ROS 2 Cheats Sheet

Command Line Interface

All ROS 2 CLI tools start with the prefix 'ros2' followed by a command, a verb and (possibly) positional/optional arguments.

For any tool, the documentation is accessible with,

```
$ ros2 command --help
```

and similarly for verb documentation,

```
$ ros2 command verb -h
```

Similarly, auto-completion is available for all commands/verbs and most positional/optional arguments. E.g.,

```
$ ros2 command [tab][tab]
```

Some of the examples below rely on:
ROS 2 demos package.

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action Allows to manually send a goal and displays debugging information about actions.

Verbs:

info	Output information about an action.
list	Output a list of action names.
send_goal	Send an action goal.
show	Output the action definition.

Examples:

```
$ ros2 action info /fibonacci
$ ros2 action list
$ ros2 action send_goal /fibonacci \
 action_tutorials/action/Fibonacci "order: 5"
$ ros2 action show action_tutorials/action/Fibonacci
```

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bag Allows to record/play topics to/from a rosbag.

Verbs:

info	Output information of a bag.
play	Play a bag.
record	Record a bag.

Examples:

```
$ ros2 info <bag-name>
$ ros2 play <bag-name>
$ ros2 record -a
```

---

component Various component related verbs.

Verbs:

list	Output a list of running containers and components.
load	Load a component into a container node.
standalone	Run a component into its own standalone container node.
types	Output a list of components registered in the ament index.
unload	Unload a component from a container node.

Examples:

```
$ ros2 component list
$ ros2 component load /ComponentManager \
 composition composition::Talker
$ ros2 component types
$ ros2 component unload /ComponentManager 1
```

---

daemon Various daemon related verbs.

Verbs:

start	Start the daemon if it isn't running.
status	Output the status of the daemon.
stop	Stop the daemon if it is running

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doctor A tool to check ROS setup and other potential issues such as network, package versions, rmw middleware etc.

Alias: **wtf** (where's the fire).

Arguments:

--report/-r	Output report of all checks.
--report-fail/-rf	Output report of failed checks only.
--include-warning/-iw	Include warnings as failed checks.

Examples:

```
$ ros2 doctor
$ ros2 doctor --report
$ ros2 doctor --report-fail
$ ros2 doctor --include-warning
$ ros2 doctor --include-warning --report-fail
```

or similarly,

```
$ ros2 wtf
```

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extension_points List extension points.

---

extensions List extensions.

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interface Various ROS interfaces (actions/topics/services)-related verbs. Interface type can be filtered with either of the following option, '--only-actions', '--only-msgs', '--only-srvs'.

Verbs:

list	List all interface types available.
package	Output a list of available interface types within one package.
packages	Output a list of packages that provide interfaces.
proto	Print the prototype (body) of an interfaces.
show	Output the interface definition.

Examples:

```
$ ros2 interface list
$ ros2 interface package std_msgs
$ ros2 interface packages --only-msgs
$ ros2 interface proto example_interfaces/srv/AddTwoInts
$ ros2 interface show geometry_msgs/msg/Pose
```

---

launch Allows to run a launch file in an arbitrary package without to 'cd' there first.

Usage:

```
$ ros2 launch <package> <launch-file>
```

Example:

```
$ ros2 launch demo_nodes_cpp add_two_ints.launch.py
```

---

lifecycle Various lifecycle related verbs.

Verbs:

get	Get lifecycle state for one or more nodes.
list	Output a list of available transitions.
nodes	Output a list of nodes with lifecycle.
set	Trigger lifecycle state transition.

---

msg (deprecated) Displays debugging information about messages.

Verbs:

list	Output a list of message types.
package	Output a list of message types within a given package.
packages	Output a list of packages which contain messages.
show	Output the message definition.

