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Kelas : TK-45-G09

Langkah ROS Motion Planning

1. **sudo apt install git** untuk menginstall Git, yang diperlukan untuk mengunduh repositori proyek dari GitHub.

```
fadhildz@DESKTOP-IMTGFNL:~$ sudo apt install git
[sudo] password for fadhildz:
Reading package lists... Done
Building dependency tree
Reading state information... Done
git is already the newest version (1:2.25.1-1ubuntu3.13).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
fadhildz@DESKTOP-IMTGFNL:~$
```

2. **pip install conan==1.59.0** untuk menginstall Conan versi 1.59.0.

```
fadhildz@DESKTOP-IMTGFNL:~$ sudo apt install git
Reading package lists... Done
Building dependency tree
Reading state information... Done
git is already the newest version (1:2.25.1-1ubuntu3.13).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
fadhildz@DESKTOP-IMTGFNL:~$ pip install conan==1.59.0
Requirement already satisfied: conan==1.59.0 in ./local/lib/python3.8/site-packages (1.59.0)
Requirement already satisfied: six<=1.16.0,>=1.10.0 in /usr/lib/python3/dist-packages (from conan==1.59.0) (1.14.0)
Requirement already satisfied: PyYAML<=6.0,>=3.11 in /usr/lib/python3/dist-packages (from conan==1.59.0) (5.3.1)
Requirement already satisfied: patch-ng<1.18,>=1.17.4 in ./local/lib/python3.8/site-packages (from conan==1.59.0) (1.17.4)
Requirement already satisfied: Jinja2<4.0.0,>=3.0; python_version >= "3" in ./local/lib/python3.8/site-packages (from conan==1.59.0) (3.1.4)
Requirement already satisfied: bottle<0.13,>=0.12.8 in ./local/lib/python3.8/site-packages (from conan==1.59.0) (0.12.25)
Requirement already satisfied: python-dateutil<3,>=2.7.0 in /usr/lib/python3/dist-packages (from conan==1.59.0) (2.7.3)
Requirement already satisfied: pygments<3.0,>=2.0 in /usr/lib/python3/dist-packages (from conan==1.59.0) (2.3.1)
Requirement already satisfied: requests<3.0.0,>=2.25 in ./local/lib/python3.8/site-packages (from conan==1.59.0) (2.32.3)
Requirement already satisfied: node-semver==0.6.1 in ./local/lib/python3.8/site-packages (from conan==1.59.0) (0.6.1)
Requirement already satisfied: urllib3<1.27,>=1.26.6 in ./local/lib/python3.8/site-packages (from conan==1.59.0) (1.26.20)
Requirement already satisfied: fasteners>=0.14.1 in ./local/lib/python3.8/site-packages (from conan==1.59.0) (0.19)
Requirement already satisfied: tqdm<5,>=4.28.1 in ./local/lib/python3.8/site-packages (from conan==1.59.0) (4.66.5)
Requirement already satisfied: PyJWT<3.0.0,>=2.4.0 in ./local/lib/python3.8/site-packages (from conan==1.59.0) (2.9.0)
Requirement already satisfied: colorama<0.5.0,>=0.3.3 in /usr/lib/python3/dist-packages (from conan==1.59.0) (0.4.3)
Requirement already satisfied: distro<=1.8.0,>=1.0.2; sys_platform == "linux" or sys_platform == "linux2" in /usr/lib/python3/dist-packages (from conan==1.59.0) (1.4.0)
Requirement already satisfied: pluginbase>=0.5 in ./local/lib/python3.8/site-packages (from conan==1.59.0) (1.0.1)
Requirement already satisfied: MarkupSafe>=2.0 in ./local/lib/python3.8/site-packages (from Jinja2<4.0.0,>=3.0; python_version >= "3"->conan==1.59.0) (2.1.5)
Requirement already satisfied: certifi>=2017.4.17 in /usr/lib/python3/dist-packages (from requests<3.0.0,>=2.25->conan==1.59.0) (2019.11.28)
Requirement already satisfied: idna<4,>=2.5 in /usr/lib/python3/dist-packages (from requests<3.0.0,>=2.25->conan==1.59.0) (2.8)
Requirement already satisfied: charset-normalizer<4,>=2 in ./local/lib/python3.8/site-packages (from requests<3.0.0,>=2.25->conan==1.59.0) (3.4.0)
fadhildz@DESKTOP-IMTGFNL:~$
```

