Porting the Robot Operating System (ROS) to FreeBSD

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You have a robot & its different parts...

- Sensors
- CPU
- Control Module
- Motors & Wheels
You need software to handle tasks

- Read data from sensors
- Navigation, Odometry, Command
- Control hardware
- Start and Stop
ROS is more than an operating system

Source: https://www.ros.org/about-ros/
Now imagine you have lots of different robots and you want to share the code...

Source: robots.ros.org
ROS follows a release similar to Ubuntu

<table>
<thead>
<tr>
<th>Distro</th>
<th>Release date</th>
<th>Poster</th>
<th>Tuturtle, turtle in tutorial</th>
<th>EOL date</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROS Moxie Moon (Recommended)</td>
<td>May 23rd, 2018</td>
<td><img src="image" alt="Poster" /></td>
<td>May, 2023 (Bionic EOL)</td>
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Source: [http://wiki.ros.org/Distributions](http://wiki.ros.org/Distributions)
Porting ROS to FreeBSD keeps open source honest

- Most parts of ROS are under a BSD or BSD-style license
- ROS mostly deals with infrastructure, tools, and communication, not drivers for robots—which should be cross-platform by nature
FreeBSD had ROS, but not anymore

**ros** Robot Operating System - core utilities

1.4.10.3 **devel**

⚠️ DEPRECATED: Unsupported upstream, see [http://wiki.ros.org/Distributions](http://wiki.ros.org/Distributions)

❤️ This port expired on: 2015-11-01

There is no maintainer for this port.

Any concerns regarding this port should be directed to the FreeBSD Ports mailing list via ports@FreeBSD.org

**Last Update:** 2015-11-01 21:30:48

**SVN Revision:** 400630

**License:** BSD3CLAUSE

**SVNWeb:** [Homepage](http://www.FreeBSD.org)

**Dependency lines:**

- ros>0:devel/ros

No installation instructions: this port has been deleted.

The package name of this deleted port was: **ros**

**PKGNAME:** ros

Source: freshports.org
FreeBSD had Diamondback from 2011

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<td>August 30, 2011</td>
<td>poster.png</td>
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<tr>
<td>ROS Diamondback</td>
<td>March 2, 2011</td>
<td>poster.png</td>
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ROS has instructions for building from scratch

Source: http://wiki.ros.org/melodic/Installation
Building from Source has 3 big steps

1. Install prerequisites (rosdep and friends)
2. Use those tools to create a source checkout
3. Build it

Use jails!!!
Step 1: We have some things in system & ports, but not everything

- We have: clang, boost, cmake, ninja, many Python libraries—ROS works best with Python 2.7(!)
- Missing: rosdep, rosinstall-generator, rosinstall, wstool (plus their dependencies)
ROS Enhancement Proposals (REPs)

Explain how ROS is set up

- REP 3  Target Platforms
- REP 125  rosdep2
- REP 141  ROS distribution files

Source: https://www.ros.org/reps/rep-0000.html
ROS Distribution files list components and how to install them on each OS

bzip2:

  alpine: [bzip2-dev]
  arch: [bzip2]
  cygwin: [bzip2]
  debian: [libbz2-dev]
  fedora: [bzip2-devel]
  freebsd: [bzip2]
  gentoo: [app-arch/bzip2]
  macports: [bzip2]
Rosdep installs dependencies for ROS

Rosdep:
- Downloads and reads rosdistro files

Package manager:
- Calls rosdistro files

Diagram:
- Rosdep
- Package manager
- Downloads and reads
- Calls
Multiple package backends for rosdep

- pip
- yum
- apt
- pkg

Used pkg_add,
Updated to pkg
We also need several dependent programs

- rosinstall_generator—get a list of components for a distro, based on rosdistro
- wstool—Cross-SCM “cloning” tool for catkin
- ros_console-bridge—ROS Logging for non-ROS programs
Initialize rosdep, run rosinstall, & wstool

# rosdep init
$ rosdep update
$ mkdir ros_catkin_ws
$ cd ros_catkin_ws
$ rosinstall_generator desktop --rosdistro melodic --deps \ --tar > melodic-desktop.rosinstall
$ wstool init -j8 src melodic-desktop.rosinstall
Install deps, apply patches, & build...

```bash
$ rosdep install --from-paths src --ignore-src --rosdistro melodic -y

$ patch < freebsd-ros-desktop-melodic.diff

$ ./src/catkin/bin/catkin_make_isolated --install --use-ninja
```

-DCMAKE_BUILD_TYPE=Release
And everything builds... until it doesn’t

- SIP causes problems generating the Python bindings (sipconfig.py issue)
Let’s see a demonstration...
I have created bugs for needed ports

- 224895—devel/ros-rosdep
- 224896—devel/ros-console_bridge
- 224897—devel/ros-urdfdom_headers
- 224898—devel/ros-urdfdom
- 235843—devel/ros-cautkin_pkg
- 235844—devel/ros-rospkg
- 235845—devel/ros-rosdistro
- 240635—devel/collada-dom
- 240646—devel/ros-rosinstall_generator
- 240637—devel/ros-rosinstall
- 240638—devel/vcstools
- 240639—devel/ros-wstool
Rosdistro changes for FreeBSD must be pushed upstream

```markdown
bzip2:

  alpine: [bzip2-dev]
  arch: [bzip2]
  cygwin: [bzip2]
  debian: [libbz2-dev]
  fedora: [bzip2-devel]
  freebsd: [bzip2]
  gentoo: [app-arch/bzip2]
  macports: [bzip2]
```
In the meantime, there are GitHub repo with the ports and a rosdistro

https://github.com/NorwegianRockCat/FreeBSD-my-ports
https://github.com/NorwegianRockCat/rosdistro

Packages and scripts:

https://www.norwegianrockcat.com/static/eurobsd/2019/
Oh yeah… there is a ROS 2 as well…
ROS can be brought to FreeBSD, but it needs some work

- Add the ports
- Update rosdistro and send it upstream
- Long term: create ports for the rest; look at Gazebo simulator and ROS 2