVD CPEs.

To support these cases, the “external_reference(s)” attribute can be used where needed in any object to reference one or more external identifiers and what is the source for this identifier (note: “external” is really a matter of point of view of who owns or produces the ABC Data). An attribute with name suffix of “xxx_reference” may also be used to provide a simpler external reference, such as “approval_reference”.

For example, this ABC Data could describe the external id of Party to a CPE and to TechnoPedia (here in a YAML format):

```
parties:
- name: Apache Foundation
  homepage_url: http://apache.org
  type: organization
  external_references:
    - source: nvd.nist.gov
      identifier: apache
    - source: technopedia.com
      identifier: Apache Foundation (The)
    - source: googlecode.com
      identifier: apache-foundation
```

Other identifiers may also be used, as needed by some tools, such as in hyperlinked APIs.

1.6.9 Organizing data and relationships

Describing relationships between objects is essential in AboutCode Data. There are two ways to describe these relationships: by referencing or by embedding objects.

When using a reference, you relate objects by providing identifiers to these objects and may provide additional object details in separate lists. When embedding, you include not only the reference but also the related object details in another object data. This could include all data about an object or a subset as needed.

For example, this components list embeds a list of two packages.

Note: “components” is always a list, *even when it has a single component*:

```
{ "components": [ {
  "source": "http://apache.org",
  "name": "Apache httpd",
  "version": "2.3",
  "packages": [
    { "name": "httpd",
      "version": "2.3.4",
      "download_url": "http://apache.org/dist/httpd/httpd-2.3.4.zip",
      "sha1": "acbf23256361abdcdf",
      "size": 3267,
      "filename": "httpd-2.3.4.zip"
    },

    { "name": "httpd",
      "version": "2.3.5",
      "download_url": "http://apache.org/dist/httpd/httpd-2.3.5.tar.gz",
      "sha1": "ac8823256361adfcdf",
      "size": 33267,
      "filename": "httpd-2.3.5.tar.gz"
    }
  ]
} ] }
```

(continues on next page)

(continued from previous page)

```
    ]
  }
}
```

In this example, the component list references two packages that are listed separately and uses the checksum as package identifiers for the reference. This data is strictly equivalent to the previous example but using a different layout. When all the data is provided, the effect of embedding or referencing objects results in the same data, just organized differently:

```
{ "components": [ {
  "source": "http://apache.org",
  "name": "Apache httpd",
  "version": "2.3",
  "packages": [
    { "sha1": "aacbf23256361abcdf" },
    { "sha1": "ac8823256361adfcdf" }
  ]
} ],

"packages": [
  { "name": "httpd", "version": "2.3.4",
    "download_url":
      "http://apache.org/dist/httpd/httpd-2.3.4.zip",
    "sha1": "acbf23256361abcdf", "size": 23267, "filename": "httpd-2.3.4.zip" },

  { "name": "httpd", "version": "2.3.5",
    "download_url": "http://apache.org/dist/httpd/httpd-2.3.5.tar.gz",
    "sha1": "ac8823256361adfcdf", "size": 33267, "filename": "httpd-2.3.5.tar.gz" }
]
```

In this third example the packages are referencing one component instead. That component is always wrapped in a components list. The component detail data is not provided. The details may be available elsewhere in a tool that tracks components:

```
"packages": [
  { "name": "httpd", "version": "2.3.4",
    "download_url": "http://apache.org/dist/httpd/httpd-2.3.4.zip",
    "sha1": "acbf23256361abcdf", "size": 23267, "filename": "httpd-2.3.4.zip",
    "components": [
      { "source": "http://apache.org", "name": "Apache httpd", "version": "2.3" }
    ]
  },

  { "name": "httpd", "version": "2.3.5",
    "download_url": "http://apache.org/dist/httpd/httpd-2.3.5.tar.gz",
    "sha1": "ac8823256361adfcdf", "size": 33267, "filename": "httpd-2.3.5.tar.gz",
    "components": [
      { "source": "http://apache.org", "name": "Apache httpd", "version": "2.3" }
    ]
  }
]
```

Relationships can be documented with this approach in different ways. Typically when the primary concern is about a Product, then the Product object may embed data about its Components. When the primary concern is Packages, they may embed or reference Products or Components or files. For example:

- A tool may prefer to provide data with products or components as top level objects. The components used in a Product are naturally embedded in the products.

