

High CPU load issue #5296

felixf4xu started this conversation in **General**

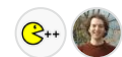
Category

 **General**

Labels

None yet

2 participants



felixf4xu on Oct 1

Code of Conduct

- ☒ I have read [CODE OF CONDUCT](#) and [Support Guidelines](#) before creating this Discussion post.

Contents

Hi,

I'm running autoware (the latest main branch) in PC with CPU type of Intel® Core™ i7-8809G @ 3.10GHz × 8, it has a graphic card of Intel® HD Graphics 630 (no cuda).

When I run the planning simulation (`ros2 launch autoware_launch planning_simulator.launch.xml`), I have a very high CPU load:

```
4C [|||||] 94.2% 4C [|||||] 82.9%
1C [|||||] 98.3% 5C [|||||] 89.0%
2C [|||||] 98.3% 6C [|||||] 89.0%
3C [|||||] 98.3% 7C [|||||] 85.2%
mem[|||||] 5.47G/31.3G Tasks: 213, 196s, 8 running
avg[|||||] 4400/2.90C Load average: 9.57 4.46 1.14
Uptime: 3 days, 16:42:49

PID USER PRI NI VIRT RES SHR S CPU% MEM% TIME+ Command
1643697 contl 20 0 1542k 482k 200k B 155 1.3 115.85 /opt/ros/humble/lib/rclcpp_components/component_container_mt --ros-args -r __node:=control_container -r __ns:=/planning/scenario_planning/trajectory
1643694 contl 20 0 1237 100k 3152k S 9.7 0.6 1:16.16 /home/contl/autoware/install/lib/autoware_remaining_distance_time_calculator/autoware_remaining_distance_time_calculator_node --ros-arg
1643652 contl 20 0 751k 225k 180k B 90.1 0.7 1:15.41 /home/contl/autoware/install/lib/autoware_behavior_path_planner/autoware_behavior_path_planner_node --ros-args -r __node:=behavior_path
1643630 contl 20 0 137k 141k 4836k S 90.1 0.4 1:22.86 /home/contl/autoware/install/lib/simple_planning_simulator/simple_planning_simulator_exe --ros-args -r __node:=simple_planning_simulator
1643652 contl 20 0 1648k 382k 150k S 31.9 1.2 0:42.60 /opt/ros/humble/lib/rclcpp_components/component_container_mt --ros-args -r __node:=motion_planning_container -r __ns:=/planning/scenario
1643937 contl 20 0 1542k 482k 200k S 31.2 1.3 0:15.33 /opt/ros/humble/lib/rclcpp_components/component_container_mt --ros-args -r __node:=control_container -r __ns:=/control -p use_sim_time
1419 contl 20 0 832k 338k 93792 S 26.6 1.0 0:21.04 /usr/bin/gnome-shell
1643685 contl 20 0 733k 142k 47860 S 23.4 0.4 0:18.51 /home/contl/autoware/install/lib/autoware_planning_evaluator/planning_evaluator --ros-args -r __node:=planning_evaluator -r __ns:=/planning/evaluator
1643939 contl 20 0 1542k 482k 200k S 22.7 1.3 0:14.46 /opt/ros/humble/lib/rclcpp_components/component_container_mt --ros-args -r __node:=vel_control_container -r __ns:=/control -p use_sim_time
1643687 contl 20 0 1037k 377k 218k S 20.1 1.2 0:20.07 /opt/ros/humble/lib/rviz2/rviz2 -d /home/contl/autoware/install/share/autoware_launch/rviz/autoware_rviz -p /home/contl/autoware/install
1643943 contl 20 0 1542k 482k 200k S 20.1 1.3 0:15.53 /opt/ros/humble/lib/rclcpp_components/component_container_mt --ros-args -r __node:=control_container -r __ns:=/control -p use_sim_time
1643736 contl 20 0 1648k 382k 150k S 18.8 1.2 0:05.02 /opt/ros/humble/lib/rclcpp_components/component_container_mt --ros-args -r __node:=motion_planning_container -r __ns:=/planning/scenario
1643946 contl 20 0 1542k 482k 200k S 18.2 1.3 0:14.05 /opt/ros/humble/lib/rclcpp_components/component_container_mt --ros-args -r __node:=control_container -r __ns:=/control -p use_sim_time
1643948 contl 20 0 1542k 482k 200k S 18.2 1.3 0:14.08 /opt/ros/humble/lib/rclcpp_components/component_container_mt --ros-args -r __node:=control_container -r __ns:=/control -p use_sim_time
1643941 contl 20 0 1542k 482k 200k S 17.5 1.3 0:14.31 /opt/ros/humble/lib/rclcpp_components/component_container_mt --ros-args -r __node:=control_container -r __ns:=/control -p use_sim_time
1643737 contl 20 0 1648k 382k 150k S 16.9 1.2 0:05.74 /opt/ros/humble/lib/rclcpp_components/component_container_mt --ros-args -r __node:=motion_planning_container -r __ns:=/planning/scenario
1643634 contl 20 0 1998k 238k 128k S 16.2 0.8 0:11.79 /home/contl/autoware/install/lib/autoware_behavior_velocity_planner/autoware_behavior_velocity_planner_node --ros-args -r __node:=behav
1643740 contl 20 0 1648k 382k 150k S 14.9 1.2 0:04.32 /opt/ros/humble/lib/rclcpp_components/component_container_mt --ros-args -r __node:=motion_planning_container -r __ns:=/planning/scenario
1643945 contl 20 0 1542k 482k 200k S 14.3 1.3 0:13.60 /opt/ros/humble/lib/rclcpp_components/component_container_mt --ros-args -r __node:=control_container -r __ns:=/control -p use_sim_time
1643535 contl 20 0 1349k 4734k 2720k S 13.6 0.1 0:12.54 /opt/ros/humble/lib/rclcpp_components/component_container_mt --ros-args -r __node:=pointcloud_container -r __ns:=/ -p use_sim_time=FA
1644621 contl 20 0 1839k 4158k 3412k S 13.6 0.1 0:06.21 /usr/bin/gls /usr/share/fgl-gnome.Characters/fgl-gnome.Characters.BackgroundService
1643630 contl 20 0 170k 5388k 3688k S 11.0 0.2 0:09.02 /opt/ros/humble/lib/rclcpp_components/component_container --ros-args -r __node:=velocity_smoother_container -r __ns:=/planning/scenario
1643735 contl 20 0 1727k 186k 8722k S 7.1 0.3 0:06.11 /opt/ros/humble/lib/rclcpp_components/component_container_mt --ros-args --log-level adapti_container:=warn --ros-args -r __node:=contai
```

