ROSifying Robots

ROSCon 2013

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Why ROSify?

ROS provides tools and capabilities

- Visualization
- Introspection
- Configurability
- Standards
- Sensor Drivers
- High Level Apps

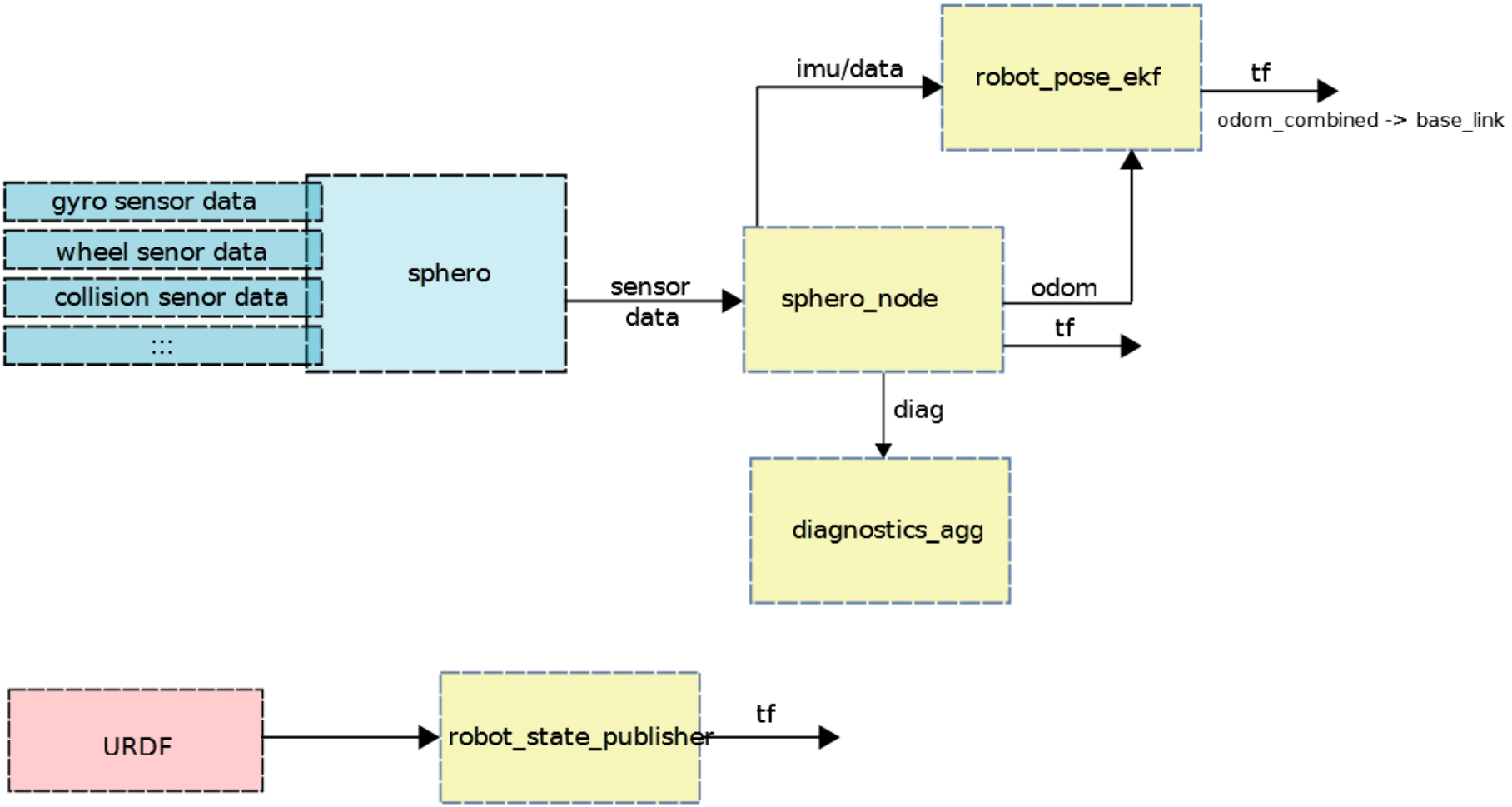
Where to start?