- A tool concerned more with files, will provide files as top level objects and may embed package details when they are found for a file or directory path.
- Another tool may focus on packages and provide packages first with component references and possibly embedded files. A matching tool may provide packages first and reference matched files. The file paths of a package are naturally embedded in the package, though using references may help keep the data simpler when there is a large volume of files.
- A tool that generates attribution documentation may focus first on components and second on licenses or packages references.
- A tool dealing with security vulnerabilities may define a Vulnerability object and reference Packages and Files that are affected by a Vulnerability.

To better understand the embedding or referencing relationships:

- using references is similar to a tabular data layout, akin to a relational database table structure
- using embedding is similar to a tree data layout such as in a file/directory tree or nested data such as XML.

Another way to think about these relationships is a “GROUP BY” statement in SQL. The data can be grouped-by Component, then Packages or grouped-by Files then Components.

Both referencing and embedding layouts can be combined freely and are not mutually exclusive. When using both at the same time, some care is needed to avoid creating documents with conflicting or duplicated data that is referenced and embedded at the same time.

Using references is often useful when there is an agreement on how to reference objects between two tools or parties. For instance, when using nexB tools, a unique and well defined license key is used to reference a license rather than embedding the full license details. A concise reference to the name and version of a public package from a well known package repository such as RPM or Maven can be used to the same effect. Or an SPDX license identifier can be used to reference an SPDX-listed license without having to embed its full license text.

The nature of the relationship between two objects can be specified when it is not obvious and requires some extra specification. Each tool can define additional attributes to document these. For instance a common relationship between a party and a product or component is a role such as owner. For packages a role can be maintainer, author, etc. Or the license of a file or package may be the “asserted” license by the project authors. It may differ from the “detected” license from a scan or code inspection and may further differ from a “concluded” license or a “selected” license when there is a license choice. At the package and license level the types of relationships documented in the SPDX specification are a good source for more details. For example this component references two parties where one is the author and the other is the maintainer documented using a role attribute:

```
"components": [{
  "source": "http://apache.org",
  "name": "Apache httpd",
  "version": "2.3",
  "parties": [
    {"name": "John Doe", "type": "person", "role": "author"},
    {"name": "Jane Smith", "type": "person", "role": "maintainer"},
    {"name": "Jane Smith", "type": "person", "role": "owner"},
  ]
}]
```

1.6.10 Document format conventions

The default ABC Data format is JSON (though it can be serialized to anything else that would preserve its structure). YAML is also supported and preferred for storage of simple documents that document one or a few top level objects and that need to be edited by a human.

The data structure by nested name/value pairs attributes and lists of values maps naturally to the corresponding JSON and YAML constructs. In JSON-speak these are arrays (lists) and objects (name/value pairs).

ABC Data can be provided as simple files or embedded in some API payload. As files, their content can be either JSON or YAML and should have either a .json or .yaml extension by convention. For backwards compatibility with previous AboutCode conventions, the .ABOUT extension can be used for YAML documents. For instance this is used in the legacy `about_code_tool` and its successors. The DocumentCode tool can store individual attribution data in a .ABOUT yaml file.

The top level structure of an ABC Data block is always a JSON object or YAML dictionary. Depending on the context this top level structure may be wrapped in another data structure (for instance when exchanging AboutCode Data in some web api, the API may provide ABC Data as a payload in a “results” or “body” or “data” block and also have some “headers” or “meta” block).

The top level elements must contain at least one of the object names and a list of objects such as here with a list of files:

```
files:
  - path: this/foo/bar
    size: 123
    sha1: aaf35463472abcd
  - path: that/baz
```

Optionally an “aboutcode_version” attribute can be added at the top level to document which version of the AboutCode Data structure is used for a document. For example: `aboutcode_version: 4.0`

Order of attributes matters to help reading documents: tools that write ABC Data should attempt to use a consistent order for objects and attribute names rather than a random ordering. However, some tools may not be able to set a specific order so this is only a recommendation. The preferred order is to start with identifiers and keys and from the most important to the least important attributes, followed by attributes grouped logically together, followed by related objects.