3. `sudo apt install python-is-python3 ros-noetic-amcl ros-noetic-base-local-planner ros-noetic-map-server ros-noetic-move-base ros-noetic-navfn libgoogle-glog-dev` untuk menginstall paket-paket ROS yang diperlukan untuk navigasi robot, pemetaan, dan perencanaan jalur.

```
fadhildz@DESKTOP-IMTGFNL: ~$ pip install conan==1.59.0
Requirement already satisfied: conan==1.59.0 in ./local/lib/python3.8/site-packages (1.59.0)
Requirement already satisfied: six<=1.16.0,>=1.10.0 in /usr/lib/python3/dist-packages (from conan==1.59.0) (1.14.0)
Requirement already satisfied: PyYAML<=6.0,>=3.11 in /usr/lib/python3/dist-packages (from conan==1.59.0) (5.3.1)
Requirement already satisfied: patch-ng<1.18,>=1.17.4 in ./local/lib/python3.8/site-packages (from conan==1.59.0) (1.17.4)
Requirement already satisfied: Jinja2<4.0.0,>=3.0; python_version >= "3" in ./local/lib/python3.8/site-packages (from conan==1.59.0) (3.1.4)
Requirement already satisfied: bottle<0.13,>=0.12.8 in ./local/lib/python3.8/site-packages (from conan==1.59.0) (0.12.25)
Requirement already satisfied: python-dateutil<3,>=2.7.0 in /usr/lib/python3/dist-packages (from conan==1.59.0) (2.7.3)
Requirement already satisfied: pygments<3.0,>=2.0 in /usr/lib/python3/dist-packages (from conan==1.59.0) (2.3.1)
Requirement already satisfied: requests<3.0.0,>=2.25 in ./local/lib/python3.8/site-packages (from conan==1.59.0) (2.32.3)
Requirement already satisfied: node-semver<=0.6.1 in ./local/lib/python3.8/site-packages (from conan==1.59.0) (0.6.1)
Requirement already satisfied: urllib3<1.27,>=1.26.6 in ./local/lib/python3.8/site-packages (from conan==1.59.0) (1.26.20)
Requirement already satisfied: fasteners<=0.14.1 in ./local/lib/python3.8/site-packages (from conan==1.59.0) (0.19)
Requirement already satisfied: tqdm<5,>=4.28.1 in ./local/lib/python3.8/site-packages (from conan==1.59.0) (4.66.5)
Requirement already satisfied: PyJWT<3.0.0,>=2.4.0 in ./local/lib/python3.8/site-packages (from conan==1.59.0) (2.9.0)
Requirement already satisfied: colorama<0.5.0,>=0.3.3 in /usr/lib/python3/dist-packages (from conan==1.59.0) (0.4.3)
Requirement already satisfied: distro<=1.8.0,>=1.0.2; sys_platform == "linux" or sys_platform == "linux2" in /usr/lib/python3/dist-packages (from conan==1.59.0) (1.4.0)
Requirement already satisfied: pluginbase<=0.5 in ./local/lib/python3.8/site-packages (from conan==1.59.0) (1.0.1)
Requirement already satisfied: MarkupSafe<=2.0 in ./local/lib/python3.8/site-packages (from Jinja2<4.0.0,>=3.0; python_version >= "3"->conan==1.59.0) (2.1.5)
Requirement already satisfied: certifi>=2017.4.17 in /usr/lib/python3/dist-packages (from requests<3.0.0,>=2.25->conan==1.59.0) (2019.11.28)
Requirement already satisfied: idna<4,>=2.5 in /usr/lib/python3/dist-packages (from requests<3.0.0,>=2.25->conan==1.59.0) (2.8)
Requirement already satisfied: charset-normalizer<4,>=2 in ./local/lib/python3.8/site-packages (from requests<3.0.0,>=2.25->conan==1.59.0) (3.4.0)
fadhildz@DESKTOP-IMTGFNL: ~$ sudo apt install python-is-python3 ros-noetic-amcl ros-noetic-base-local-planner ros-noetic-map-server ros-noetic-move-base ros-noetic-navfn libgoogle-glog-dev
Reading package lists... Done
Building dependency tree
Reading state information... Done
python-is-python3 is already the newest version (3.8.2-4).
libgoogle-glog-dev is already the newest version (0.4.0-1build1).
ros-noetic-amcl is already the newest version (1.17.3-1focal.20240913.200354).
ros-noetic-base-local-planner is already the newest version (1.17.3-1focal.20240913.203453).
ros-noetic-map-server is already the newest version (1.17.3-1focal.20240913.191428).
ros-noetic-move-base is already the newest version (1.17.3-1focal.20240913.204544).
ros-noetic-navfn is already the newest version (1.17.3-1focal.20240913.203647).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
fadhildz@DESKTOP-IMTGFNL: ~$
```