Color by numbers: look at other ROS robots

(ros.org/wiki/Robots)

Package structure

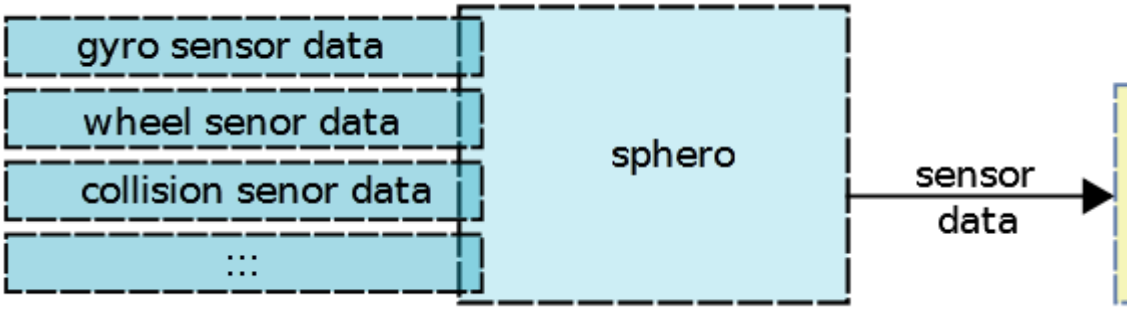
- Drivers (low level interface to the hardware)
- URDF (robot model)
- ROS Wrapper Node
- Bringup (config/launch files)
- Apps
- msgs/srvs


gyro sensor data
wheel senor data
collision senor data
:::
sphero
sensor data
sphero_node
imu/data
robot_pose_ekf
tf
odom_combined -> base_link
odom
tf
diag
diagnostics_agg
URDF
robot_state_publisher
tf

Before You Start

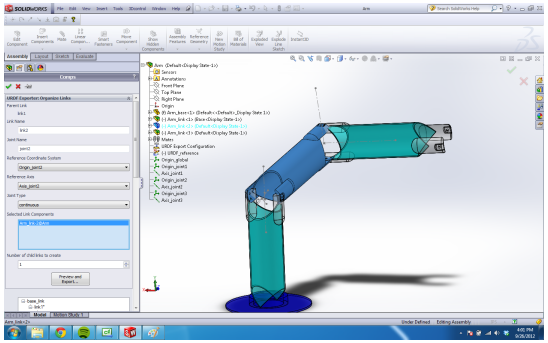
There are lots of drivers in ROS.

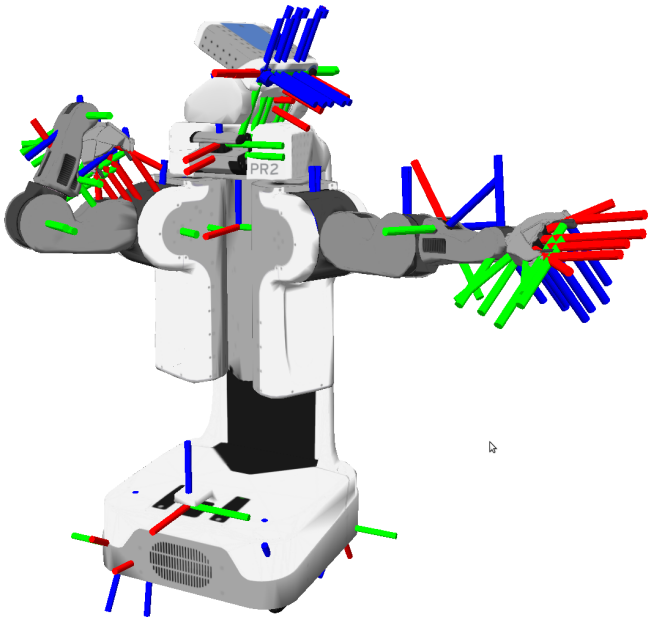
1. Do a search (see if ROS driver exists)
2. Write a standalone driver
3. **Don't copy. Config or Contribute. (There are too many copies joy.py in the world)**