1.6.11 References between documents and payload, embedding other files

ABC Data may reference other data. For instance in a hyperlinked REST API a list of URLs to further invoke the API and get license’ details may be provided with an `api_url` attribute to identify which API calls to invoke. The ways to reference data and the semantics and mechanics of each of these embeddings or references needed to get the actual data are not specified here. Each tool may offer its own mechanism. A convention for an hyperlinked REST API JSON payload could be to use `api_url(s)` identifier to specify additional “GET”able endpoints. The AttributeCode tool use `*_file` attributes in YAML or JSON documents to reference external license and notices text files to load with the text content.

Another convention is used in ScanCode to reference license texts and license detection rules by key: An ABC Data YAML file contains the ABC Data. And side by side there is a file with the same base name and a LICENSE, SPDX or NOTICE, RULE, extension that contains the actual text corresponding to the license, the SPDX text or the rule text. The convention here is to use an implicit reference between files because they have the same base name and different extensions.

In the future, we may specify how to embed an external ABC Data file in another ABC Data file; this would only apply to file-based ABC Data payload though and could not apply to hyperlinked REST APIs.

1.6.12 Document-as-files naming, exchange and storage

Each tool handling ABC Data may name an ABC Data file in any manner and store the data in any way that is appropriate. The structure is a set of data exchange conventions and may be used for storage but nothing is specified on how to do this.

For consistency, tools consuming AboutCode Data are encouraged to use the same data structure internally and in their user interface to organize and name the data, but this is only a recommendation.

For instance, the AttributeCode tool uses a convention to store ABC Data as YAML in a file with a .ABOUT extension and uses the ABC Data structures internally and externally.

When exchanging data (for instance over an API), the API provider of ABC Data should support a request to return either embedded data or data by reference and ideally allow the caller to specify which objects and attributes it is interested in (possibly in the future using something like GraphQL).

When interacting with tools through an API, the conversation could start by sending an ABC Data payload with some extra request data and receiving an ABC Data payload in return. For instance, when requesting matching packages from a matching tool, you could start by passing scan data with checksums for several files at once and receive detailed data for each of the matched files or packages.

1.6.13 Documenting and validating attributes

Each tool handling ABC Data may only be interested in processing certain objects and attributes when accepting data in, or when providing data out. Attributes that are unknown should be ignored. To document which objects and which attributes a tool can handle, a tool should provide some documentation. The documentation format is not specified here, but it could use a JSON schema in the future. This should include documentation regarding if and how data is validated, and when and how errors or warnings are triggered and provided when there is a validation error. For example, a validation could be to check that an SPDX license id exists at SPDX or that a URL is valid.

1.6.14 Notes on YAML format

YAML is the preferred file format for ABC Data destined for reading or writing primarily by humans.

- Block-style is better.
- When you write AboutCode Data as YAML, you should privilege block-style and avoid flow-style YAML which is less readable for humans.
- Avoid Multi-document YAML.
- Multi-document YAML documents should be avoided (when using the — separators).
- Beware of parser shenanigans: Most YAML parsers recognize and convert automatically certain data types such as numbers, booleans or dates. You should be aware of this because the ABC Data strings may contain date stamps. You may want to configure a YAML parser to deactivate some of these automated format conversions to avoid unwanted conversions.

1.6.15 Notes on JSON Format

JSON is the preferred file format for ABC Data destined for reading and writing primarily by machines.

- “Streamable” JSON with JSON-lines.

A large JSON document may benefit from being readable line-by-line rather than loaded all at once in memory. For this purpose, the convention is to use JSON lines where each line in the document is a valid JSON document itself: this enables reading the document in line-by-line increments. The preferred way to do so is to provide one ABCD top level object per document where the first line contains meta information about the stream such as a notice, a tool version or the aboutcode version.

- Avoid escaped slash.

The JSON specification says you CAN escape forward slash, but this is optional. It is best to avoid escaping slash when not needed for better readability.

For instance for URLs this form:

```
"https://enterprise.dejacode.com/component_catalog/nexB/16fusb/1.0/"
```

should be preferred over this escaped form when backslashes are not needed:

```
"https:\\\\enterprise.dejacode.com\\\\component_catalog\\\\nexB\\\\16fusb\\\\1.0\\"
```

1.6.16 Notes on embedding ABC Data in source code files.

It could be useful to include ABC Data directly in a source code file, such as to provide structured license and provenance data for a single file. This requires of course a file modification. While this is not a preferred use case, it can be handy to document your own code one file at a time. Using an external ABC Data file should be preferred but here are conventions for this use case:

- The ABC Data should be embedded in a top level block of comments.
- Inside that block of comments the preferred format is YAML.
- How a tool collects that ABC Data when embedded in code is to be determined.
- Tools offering such support should document and eventually enforce their own conventions.

