

ROScan clearing concept for ROS packages

Open source scanning method for the ROS core components

Supported by **ROSIN** - ROS-Industrial Quality-Assured Robot Software Components.

More information: rosin-project.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 732287.

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Problem Statement

One of the main steps in product development is the clarification of license terms in the developed or used software. This is typically also a very restrict process step in bigger companies. More specifically, for example in Bosch, in order to transfer any compiled software to a customer either for a demo purpose, prototyping or series solution, an open source scan has to be performed and the results should be critically analyzed and well documented.

Considering the wide usage of ROS in product development, especially in mobile robotic applications, clarification of license terms and conditions for the software provides by either ROS itself or functional ROS-packages is an important issue. Currently the only source of information about the license term is the general term appearing in the wiki.ros.org pages for each package. However, this is too generic and unfortunately not satisfactory to allow skipping the detailed open source scanning procedure. Therefore, the open source scanning is currently expected to be performed by each single company when they aim for using ROS into their products.

With this project, Bosch Engineering GmbH aims for performing the open source scanning (OSS) of the ROS core software and main mobile robotics functional packages, analyses the results and prepares a referable source of their license terms and conditions. The results will be released to ROS community with specific following objectives:

- Providing the chance to other companies and ROS users to skip the OSS scan procedure, but instead only refer to the results of OSS scan performed by this project,
- Pointing out all packages with unknown or potential problematic (from license point of view) packages, which could be a very valuable hint for ROS developers for taking care of the license restriction for example by re-implementation of the problematic part of a package.

Background

Apart from a generic and one license term that appears on the wiki.ros.org page for each ROS package, based on our knowledge there is no other real source of information available. The only reliable source of information about the license terms and condition is the one mentioned in every single part of the software, which has not been already scanned and summarized in a stand-alone and well-prepared documentation. Therefore, this project aims to fill our this gap with preparation of a referable summary list from all available terms and condition mentioned in each piece of software for the above-mentioned packages.

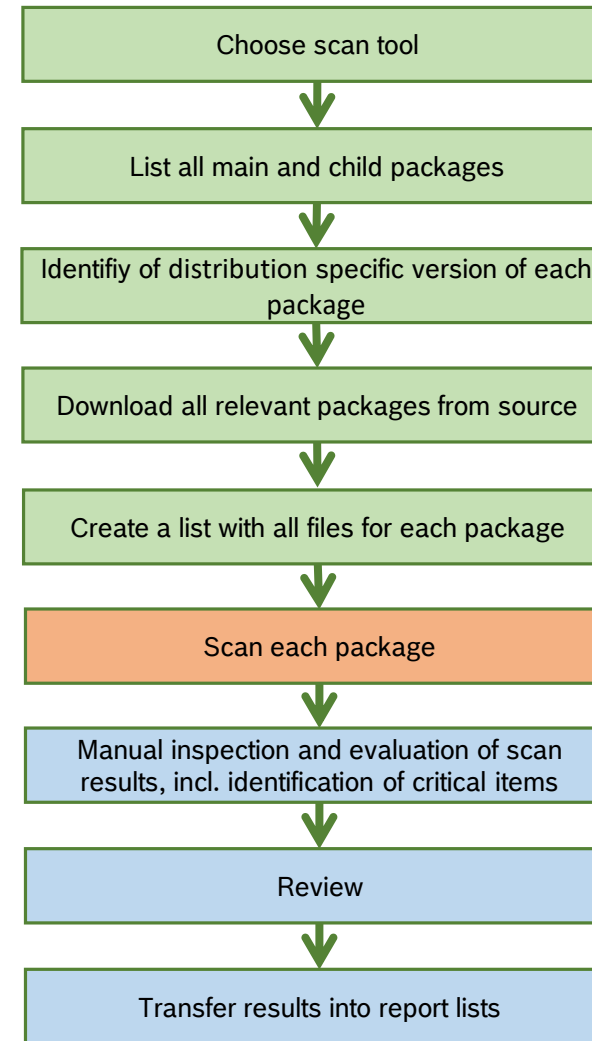
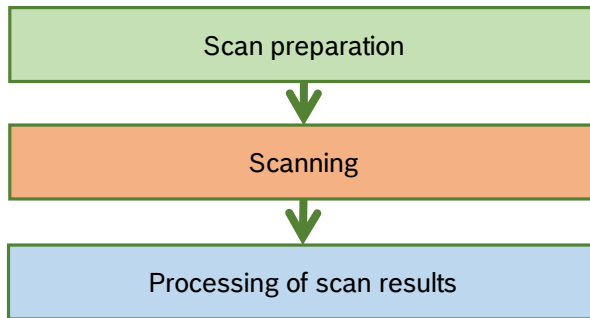
Objectives

The general objective is to empower the ROS community with well-documented and clarified license terms and conditions for the software packages for ROS core as well as main mobile robotic functions such as move-base, Robot localization and AMCL.