The Basics

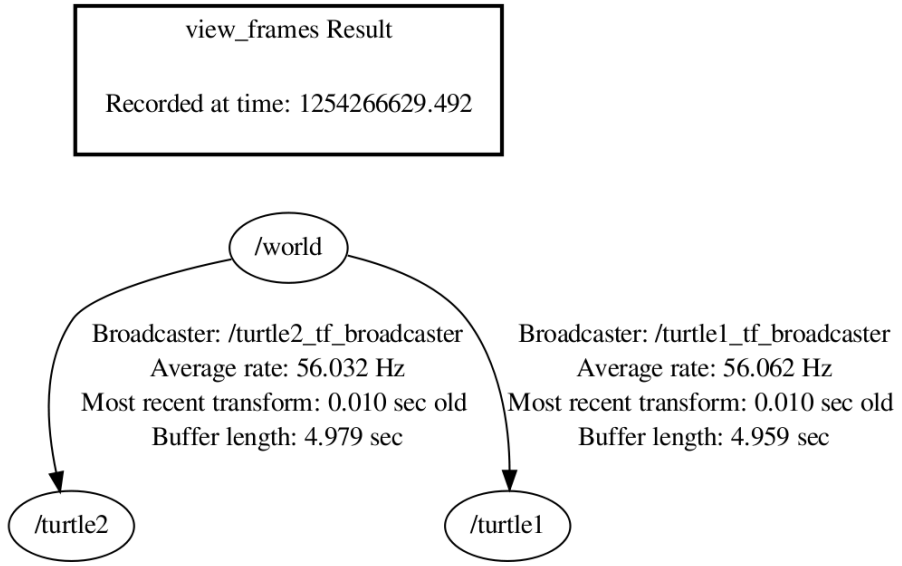
- rviz
- urdf
  - sw_urdf_exporter – check out the talk at 3:30
  - joint_state_publisher – fake your r
- robot_state_publisher
  - publishes tf based urdf
  - requires joint states from robot driver

