Multi-Robot Control (MRC)

W2: ROS Topics, Services, roslaunch and rosbag
MATLAB and ROS
Plan of the Week

Topics
• ROS Topics and Services
• roslaunch
• rosbag
• ROS and MATLAB

Activities
• Read PRR Ch 2, 3 and 4
• Do ROS tutorials
• Do Assignment 3
ROS Vocabulary
“A topic is a name for a stream of messages with a defined type”
“A topic is a **name** for a stream of messages with a defined **type**”
ROS Services

~Synchronous version of message passing
- Get/set interactions
- Queries
2.1 turtlesim_node

 turtlesim_node provides a simple simulator for teaching ROS concepts.

2.1.1 Subscribed Topics

turtleX/cmd_vel (geometry_msgs/Twist)
   The linear and angular command velocity for turtleX. The turtle will execute a velocity command for 1 second then time out.

2.1.2 Published Topics

turtleX/pose ( turtlesim/Pose)
   The x, y, theta, linear velocity, and angular velocity of turtleX.

2.1.3 Services

clear (std_srvs/Empty)
   Clears the turtlesim background and sets the color to the value of the background parameters.

reset (std_srvs/Empty)
   Resets the turtlesim to the start configuration and sets the background color to the value of the background.

kill ( turtlesim/Kill)
   Kills a turtle by name.

spawn ( turtlesim/Spawn)
   Spawns a turtle at (x, y, theta) and returns the name of the turtle. Also will take name for argument but will fail if a duplicate name.

turtleX/set_pen ( turtlesim/SetPen)
   Sets the pen's color (r g b), width (width), and turns the pen on and off (off).

turtleX/teleport_absolute ( turtlesim/TeleportAbsolute)
   Teleports the turtleX to (x, y, theta).

turtleX/teleport_relative ( turtlesim/TeleportRelative)
   Teleports the turtleX a linear and angular distance from the turtles current position.
2.1 turtlesim_node

TurtleSim

bsb@aku:/catkin_ws/src/mrc_hw3/launch$ rosservice list
/clear
/keyboard_control/get_loggers
/keyboard_control/set_logger_level
/kill
/reset
/rosout/get_loggers
/rosout/set_logger_level
/simulated_turtle/get_loggers
/simulated_turtle/set_logger_level
/spawn
/turtle1/set_pen
/turtle1/teleport_absolute
/turtle1/teleport_relative
2.1 turtlesim_node

`turtlesim_node` provides a simple simulator for teaching ROS concepts.

2.1.1 Subscribed Topics

```
$ rosservice call /turtle1/teleport_absolute 1 1 1.57
```

- turtleX/teleport_relative (turtlesim/TeleportRelative)

Teleports the turtleX a linear and angular distance from the turtles current position.
roslaunch

What happens when we have lots of nodes, remapping, configuration, etc.?
• Opening N terminal windows get annoying
• Launch files are recipes for more complex operations
  – Repeatable
  – Distributable

Documented XML format for scripting ROS
• Automatically instantiates roscore if necessary
```xml
<?xml version="1.0"?>
<launch>
  <node pkg="turtlesim" type="turtlesim_node" name="my_simulated_turtle"/>
</launch>

$ roslaunch mrc_hw3 turtle_ex.launch
```
rosbag

Collection of tools for logging and replaying ROS data
Indispensable part of middleware

- Documenting
  - Did it do what it was supposed to?
  - Writing the thesis!

- Debugging
  - Why didn't it do what it was supposed to?

- Development
  - Running a new robot in an old situation
Using MATLAB with ROS bag files

myturtle.bag

Figure 1

turtle1/pose
For Next Time

Do the reading (PRR Ch2-4)

Assignment

• Do tutorials first!
• Check your MATLAB installation (see Exercise 4)
  – Open MATLAB and call “rosinit”