1.6.17 Notes on spreadsheet and CSV files

ABC Data does not support or endorse using CSV or spreadsheets for data exchange.

CSV and other spreadsheet file formats are NOT recommended to store ABC Data. In most cases you cannot store a correct data set in a spreadsheet. However, these tools are also widely used and convenient. Here are some recommendations when you need to communicate ABC data in a CSV or spreadsheet format: even though ABC Data is naturally nested and tree-like, it should be possible to serialize certain ABCD objects as flat, tabular data.

- Naming columns

The table column names may need to be adjusted to correctly reference the multiple level of object and attribute nesting using a dot as a separator. The dot or period is otherwise not allowed in attribute names. For example, you could use `files.path` for files or `components.name` to reference a component name. Some tools may prefer to create tabular files with their own column names and layout, and provide mappings to ABC Data attribute and object names.

- Example for an inventory:

Since ABC Data can be related by reference, the preferred (and cumbersome) way to store ABC Data in a spreadsheet is to use one tab for each object type and use identifying attributes to relate objects between each others across tabs. For instance, in a Bill of Materials (BOM) spreadsheet for a Product, you could use a tab to describe the Product attributes and another tab to describe the Components used in this Product and possibly additional tabs to describe the related packages and files corresponding to these

- Care is needed for Packages, Components and other names and for dates, versions, unicode and UTF-8 to avoid damaging content (aka. mojibake)

Spreadsheet tools such as Excel or LibreOffice automatically recognize and convert data to their own format: a date of 20016-08-17 may be converted to a date number when a CSV is loaded and difficult to recover as a correct original date stamp string afterwards. Or a version 1.0 may be irreversibly converted to 1 or 1.90 to 1.9 losing important version information.

Spreadsheet tools may not recognize and handle properly UTF-8 texts and damage descriptions and texts. These tools may also treat strings starting with the equal sign as a formula. When incorrectly recognizing special accentuated characters this may damage texts creating what is called “mojibake” (See <https://en.wikipedia.org/wiki/Mojibake>)

Always use these tools with caution and be prepared for damage to your data if you use these tools to save or create ABC Data.

Impact on AttributeCode

As an integration tool, AttributeCode itself may specify only a very few elements.

The new structure will need to be implemented. Here could be an example in YAML:

```
aboutcode_version: 4.0
components:
  - source: dejacode.com
    name: bitarray
    version: 0.8.1
    homepage_url: https://github.com/ilanschnell/bitarray
    copyright: Copyright (c) Ilan Schnell and others
    files:
      - path: some/directory/
        type: dir
      - path: bitarray-0.8.1-cp27-cp27m-macosx_10_9_intel.whl
      - path: someotherdir/bitarray-0.8.1-cp27-cp27m-manylinux1_i686.whl
      - path: bitarray-0.8.1-cp27-cp27m-manylinux1_x86_64.whl
      - path: bitarray-0.8.1-cp27-cp27m-win_amd64.whl
      - path: bitarray-0.8.1-cp27-cp27m-win32.whl
      - path: bitarray-0.8.1-cp27-cp27mu-manylinux1_i686.whl
      - path: bitarray-0.8.1-cp27-cp27mu-manylinux1_x86_64.whl
      - path: bitarray-0.8.1-cp27-none-macosx_10_6_intel.whl
      - path: bitarray-0.8.1.tar.gz

    parties:
      - role: owner
        name: Ilan Schnell

    packages:
      - download_url: http://pypi.python.org/packages/source/b/bitarray/bitarray-0.8.
↪1.tar.gz
        sha1: 468456384529abcdef342

    license_expression: psf

    licenses:
      - source: scancode.com
        key: psf
        text_file: PSF.LICENSE
```

And here would be similar data in JSON:

```
{ "components": [ {
  "name": "bitarray",
  "version": "0.8.1"
  "homepage_url": "https://github.com/ilanschnell/bitarray",
  "copyright": "Copyright (c) Ilan Schnell and others",
  "license_expression": "psf",
```

