

## WORKSPACES

### Create Workspace

```
mkdir catkin_ws && cd catkin_ws
wstool init src
catkin_make
source devel/setup.bash
```

### Add Repo to Workspace

```
roscd; cd ../src
wstool set repo_name \
--git http://github.com/org/repo_name.git \
--version=melodic-devel
wstool up
```

### Resolve Dependencies in Workspace

```
sudo rosdep init # only once
rosdep update
rosdep install --from-paths src --ignore-src \
--rostdistro=${ROS_DISTRO} -y
```

## PACKAGES

### Create a Package

```
catkin_create_pkg package_name [dependencies ...]
```

### Package Folders

include/package_name	C++ header files
src	Source files. Python libraries in subdirectories
scripts	Python nodes and scripts
msg, srv, action	Message, Service, and Action definitions

### Release Repo Packages

```
catkin_generate_changelog
# review & commit changelogs
catkin_prepare_release
bloom-release --track melodic --ros-distro melodic repo_name
```

### Reminders

- Testable logic
- Publish diagnostics
- Desktop dependencies in a separate package

## CMakeLists.txt

### Skeleton

```
cmake_minimum_required(VERSION 2.8.3)
project(package_name)
find_package(catkin REQUIRED)
catkin_package()
```

### Package Dependencies

To use headers or libraries in a package, or to use a package's exported CMake macros, express a build-time dependency:

```
find_package(catkin REQUIRED COMPONENTS roscpp)
```

Tell dependent packages what headers or libraries to pull in when your package is declared as a catkin component:

```
catkin_package(
  INCLUDE_DIRS include
  LIBRARIES ${PROJECT_NAME}
  CATKIN_DEPENDS roscpp)
```

Note that any packages listed as CATKIN\_DEPENDS dependencies must also be declared as a <run\_depend> in package.xml.

### Messages, Services

These go after find\_package(), but before catkin\_package().

Example:

```
find_package(catkin REQUIRED COMPONENTS message_generation
std_msgs)
add_message_files(FILES MyMessage.msg)
add_service_files(FILES MyService.msg)
generate_messages(DEPENDENCIES std_msgs)
catkin_package(CATKIN_DEPENDS message_runtime std_msgs)ww
```

### Build Libraries, Executables

Goes after the catkin\_package() call.

```
add_library(${PROJECT_NAME} src/main)
add_executable(${PROJECT_NAME}_node src/main)
target_link_libraries(
  ${PROJECT_NAME}_node ${catkin_LIBRARIES})
```

### Installation

```
install(TARGETS ${PROJECT_NAME}
  DESTINATION ${CATKIN_PACKAGE_LIB_DESTINATION})
install(TARGETS ${PROJECT_NAME}_node
  DESTINATION ${CATKIN_PACKAGE_BIN_DESTINATION})
install(PROGRAMS scripts/myscript
  DESTINATION ${CATKIN_PACKAGE_BIN_DESTINATION})
install(DIRECTORY launch
  DESTINATION ${CATKIN_PACKAGE_SHARE_DESTINATION})
```

## RUNNING SYSTEM

Run ROS using plain:  
roscore

Alternatively, roslaunch will run its own roscore automatically if it can't find one:  
roslaunch my\_package package\_launchfile.launch

Suppress this behaviour with the --wait flag.

### Nodes, Topics, Messages

```
roslaunch my_package package_launchfile.launch
rosnode list
rostopic list
rostopic echo cmd_vel
rostopic hz cmd_vel
rostopic info cmd_vel
rosmmsg show geometry_msgs/Twist
```

### Remote Connection

Master's ROS environment:

- ROS\_IP or ROS\_HOSTNAME set to this machine's network address.
- ROS\_MASTER\_URI set to URI containing that IP or hostname.

Your environment:

- ROS\_IP or ROS\_HOSTNAME set to your machine's network address.
- ROS\_MASTER\_URI set to the URI from the master.

To debug, check ping from each side to the other, run roswtf on each side.

### ROS Console

Adjust using rqt\_logger\_level and monitor via rqt\_console. To enable debug output across sessions, edit the \$HOME/.ros/config/rosconsole.config and add a line for your package:  
log4j.logger.ros.package\_name=DEBUG

And then add the following to your session:

```
export ROSCONSOLE_CONFIG_FILE=$HOME/.ros/config/rosconsole.config
```

Use the roslaunch --screen flag to force all node output to the screen, as if each declared <node> had the output="screen" attribute.

