ROS2 Real-Time Working Group
Real-Time Testing Proposal
Motivation

- Performance and real-time capability are currently not tested in automatic build testing in the ROS2 build farm
  - Typically cannot be analyzed (fully) statically
- Existing software tools mostly cover functional verification/testing and static code checking
- Dynamic analysis of these software stacks is very complex:
  - What to measure, when, and how?!
- Lots of test scenarios → benchtop setups are insufficient
Proposal

- Test performance/real-time capability of ROS2 at regular intervals

- Test application:
  - Inverted Pendulum Demo (https://github.com/ros2-realtime-demo/pendulum)
  - Adapt for automated testing
  - Configure for real-time usage (priorities, core pinning, etc.)
Proposal

- Target platforms:
  - x86_64/aarch64 AWS metal instances (full access to performance counters, no virtualization overhead)
  - Ubuntu 18.04 with PREEMPT_RT patches

- Test frequency: weekly (always test current (ROS2) master)

- Test metrics:
  - Key latencies in the application (to be determined)
  - Node runtimes (to detect performance regressions)
Proposal

- Test platform:
  - SLX ROS Performance Testing Platform:
    - Multi-run analysis
    - Automated constraints checks
    - Results database
    - Demonstrated here
  - Results published as static Jupyter notebooks
- Planned release: Q1/2020
Roadmap

To be discussed...

- ROS Performance Tests
  (https://github.com/ApexAI/performance_test)
- More applications!?
- More metrics!?
- More platforms!?
- Higher test frequency!?