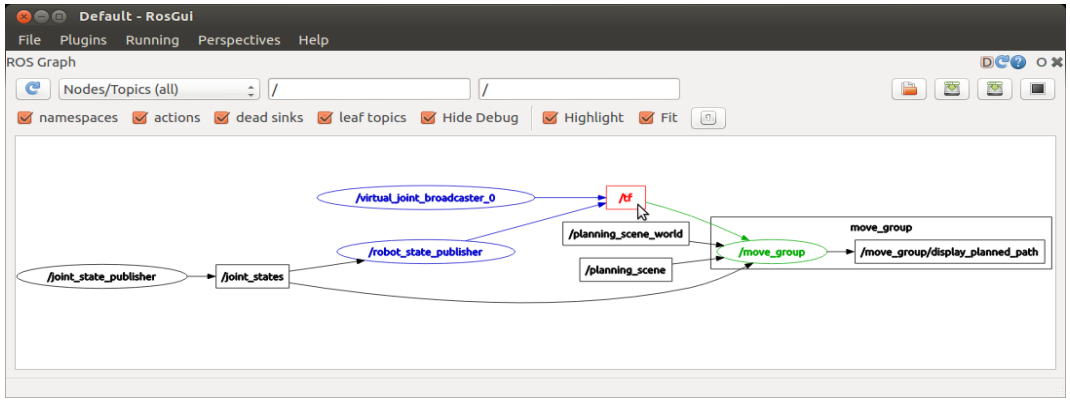


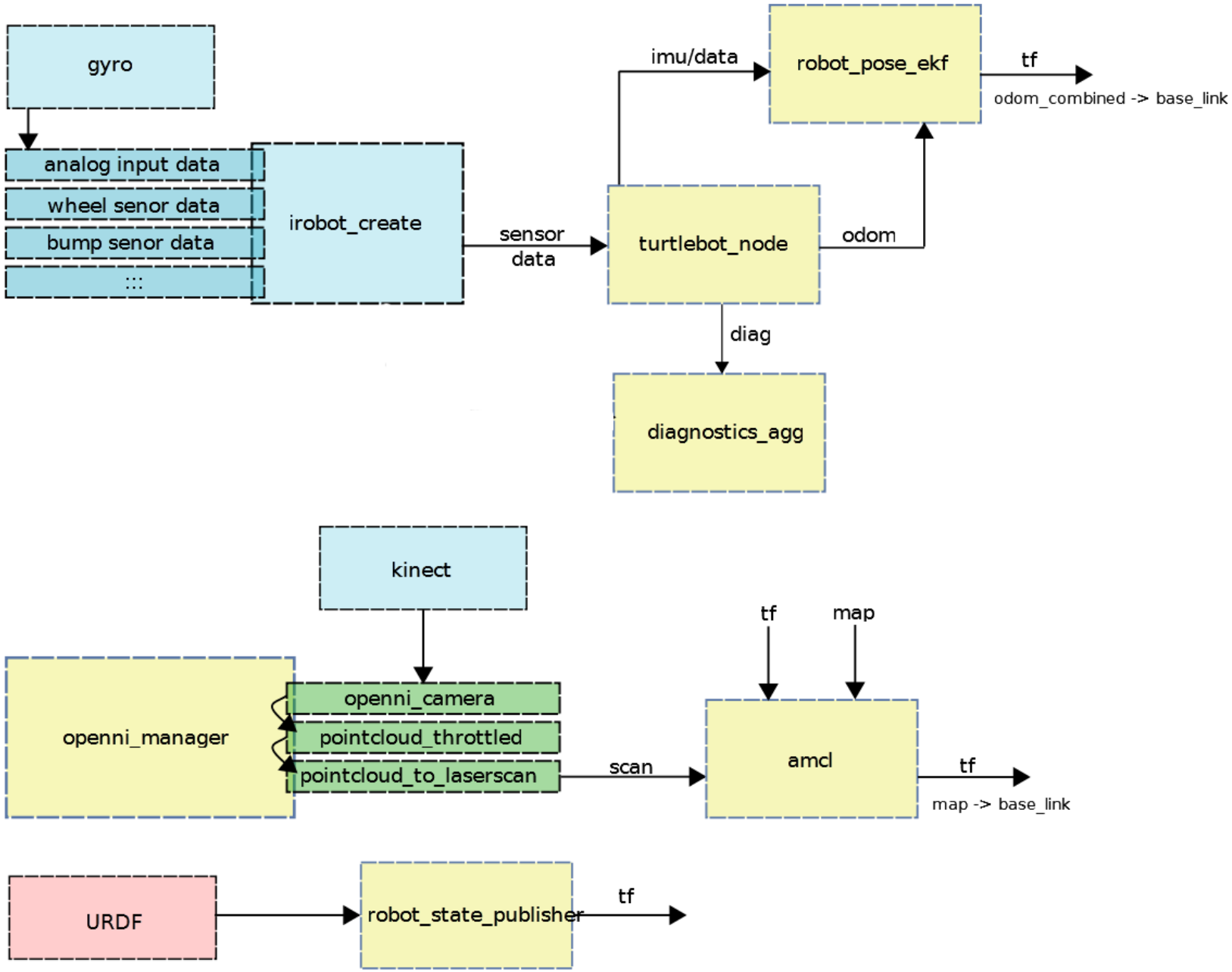


When it doesn't work?