Outcome

The main outcome of this project is a referable document (Excel file) including the list of all ROS core packages and mobile robotic functions, their license and conditions, marked critical or non-identified items. Additionally, the documentation of the whole procedure performed is released publicly. These outcomes are released as open-source to public without any IP restriction.

Concept



Scan preparation – Choose scan tool



- Scan software files to find license information
- Open source code is licensed under [GPL-2.0](#) or [LGPL-2.1](#)
- Content is licensed under [CC-BY-SA-4.0](#)

Intersection: Fossology

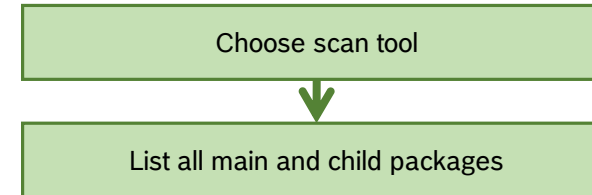
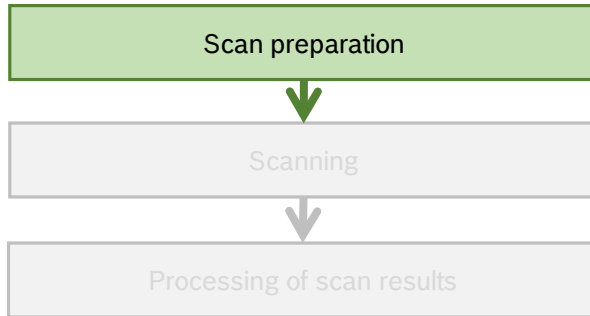
Fossology compares the text content of cleared files and text phrases of the Fossology data base.

It uses different kind of license scanners as Ninka and Nomos

Image beside show what different scanners found during file clearing. (Highlighted in red and grey)

```
/******  
* Software License Agreement (BSD License)  
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* Copyright (c) 2010, Willow Garage, Inc.  
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* are met:  
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* * Redistributions of source code must retain the above copyright  
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* LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS  
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* COPYRIGHT OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT,  
* INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING,  
* BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES;  
* LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER  
* CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT  
* LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN  
* ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE  
* POSSIBILITY OF SUCH DAMAGE.  
*****/  
  
#include "rosbag/time_translator.h"
```

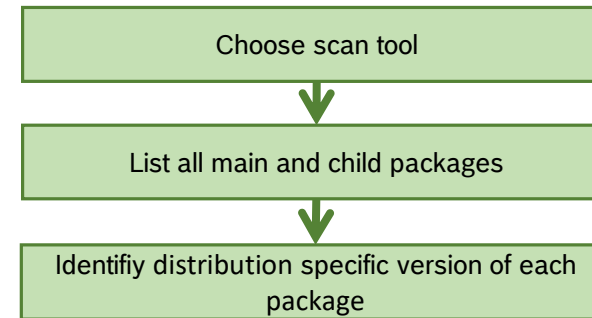
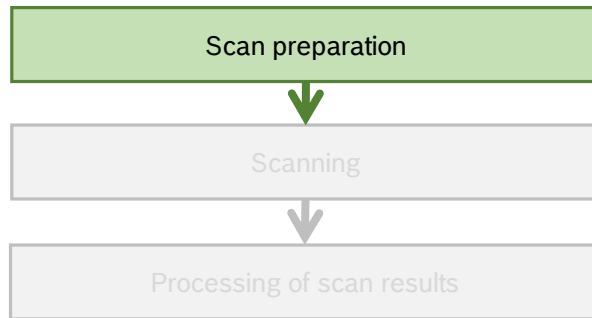
Scan preparation – List all main and child packages



- *Main packages:* actionlib, bond-core, class-loader, dynamic-reconfigure, nodelet-core, pluginlib, ros-core
- *Child packages:* actionlib-msgs, bond, bondcpp, bondpy, catkin, cmake-modules, .., ros_comm, ...