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```

        "licenses": [{"key": "psf", "text_file": "PSF.LICENSE", "source":
↪ "scancode.com"}],
        "packages": [{"download_url": "http://pypi.python.org/packages/source/
↪ b/bitarray/bitarray-0.8.1.tar.gz"
                        "sha1": "468456384529abcdef342"
                    }],
        "parties": [{"name": "Ilan Schnell", "role": "owner"}],

        "files": [{"path": "some/directory/", "type": "dir"},
                    {"path": "bitarray-0.8.1-cp27-cp27m-macosx_10_9_intel.whl"},
                    {"path": "bitarray-0.8.1-cp27-cp27m-manylinux1_i686.whl"},
                    {"path": "bitarray-0.8.1-cp27-cp27m-manylinux1_x86_64.whl"},
                    {"path": "bitarray-0.8.1-cp27-cp27m-win_amd64.whl"},
                    {"path": "bitarray-0.8.1-cp27-cp27m-win32.whl"},
                    {"path": "bitarray-0.8.1-cp27-cp27mu-manylinux1_i686.whl"},
                    {"path": "bitarray-0.8.1-cp27-cp27mu-manylinux1_x86_64.whl"},
                    {"path": "bitarray-0.8.1-cp27-none-macosx_10_6_intel.whl"},
                    {"path": "bitarray-0.8.1.tar.gz"}],

    },

    aboutcode_version: "4.0"}

```

Impact on ScanCode Toolkit

The new format will need to be implemented for scan results in general and for packages in particular.

ScanCode will specify Package and several attributes related to scanning and referencing clues for files, directories and packages.

Alternatively Packages could be extracted to an independent PackagedCode library.

The changes will minimize impact on the layout of the scan results. Here is an example of a scan payload in ABCD format: this is essentially the standard scan format:

```

{
  "scancode_notice": "Generated with ScanCode and provided .....",
  "scancode_version": "2.0.0.dev0",
  "files_count": 7,
  "files": [
    {
      "path": "samples/JGroups/src/",
      "type": "directory",
      "files_count": 29
      "licenses" : [
        { "key": "apache-2.0",
          "concluded": true}
      ]
    }
  ]
  {
    "path": "samples/JGroups/src/GuardedBy.java",
    "date": "2015-12-10",
    "programming_language": "Java",
    "sha1": "981d67087e65e9a44957c026d4b10817cf77d966",
    "name": "GuardedBy.java",
    "extension": ".java",
    "file_type": "ASCII text",

```

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```

    "is_text": true,
    "is_source": true,
    "md5": "c5064400f759d3e81771005051d17dc1",
    "type": "file",
    "is_archive": null,
    "mime_type": "text/plain",
    "size": 813,
    "copyrights": [
      {
        "end_line": 12,
        "start_line": 9,
        "holder": "Brian Goetz and Tim Peierls",
        "statement": "Copyright (c) 2005 Brian Goetz and Tim Peierls"
      }
    ],
    "licenses": [
      { "detected": true,
        "key": "cc-by-2.5",
        "short_name": "CC-BY-2.5",
        "homepage_url": "http://creativecommons.org/licenses/by/2.5/",
        "dejacode_url": "https://enterprise.dejacode.com/license_library/Demo/cc-by-
→2.5/",
        "text_url": "http://creativecommons.org/licenses/by/2.5/legalcode",
        "owner": {
          "name": "Creative Commons",
        },
        "detection_score": 100.0,
        "start_line": 11,
        "end_line": 11,
        "category": "Attribution",
        "external_reference": {
          "source": "spdx.org",
          "key": "CC-BY-2.5",
          "url": "http://spdx.org/licenses/CC-BY-2.5",
        },
      },
    ],
  },
  {
    "path": "samples/JGroups/src/ImmutableReference.java",
    "date": "2015-12-10",
    "md5": "48ca3c72fb9a65c771a321222f118b88",
    "type": "file",
    "mime_type": "text/plain",
    "size": "1838",
    "programming_language": "Java",
    "sha1": "30f56b876d5576d9869e2c5c509b08db57110592",
    "name": "ImmutableReference.java",
    "extension": ".java",
    "file_type": "ASCII text",
    "is_text": true,
    "license_expression": "lgpl-2.1-plus and lgpl-2.0-plus",
    "is_source": true,
    "copyrights": [{
      "end_line": 5,
      "start_line": 2,
      "holder": "Red Hat, Inc.",
    }
  ]
}