This is actually after I have disabled `pointcloud_container` , it would be even higher with that.

This cause autoware to ERROR:

```
[topic_state_monitor_node-11] [WARN] [1727836489.142532714]
[system.topic_state_monitor_scenario_planning_trajectory]:
/planning/scenario_planning/trajectory topic rate has dropped to the
error level. Set ERROR in diagnostics.
```

Then I looked again to the processes with top CPU load:

```
%CPU CMD
152 /opt/ros/humble/lib/rclcpp_components/component_container_mt --
ros-args -r __node:=control_container
96.4
/home/cccc/autoware/install/lib/simple_planning_simulator/simple_plan
ning_simulator_exe
96.1
/home/cccc/autoware/install/lib/autoware_behavior_path_planner/auto
ware_behavior_path_planner_node
95.9
/home/cccc/autoware/install/lib/autoware_remaining_distance_time_cal
culator/autoware_remaining_distance_time_calculator_node
52.8 /opt/ros/humble/lib/rclcpp_components/component_container_mt -
-ros-args -r __node:=motion_planning_container
```

I don't think `autoware_remaining_distance_time_calculator` should consume so much CPU power, by its function role in autoware.

My PC has an old CPU, i7-8809G, but I don't think it's too old to run a framework like autoware. In real world, what's the CPU spec in a vehicle? It will be some arm based multicore CPU but I would not assume it will be as powerful as a new PC.

I have 3 questions:

1. Is it acceptable? is CPU like i7-8809G too old to run autoware?
2. How to reduce the CPU load, by ROS2 setting (like change of RMW, use more intra-process communication)?
3. How to profile the functions in different autoware packages to find out the most time consuming functions

↑ 1

1 comment · 1 reply

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maxime-clem on Oct 2 Collaborator

Such high CPU loads (especially for the `autoware_remaining_distance_time_calculator`) are unexpected so please make sure you are building Autoware with the `Release` flag (add the argument `-DCMAKE_BUILD_TYPE=Release` to the `colcon build` command).

↑ 1

👍 2

😬 1

1 reply



felixf4xu on Oct 2 Author

nice catch! yes the cpu data above is captured for a debug build. When I switched to release, the cpu load (first column) is like this:

35.9

```
/opt/ros/humble/lib/rclcpp_components/component_containe.____
--ros-args -r __node:=control_container
```



```

27.2 /opt/ros/humble/lib/rviz2/rviz2 -d
/home/cccc/autoware/install/share/autoware_launch/rviz/autowa
22.5
/home/cccc/autoware/install/lib/autoware_behavior_path_planne
20.7
/opt/ros/humble/lib/rclcpp_components/component_container_mt
--ros-args -r __node:=motion_planning_container
13.9
/opt/ros/humble/lib/rclcpp_components/component_container_mt
--ros-args --log-level adapi.container:=WARN
11.5
/home/cccc/autoware/install/lib/simple_planning_simulator/sim
9.7 /usr/bin/python3 /opt/ros/humble/bin/ros2 launch
autoware_launch planning_simulator.launch.xml
8.0
/home/cccc/autoware/install/lib/autoware_behavior_velocity_pl
6.2
/opt/ros/humble/lib/rclcpp_components/component_container_mt
--ros-args --log-level
autoware_api.external.rtc_controller.container
6.1
/home/cccc/autoware/install/lib/autoware_planning_evaluator/p
5.4
/home/cccc/autoware/install/lib/autoware_remaining_distance_t
5.2
/opt/ros/humble/lib/rclcpp_components/component_container -
--ros-args -r __node:=velocity_smoother_container
4.9
/opt/ros/humble/lib/rclcpp_components/component_container -
--ros-args -r __node:=container -r
__ns:=/system/component_state_monitor
4.8
/home/cccc/autoware/install/lib/diagnostic_graph_aggregator/a

```

much more reasonable!