Examples:

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```
$ ros2 msg list
$ ros2 msg package std_msgs
$ ros2 msg packages
$ ros2 msg show geometry_msgs/msg/Pose
```

---

multicast Various multicast related verbs.

Verbs:

receive	Receive a single UDP multicast packet.
send	Send a single UDP multicast packet.

---

node Displays debugging information about nodes.

Verbs:

info	Output information about a node.
list	Output a list of available nodes.

Examples:

```
$ ros2 node info /talker
$ ros2 node list
```

---

param Allows to manipulate parameters.

Verbs:

delete	Delete parameter.
describe	Show descriptive information about declared parameters.
dump	Dump the parameters of a given node in yaml format, either in terminal or in a file.
get	Get parameter.
list	Output a list of available parameters.
set	Set parameter

Examples:

```
$ ros2 param delete /talker /use_sim_time
$ ros2 param get /talker /use_sim_time
$ ros2 param list
$ ros2 param set /talker /use_sim_time false
```

---

pkg Create a ros2 package or output package(s)-related information.

Verbs:

create	Create a new ROS2 package.
executables	Output a list of package specific executables.
list	Output a list of available packages.
prefix	Output the prefix path of a package.
xml	Output the information contained in the package xml manifest.

Examples:

```
$ ros2 pkg executables demo_nodes_cpp
$ ros2 pkg list
$ ros2 pkg prefix std_msgs
$ ros2 pkg xml -t version
```

---

run Allows to run an executable in an arbitrary package without having to 'cd' there first.

Usage:

```
$ ros2 run <package> <executable>
```

Example:

```
$ ros2 run demo_node_cpp talker
```

---

security Various security related verbs.

Verbs:

create_key	Create key.
create_permission	Create keystore.
generate_artifacts	Create permission.
list_keys	Distribute key.
create_keystore	Generate keys and permission files from a list of identities and policy files.
distribute_key	Generate XML policy file from ROS graph data.
generate_policy	List keys.

Examples (see sros2 package):

```
$ ros2 security create_key demo_keys /talker
$ ros2 security create_permission demo_keys /talker  \
 policies/sample_policy.xml
$ ros2 security generate_artifacts
$ ros2 security create_keystore demo_keys
```

---

service Allows to manually call a service and displays debugging information about services.

Verbs:

call	Call a service.
find	Output a list of services of a given type.
list	Output a list of service names.
type	Output service's type.

Examples:

```
$ ros2 service call /add_two_ints  \
 example_interfaces/AddTwoInts "a: 1, b: 2"
$ ros2 service find rcl_interfaces/srv/ListParameters
$ ros2 service list
$ ros2 service type /talker/describe_parameters
```

---

srv (deprecated) Various srv related verbs.

Verbs:

list	Output a list of available service types.
package	Output a list of available service types within one package.
packages	Output a list of packages which contain services.
show	Output the service definition.

---

test Run a ROS2 launch test.

---

topic A tool for displaying debug information about ROS topics, including publishers, subscribers, publishing rate, and messages.

Verbs:

bw	Display bandwidth used by topic.
delay	Display delay of topic from timestamp in header.
echo	Output messages of a given topic to screen.
find	Find topics of a given type type.
hz	Display publishing rate of topic.
info	Output information about a given topic.
list	Output list of active topics.
pub	Publish data to a topic.
type	Output topic's type.

Examples:

```
$ ros2 topic bw /chatter
$ ros2 topic echo /chatter
$ ros2 topic find rcl_interfaces/msg/Log
$ ros2 topic hz /chatter
$ ros2 topic info /chatter
$ ros2 topic list
$ ros2 topic pub /chatter std_msgs/msg/String  \
 'data: Hello ROS 2 world'
$ ros2 topic type /rosout
```

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ROS 2 Cheats Sheet

colcon - collective construction

colcon is a command line tool to improve the workflow of building, testing and using multiple software packages. It automates the process, handles the ordering and sets up the environment to use the packages.

All colcon tools start with the prefix 'colcon' followed by a command and (likely) positional/optional arguments.

For any tool, the documentation is accessible with,