```

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```

        "statement": "Copyright 2010, Red Hat, Inc."
    }],
    "licenses": [
        { "detected": true,
          "key": "lgpl-2.1-plus",
          "category": "Copyleft Limited",
          "homepage_url": "http://www.gnu.org/licenses/old-licenses/lgpl-2.1-
↪ standalone.html",
          "start_line": 7,
          "end_line": 10,
          "short_name": "LGPL 2.1 or later",
          "owner": "Free Software Foundation (FSF)",
          "dejacode_url": "https://enterprise.dejacode.com/license_library/Demo/lgpl-
↪ 2.1-plus/",
          "detection_score": 100.0,
          "external_reference": {
            "url": "http://spdx.org/licenses/LGPL-2.1+",
            "source": "spdx.org",
            "key": "LGPL-2.1+"
          }
        },
        { "concluded": true,
          "key": "lgpl-2.0-plus",
          "short_name": "LGPL 2.0 or later",
          "homepage_url": "http://www.gnu.org/licenses/old-licenses/lgpl-2.0.html",
          "end_line": 20,
          "dejacode_url": "https://enterprise.dejacode.com/license_library/Demo/lgpl-
↪ 2.0-plus/",
          "text_url": "http://www.gnu.org/licenses/old-licenses/lgpl-2.0-standalone.
↪ html",
          "owner": "Free Software Foundation (FSF)",
          "start_line": 12,
          "detection_score": 47.46,
          "category": "Copyleft Limited",
          "external_reference": {
            "url": "http://spdx.org/licenses/LGPL-2.0+",
            "source": "spdx.org",
            "key": "LGPL-2.0+"
          }
        }
    ],
  },
  {
    "path": "samples/arch/zlib.tar.gz",
    "file_type": "gzip compressed data, last modified: Wed Jul 15 11:08:19 2015,
↪ from Unix",
    "date": "2015-12-10",
    "is_binary": true,
    "md5": "20b2370751abfc08bb3556c1d8114b5a",
    "sha1": "576f0ccfe534d7f5ff5d6400078d3c6586de3abd",
    "name": "zlib.tar.gz",
    "extension": ".gz",
    "size": 28103,
    "type": "file",
    "is_archive": true,
    "mime_type": "application/x-gzip",
    "packages": [

```

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```
{
  {
    "type": "plain tarball"
  }
},
}
]
```

AboutCode Manager

As a primary GUI for data review and integration, AboutCode Manager will need to be fluent in ABC Data to read/write ABC Data locally and remotely through API from several sources.

The short term changes would include:

- Support reading ABC Data from ScanCode
- Writing ABC Data, adding conclusions as related objects in the proper lists

New and Future tools

- TraceCode: would likely specify low level attributes for files (such as debug symbols, etc) and how files are related from devel to deploy and back.
- VulnerableCode: would likely specify a new Vulnerability object and the related attributes and may track several identifiers to the NIST NVD CPE and CVE.
- DeltaCode: would likely specify attributes to describe the changes between codebases, files, packages.

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DOCUMENTATION GUIDE

2.1 Help

AboutCode is a suite of open source projects.