[Main packages: 7 Child packages: 72]

Scan preparation - Identify distribution specific version of each package



Sometimes the name of the distribution and the branch is not the same

The screenshot shows the ROS package page for `class_loader`. The 'kinetic' distribution is selected in the top navigation bar. A red box highlights the 'kinetic' button. Another red box highlights the source link in the package summary: `https://github.com/ros/class_loader.git (branch: indigo-devel)`. A red arrow points from the text 'Sometimes the name of the distribution and the branch is not the same' to this source link.

class_loader

indigo **kinetic** lunar melodic Show EOL distros: ☐

Documentation Status

ros_base: actionlib | bond_core | class_loader | dynamic_reconfigure | nodelet_core | pluginlib | ros_core

Package Summary

✓ Released ✓ Continuous Integration ✓ Documented

The class_loader package is a ROS-independent package for loading plugins during runtime and the foundation of the higher level ROS "pluginlib" library. class_loader utilizes the host operating system's runtime loader to open runtime libraries (e.g. .so/.dll files), introspect the library for exported plugin classes, and allows users to instantiate objects of said exported classes without the explicit declaration (i.e. header file) for those classes.

- Maintainer status: maintained
- Maintainer: Steven Ragnarök <stevenragnarok AT osrfoundation DOT org>
- Author: Mirza Shah
- License: BSD
- Bug / feature tracker: https://github.com/ros/class_loader/issues
- Source: git https://github.com/ros/class_loader.git (branch: indigo-devel)

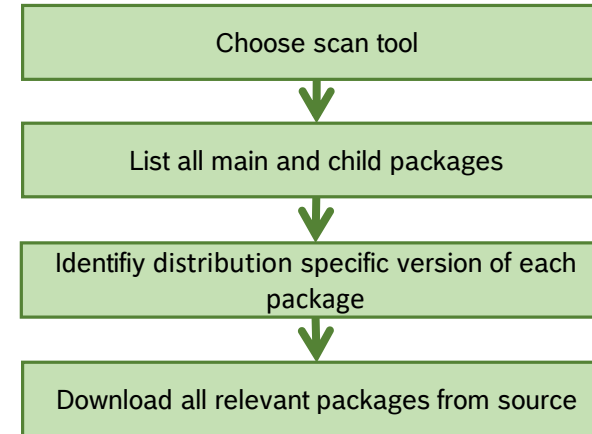
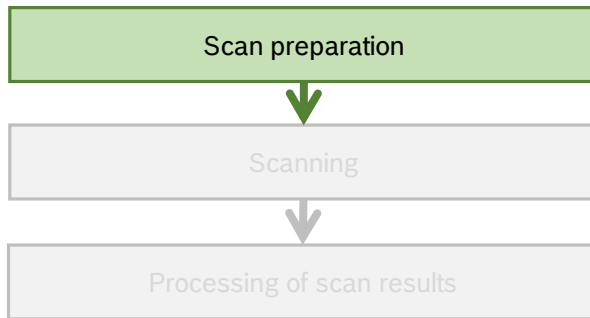
Package Links

- Code API
- FAQ
- Changelog
- Change List
- Reviews

Dependencies (2)

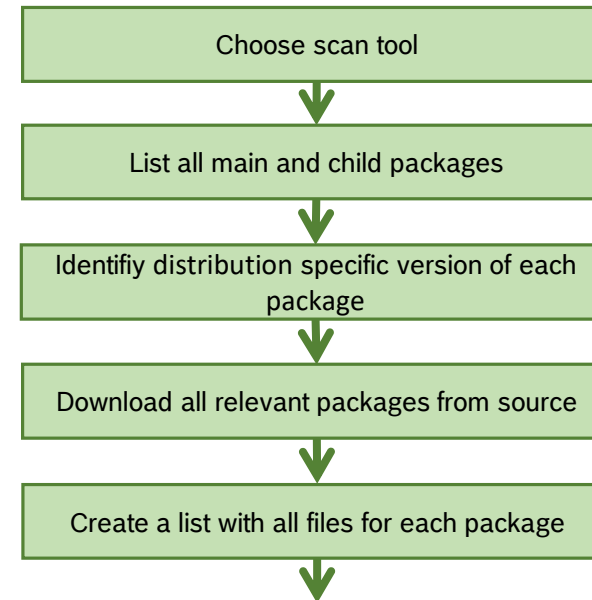
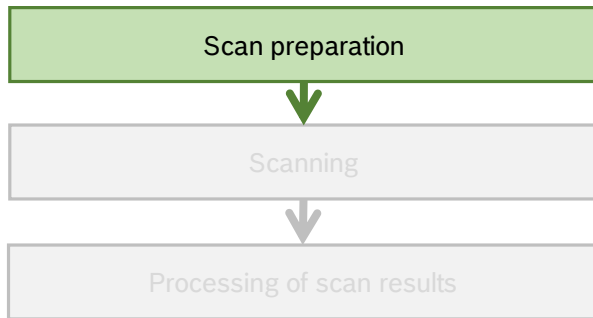
- Used by (12)
- Jenkins jobs (7)

Scan preparation - Download all relevant packages from source



To ensure that the package are downloaded from the right branch the github environment is used. By using the clone command also the git versioning information is “downloaded”. This information will be deleted later from the package file list.