```
$ colcon command --help
```

Moreover, colcon offers auto-completion for all verbs and most positional/optional arguments. E.g.,

```
$ colcon command [tab][tab]
```

Find out how to enable auto-completion at colcon's online documentation.

Environment variables:

- CMAKE_COMMAND The full path to the CMake executable.
- COLCON_ALL_SHELLS Flag to enable all shell extensions.
- COLCON_COMPLETION_LOGFILE Set the logfile for completion time.
- COLCON_DEFAULTS_FILE Set path to the yaml file containing the default values for the command line arguments (default:$COLCON_HOME/defaults.yaml).
- COLCON_DEFAULT_EXECUTOR Select the default executor extension.
- COLCON_EXTENSION_BLACKLIST Blacklist extensions which should not be used.
- COLCON_HOME Set the configuration directory (default: /.colcon.)
- COLCON_LOG_LEVEL Set the log level (debug—10, info—20, warn—30, error—40, critical—50, or any other positive numeric value).
- COLCON_LOG_PATH Set the log directory (default: $COLCON_HOME/log).
- CTEST_COMMAND The full path to the CTest executable.
- POWERSHELL_COMMAND The full path to the PowerShell executable.

Global options:

- --log-base <path> The base path for all log directories (default: log).
- --log-level <level> Set log level for the console output, either by numeric or string value (default: warn)

---

build Build a set of packages.

Examples:

Build the whole workspace:

```
$ colcon build
```

Build a single package excluding dependencies:

```
$ colcon build --packages-selected demo_nodes_cpp
```

Build two packages including dependencies, use symlinks instead of copying files where possible and print immediately on terminal:

```
$ colcon build --packages-up-to demo_nodes_cpp \
 action_tutorials --symlink-install \
 --event-handlers console_direct+
```

---

extension-points List extension points.

---

extensions Package information.

---

info List extension points.

---

list List packages, optionally in topological ordering.

Example:

List all packages in the workspace:

```
$ colcon list
```

List all packages names in topological order up-to a given package:

```
$ colcon list --names-only --topological-order \
 --packages-up-to demo_nodes_cpp
```

---

metadata Manage metadata of packages.

---

test Test a set of packages.

Example:

Test the whole workspace:

```
$ colcon test
```

Test a single package excluding dependencies:

```
$ colcon test --packages-select demo_nodes_cpp
```

Test a package including packages that depend on it:

```
$ colcon test --packages-above demo_nodes_py
```

Test two packages including dependencies, and print on terminal:

```
$ colcon test --packages-up-to demo_nodes_cpp \
 demo_nodes_py --event-handlers console_direct+
```

Pass arguments to pytest (e.g. to print a coverage report):

```
$ colcon test --packages-select demo_nodes_cpp \
 --event-handlers console_direct+ \
 --pytest-args --cov=sros2
```

---

test-result Show the test results generated when testing a set of packages.

Example:

Show all test results generated, including successful tests:

```
$ colcon test-result --all
```

---

version-check Compare local package versions with PyPI.

Examples:

```
$ todo
```

Must know colcon flags.

- --symlink-install Use 'symlinks' instead of installing (copying) files where possible.
- --continue-on-error Continue other packages when a package fails to build. Packages recursively depending on the failed package are skipped.
- --event-handlers console_direct+ Show output on console.
- --event-handlers console_cohesion+ Show output on console after a package has finished.
- --packages-select Build only specific package(s).
- --packages-up-to Build specific package(s) and its/their recursive dependencies.
- --packages-above Build specific package(s) and other packages that recursively depending on it.
- --packages-skip Skip package(s).
- --packages-skip-build-finished Skip a set of packages which have finished to build previously.
- --cmake-args Pass arguments to CMake projects.
- --cmake-clean-cache Remove CMake cache before the build (implicitly forcing CMake configure step).
- --cmake-clean-first Build target 'clean' first, then build (to only clean use '–cmake-target clean').
- --cmake-force-configure Force CMake configure step.

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