2.1.1 AboutCode Projects

- **ScanCode Toolkit**: This is a set of code scanning tools to detect the origin and license of code and dependencies. ScanCode Toolkit uses a plug-in architecture to run a series of scan-related tools in one process flow. This is the most popular project and is used by hundreds of software teams. <https://github.com/nexB/scancode-toolkit> . The lead maintainer is @pombredanne
- **Scancode Workbench** (formerly AboutCode Manager) This is a desktop application (based on Electron) to review the results of a scan and document your conclusions about the origin and license of software components and packages. <https://github.com/nexB/aboutcode-manager> . The lead maintainer is @majurg
- **AboutCode Toolkit**: This is a set of command line tools to document the provenance of your code and generate attribution notices. AboutCode Toolkit uses small yaml files to document code provenance inside a codebase. <https://github.com/nexB/aboutcode-toolkit> . The lead maintainer is @chinyeungli
- **TraceCode Toolkit**: This is a set of tools to trace files from your deployment or distribution packages back to their origin in a development codebase or repository. The primary tool uses strace <https://github.com/strace/strace/> to trace system calls on Linux and construct a build graph from syscalls to show which files are used to build a binary. We are contributors to strace. Maintained by @pombredanne
- **Conan**: “conan” stands for “CONtainer ANalysis” and is a tool to analyze the structure and provenance of software components in Docker images using static analysis. <https://github.com/nexB/conan> Maintained by @pombredanne
- **license-expression**: This is a library to parse, analyze, compare and normalize SPDX-like license expressions using a boolean logic expression engine. See <https://spdx.org/spdx-specification-21-web-version#h.jxpfx0ykyb60> to understand what a license expression is. See <https://github.com/nexB/license-expression> for the code. The underlying boolean engine is at <https://github.com/bastikr/boolean.py> . Both are co-maintained by @pombredanne
- **ABCD aka AboutCode Data**: is a simple set of conventions to define data structures that all the AboutCode tools can understand and use to exchange data. The specification lives in this repository. .ABOUT files and ScanCode toolkit data are examples of this approach. Other projects such as <https://libraries.io> and **OSS Review Toolkit** also use these conventions.
- **DeltaCode** is a command line tool to compare scans and determine if and where there are material differences that affect licensing. The lead maintainer is @majurg
- **VulnerableCode**: an emerging server-side application to collect and track known package vulnerabilities.

2.2 License

AboutCode includes documents that are dedicated to the Public Domain using the Creative Commons CC0 1.0 Universal (CC0 1.0) Public Domain Dedication: <http://creativecommons.org/publicdomain/zero/1.0/>

2.3 Document Maintenance

2.3.1 Document Software Setup

AboutCode documentation is built using Sphinx. See <http://www.sphinx-doc.org/en/master/index.html>

AboutCode documentation is distributed using “Read the Docs”. See <https://readthedocs.org/>

Individual document files are in reStructuredText format. See <http://www.sphinx-doc.org/en/master/usage/restructuredtext/basics.html>

You create, build, and preview AboutCode documentation on your local machine.

You commit your updates to the AboutCode repository on GitHub, which triggers an automatic rebuild of <https://aboutcode.readthedocs.io/en/latest/index.html>

2.3.2 Clone AboutCode

To get started, create or identify a working directory on your local machine.

Open that directory and execute the following command in a terminal session:

```
git clone https://github.com/nexB/aboutcode.git
```

That will create an /aboutcode directory in your working directory. Now you can install the dependencies in a virtualenv:

```
cd aboutcode
virtualenv -p /usr/bin/python3.6 docs-venv
source bin/activate
```

Now you can install Sphinx and the format theme used by readthedocs:

```
pip install Sphinx sphinx_rtd_theme doc8
```

Now you can build the HTML documents locally:

```
cd docs
make html
```

Assuming that your Sphinx installation was successful, Sphinx should build a local instance of the documentation .html files:

```
open build/html/index.html
```

In case this command did not work, for example on Ubuntu 18.04 you may get a message like “Couldn’t get a file descriptor referring to the console”, try:

```
see build/html/index.html
```

You now have a local build of the AboutCode documents.

2.3.3 Improve AboutCode Documents

Before you begin creating and modifying AboutCode documents, be sure that you understand the basics of reStructuredText as explained at <http://www.sphinx-doc.org/en/master/usage/restructuredtext/basics.html>

Ensure that you have the latest AboutCode files:

```
git pull
git status
```

Use your favorite text editor to create and modify .rst files to make your documentation improvements.

Review your work:

```
cd docs
make html
open build/html/index.html
```

AboutCode uses Travis-CI to test build status and check links, so run this script at your local system before creating a Pull Request.

```
cd docs
./scripts/sphinx_build_link_check.sh
```

2.3.4 Share AboutCode Document Improvements

Follow standard git procedures to upload your new and modified files. The following commands are examples:

```
git status
git add source/index.rst
git add source/how-to-scan.rst
git status
git commit -m "New how-to document that explains how to scan"
git status
git push
git status
```

The AboutCode webhook with ReadTheDocs should rebuild the documentation. You can review your results online.

TUTORIAL DOCUMENTS

HOW-TO DOCUMENTS

REFERENCE DOCUMENTS

DISCUSSION DOCUMENTS

INDICES AND TABLES

- `genindex`
- `modindex`