Scan preparation - Create a list with all files for each package



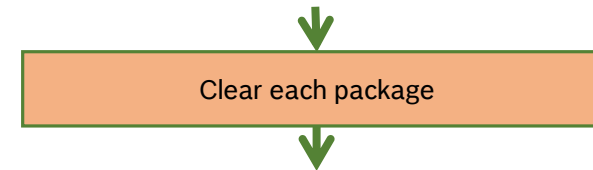
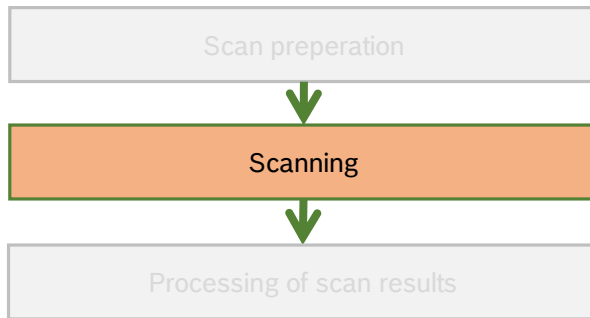
Scan preparation - Create a list with all files for each package

Package:	ros_comm		
Package version:			
Package license:	BSD		
Sub file path	▼ License	▼ File \ Folder	▼ Anomalies
clients\roscpp			
clients\roscpp\CHANGELOG.rst			
clients\roscpp\CMakeLists.txt			
clients\roscpp\include			
clients\roscpp\include\boost_161_condition_variable.h			
clients\roscpp\include\boost_161_pthread_condition_variable.h			
clients\roscpp\include\boost_161_pthread_condition_variable_fwd.h			
clients\roscpp\include\ros			
clients\roscpp\include\ros\advertise_options.h			
clients\roscpp\include\ros\advertise_service_options.h			
clients\roscpp\include\ros\callback_queue.h			
clients\roscpp\include\ros\callback_queue_interface.h			
clients\roscpp\include\ros\common.h.in			
clients\roscpp\include\ros\connection.h			
clients\roscpp\include\ros\connection_manager.h			
clients\roscpp\include\ros\exceptions.h			
clients\roscpp\include\ros\file_log.h			
clients\roscpp\include\ros\forwards.h			
clients\roscpp\include\ros\init.h			
clients\roscpp\include\ros\internal_timer_manager.h			
clients\roscpp\include\ros\intraprocess_publisher_link.h			
clients\roscpp\include\ros\intraprocess_subscriber_link.h			
clients\roscpp\include\ros\io.h			
clients\roscpp\include\ros\master.h			

To get an overview of all files in each package they are listed in a table sorted by path and name.

The list is an excel file, so the information can be shared independent from the scanning tool.

Scanning – Clear each package



Scanning – Clear each package: results for package ros_comm

	-- filter for scan results -- ▾	-- filter for edited results -- ▾	<input type="checkbox"/> open	
Files ▲	Scanner Results (N: nomos, M: monk, Nk: ninka, I: reportImport, O: ojo)	Edited Results	Clearing Status	Files Cleared
clients	BSD-3-Clause, BSD-possibility, BSL-1.0, No_license_found, WebM		●	0/154
.git	No_license_found		●	0/0
ros_comm	BSD, No_license_found		●	0/1
test	BSD-3-Clause, BSD-possibility, No_license_found, WebM		●	0/183
tools	BSD-3-Clause, BSD-possibility, No_license_found, WebM		●	0/217
utilities	BSD, BSD-2-Clause, BSD-3-Clause, BSD-possibility, LGPL-2.1, LGPL-2.1+, MPL, No_license_found, See-doc.OTHER, WebM		●	0/61
.gitignore	No_license_found [N]		●	0/0

The scanners may find many different licenses within one package. Each file and its license(s) has to be cleared manually.