- rqt tools
  - rqt_bag
  - rqt_graph
  - rqt_plot
- tf tools
  - view_frames
  - tf_monitor
  - tf_echo
- roswtf






gyro
analog input data
wheel senor data
bump senor data
:::
irobot_create
sensor data
turtlebot_node
imu/data
robot_pose_ekf
tf
odom_combined -> base_link
odom
diag
diagnostics_agg
kinect
openni_manager
openni_camera
pointcloud_throttled
pointcloud_to_laserscan
scan
tf
map
amcl
tf
map -> base_link
URDF
robot_state_publisher
tf

What's wrong?

- diagnostics_msgs
- diagnostics_aggregator
- robot_monitor

Know The Standards

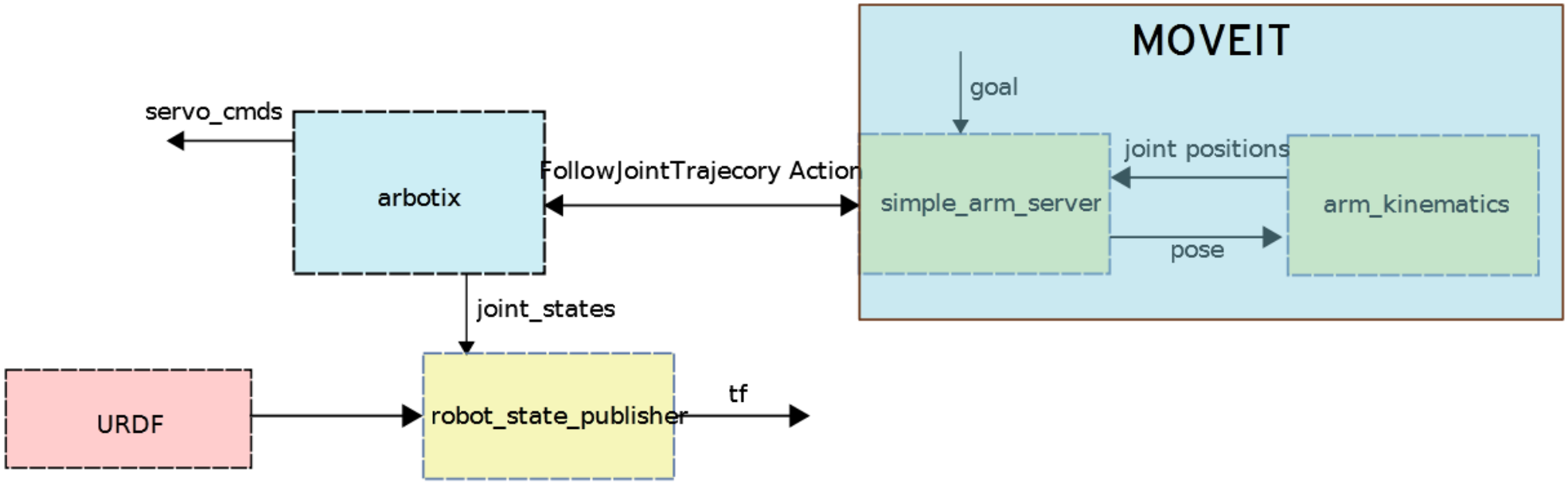
REPs

- REP103 – standard units of measure and coordinate frames
- REP107 – diagnostic system for robots running ROS
- REP105 – coordinate frames for mobile platforms
- REP120 – coordinate frames for humanoid robots
- REP135 – driver name space practices

Don't Get Creative

- standard topics and msgs
  - odom – nav_msgs/Odometry
  - cmd_vel - geometry_msgs/Twist
  - scan – sensor_msgs/LaserScan
  - diagnostics - diagnostic_msg/DiagnosticStatus
  - joy - sensor_msgs/Joy

What About Arms?



Documentation

No robot is complete without documentation!

1. Node API documentation
2. Tutorials
3. Get a ginea pig (as a friend non-ROS friend to try it)