Processing of scan results - Manual inspection and evaluation of scan results, incl. identification of critical items



Processing of scan results - Manual inspection and evaluation of scan results, incl. identification of critical items

```
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* CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT  
* LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN  
* ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE  
* POSSIBILITY OF SUCH DAMAGE.  
*****/  
  
#include "roscpp/time_translator.h"
```

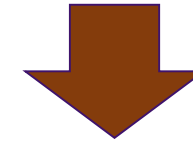
Often the scan identifies different licenses for the same file or the detected text does not match by 100%

Clearing decision type

- ☐ No license known ⓘ
- ☐ To be discussed ⓘ
- ☐ Irrelevant ⓘ
- ☐ Identified ⓘ

Action ⓘ ▲	License ⓘ ⬆	Source ⓘ	License Text ⓘ	Acknowledgement ⓘ
✗ ☆	WebM	monk: #1 (93 %)	Click to add	Click to add
✗ ☆	BSD-3-Clause	nomos: #1	Click to add	Click to add

Manual clearing



Clearing decision type

- ☐ No license known ⓘ
- ☐ To be discussed ⓘ
- ☐ Irrelevant ⓘ
- ☒ Identified ⓘ

Action ⓘ ▲	License ⓘ ⬆	Source ⓘ	License Text ⓘ	Acknowledgement ⓘ
✗ ☆	WebM	monk: #1 (93 %)	-	-
✗ ☆	BSD-3-Clause	nomos: #1 User confirmed agent finding	Click to add	Click to add

Preliminary result

	-- filter for scan results -- ▾	-- filter for edited results -- ▾	<input type="checkbox"/> open	
Files ▲	Scanner Results (N: nomos, M: monk, Nk: ninka, I: reportImport, O: ojo)	Edited Results	Clearing Status	Files Cleared
clients	boost-1, boost-1ref, BSD-3-Clause, BSD-possibility, BSL-1.0, No_license_found, See-file, UnclassifiedLicense, WebM	BSD-3-Clause, License_info, BSL-1.0	●	152/154
.git	No_license_found, UnclassifiedLicense	UnclassifiedLicense	●	0/1
ros_comm	BSD, No_license_found, UnclassifiedLicense	License_info	●	0/1
test	BSD-3-Clause, BSD-possibility, No_license_found, UnclassifiedLicense, WebM	BSD-3-Clause, License_info	●	174/185
tools	BSD-3-Clause, BSD-possibility, No_license_found, UnclassifiedLicense, WashU, WebM	BSD-3-Clause, BSD-possibility, License_info, UnclassifiedLicense	●	200/218
utilities	BSD, BSD-2-Clause, BSD-3-Clause, BSD-possibility, LesserGPLv2.1+, LGPL-2.1, LGPL-2.1+, MPL, No_license_found, See-doc.OTHER, UnclassifiedLicense, WebM	BSD-2-Clause, License_text_file, LGPL-2.1, UnclassifiedLicense, LGPL-2.1+, BSD-3-Clause, License_info	●	55/73
.gitignore	No_license_found [N][Nk]		●	0/0

After the manual clearing are still files with unclear status and anomalies left, which have to be reported and discussed in review.

For ros_comm as example 632 files has been inspected manually.

Processing of scan results – Example for anomalies

[ros/core/rosbuild/core/rosbuild/ProcessorCount.cmake](#)

```
# - ProcessorCount(var)
# Determine the number of processors/cores and save value in ${var}
#
# Sets the variable named ${var} to the number of physical cores available on
# the machine if the information can be determined. Otherwise it is set to 0.
# Currently this functionality is only implemented for Windows, Mac OS X and
# Unix systems providing getconf or the /proc/cpuinfo interface (e.g. Linux).

# A more reliable way might be to compile a small C program that uses the CPUID
# instruction, but that again requires compiler support or compiling assembler
# code.

=====
# Copyright 2010 Kitware, Inc.
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# Distributed under the OSI-approved BSD License (the "License");
# see accompanying file Copyright.txt for details.
#
# This software is distributed WITHOUT ANY WARRANTY; without even the
# implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
# See the License for more information.
#
=====
# (To distribute this file outside of CMake, substitute the full
# License text for the above reference.)
```

- Which BSD license?
- No copyright.txt in the package -> Checked package.xml
- No license text file in the folder

Processing of scan results - Example

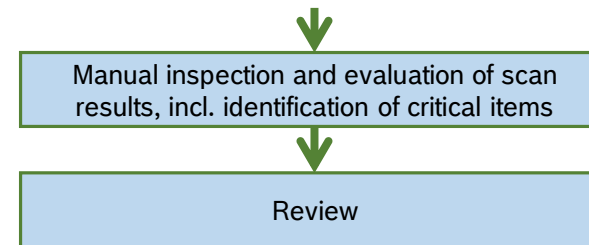
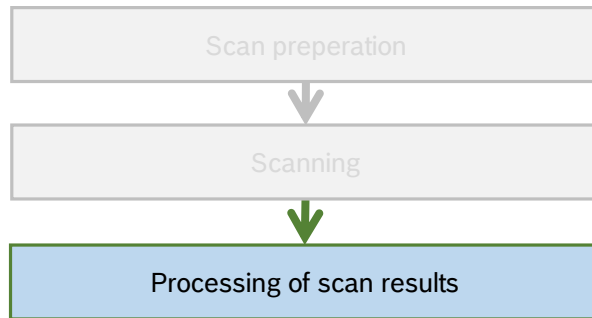
[ros/core/rosbuild/package.xml](#)

```
<package>
<name>rosbuild</name>
<version>1.14.6</version>
<description>
rosbuild contains scripts for managing the CMake-based build system for ROS.
</description>
<maintainer email="dthomas@osrfoundation.org">Dirk Thomas</maintainer>
<license>BSD</license>

<url>http://ros.org/wiki/rosbuild</url>
<author>Brian Gerkey</author>
<author>Troy Straszheim</author>
<author>Morgan Quigley</author>
```

- Which BSD license?

Processing of scan results - Review



Review and discussion of anomalies with other OSS experts

Processing of scan results - Transfer results into report lists



Autogenerated reports from the tool are sorted the information in decency of the found licenses and with a fix layout (pdf)

To allow the maintainers to filter the results as needed, all report results have been transferred to above shown package file lists.

Documentation of results - Structure

Structure of the document

Each package is represented by a sheet within this file.

Package:	actionlib	Name of the scanned package
Package github repository:	https://github.com/ros/actionlib/tree/indigo-devel	Link to the github repository
Package license:	BSD	License(s) which are listed at the wiki page
Contained licenses:	BSD-3-Clause	License(s) which are determined in the package files
Package wiki page:	https://wiki.ros.org/actionlib	Link to the ros wiki page
Number of files:	3	Number of files without folder within the package

The files of each package are organized in their folder structure. The license information found for each document is entered in the **License** column. If the field is empty, then no license is stored in the corresponding file.

The column **File / Folder** separates the specified sub file paths into folders or files.

The column **Anomalies** contains information about certain files with incorrect license information.

Sub file path	License	File / Folder:	Anomalies
angles\include		folder	
angles\include\angles		folder	
angles\include\angles\angles	BSD-3-clause	-	License info deviation
angles\package.xml	License_info	-	Which BSD version?
angles\setup.py		-	

Documentation of results - Example

INFORMATION

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Package:

Package github repository:

Package license:

Contained licenses:

Package wiki page:

Number of files:

Sub file path

.gitignore

action

action/Test.action

action/TestRequest.action

action/Twoints.action

CHANGELOG.rst

CMakeLists.txt

docs

doctestaction_interface.svg

doctestcancel_policy.svg

doctestserver_states_detailed.svg

doctestsimple_goal_reception.svg

include

include/actionlib

include/actionlib/action_definition.h

include/actionlib/client

include/actionlib/client/action_client.h

include/actionlib/client/client_goal_handle_imp.h

include/actionlib/client/client_helpers.h

include/actionlib/client/comm_state.h

include/actionlib/client/comm_state_machine_imp.h

include/actionlib/client/connection_monitor.h

include/actionlib/client/goal_manager_imp.h

include/actionlib/client/service_client.h

include/actionlib/client/service_client_imp.h

include/actionlib/client/simple_action_client.h

include/actionlib/client/simple_client_goal_state.h

include/actionlib/client/simple_goal_state.h

include/actionlib/client/terminal_state.h

include/actionlib/client/goal_status.h

include/actionlib/decl.h

include/actionlib/destruction_guard.h

include/actionlib/enclosure_deleter.h

include/actionlib/goal_id_generator.h

include/actionlib/managed_list.h

include/actionlib/one_shot_timer.h

include/actionlib/server

include/actionlib/server/action_server.h

include/actionlib/server/action_server_base.h

include/actionlib/server/action_server_imp.h

include/actionlib/server/handle_tracker_deleter.h

License

</