4. `git clone https://github.com/ai-winter/ros_motion_planning.git` untuk mengunduh repositori `ros_motion_planning` dari Github ke dalam direktori lokal.

```
fadhildz@DESKTOP-IMTGFNL: ~$ sudo apt install python-is-python3 ros-noetic-amcl ros-noetic-base-local-planner ros-noetic-map-server ros-noetic-move-base ros-noetic-navfn libgoogle-glog-dev
Reading package lists... Done
Building dependency tree
Reading state information... Done
python-is-python3 is already the newest version (3.8.2-4).
libgoogle-glog-dev is already the newest version (0.4.0-1build1).
ros-noetic-amcl is already the newest version (1.17.3-1focal.20240913.200354).
ros-noetic-base-local-planner is already the newest version (1.17.3-1focal.20240913.203453).
ros-noetic-map-server is already the newest version (1.17.3-1focal.20240913.191428).
ros-noetic-move-base is already the newest version (1.17.3-1focal.20240913.204544).
ros-noetic-navfn is already the newest version (1.17.3-1focal.20240913.203647).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
fadhildz@DESKTOP-IMTGFNL: ~$ git clone https://github.com/ai-winter/ros_motion_planning.git
Cloning into 'ros_motion_planning'...
remote: Enumerating objects: 6169, done.
remote: Counting objects: 100% (1479/1479), done.
remote: Compressing objects: 100% (569/569), done.
remote: Total 6169 (delta 842), reused 1389 (delta 811), pack-reused 4690 (from 1)
Receiving objects: 100% (6169/6169), 143.78 MiB | 5.03 MiB/s, done.
Resolving deltas: 100% (3322/3322), done.
Updating files: 100% (527/527), done.
fadhildz@DESKTOP-IMTGFNL: ~$
```

5. **./build.sh** untuk membangun proyek, mengompilasi kode sumber, dan menyiapkan semua dependensi yang diperlukan.

```
fadhildz@DESKTOP-IMTGFNL: ~/ros_motion_planning/script$ ./build.sh
Configuration:
[settings]
arch=x86_64
arch_build=x86_64
build_type=Release
compiler=gcc
compiler.libcxx=libstdc++
compiler.version=9
os=Linux
os_build=Linux
[options]
[build_requires]
[env]

conanfile.py: Installing package
Requirements
  osqp/0.6.3 from 'conancenter' - Cache
Packages
  osqp/0.6.3:6af9cc7cb931c5ad942174fd7838eb655717c709 - Cache

Installing (downloading, building) binaries...
osqp/0.6.3: Already installed!
conanfile.py: Generator cmake_find_package created Findosqp.cmake
conanfile.py: WARN: Using the new toolchains and generators without specifying a build profile (e.g: -pr:b=default) is discouraged and might cause failures and unexpected behavior
conanfile.py: Generator 'CMakeDeps' calling 'generate()'
conanfile.py: WARN: Using the new toolchains and generators without specifying a build profile (e.g: -pr:b=default) is discouraged and might cause failures and unexpected behavior
conanfile.py: Generator 'CMakeToolchain' calling 'generate()'
conanfile.py: Preset 'release' added to CMakePresets.json. Invoke it manually using 'cmake --preset release'
conanfile.py: If your CMake version is not compatible with CMakePresets (<3.19) call cmake like: 'cmake <path> -G "Unix Makefiles" -DCMAKE_TOOLCHAIN_FILE=/home/fadhildz/ros_motion_planning/3rd/build/Release/generators/conan_toolchain.cmake -DCMAKE_POLICY_DEFAULT_CMP0091=NEW -DCMAKE_BUILD_TYPE=Release'
conanfile.py: Generator cmake created conanbuildinfo.cmake
conanfile.py: Generator txt created conanbuildinfo.txt
conanfile.py: Aggregating env generators
conanfile.py: Generated conaninfo.txt
conanfile.py: Generated graphinfo
Base path: /home/fadhildz/ros_motion_planning
Source space: /home/fadhildz/ros_motion_planning/src
Build space: /home/fadhildz/ros_motion_planning/build
Devel space: /home/fadhildz/ros_motion_planning/devel
```

6. **./main.sh** untuk menjalankan skrip utama aplikasi, yang akan memulai semua komponen yang diperlukan untuk motion planning.

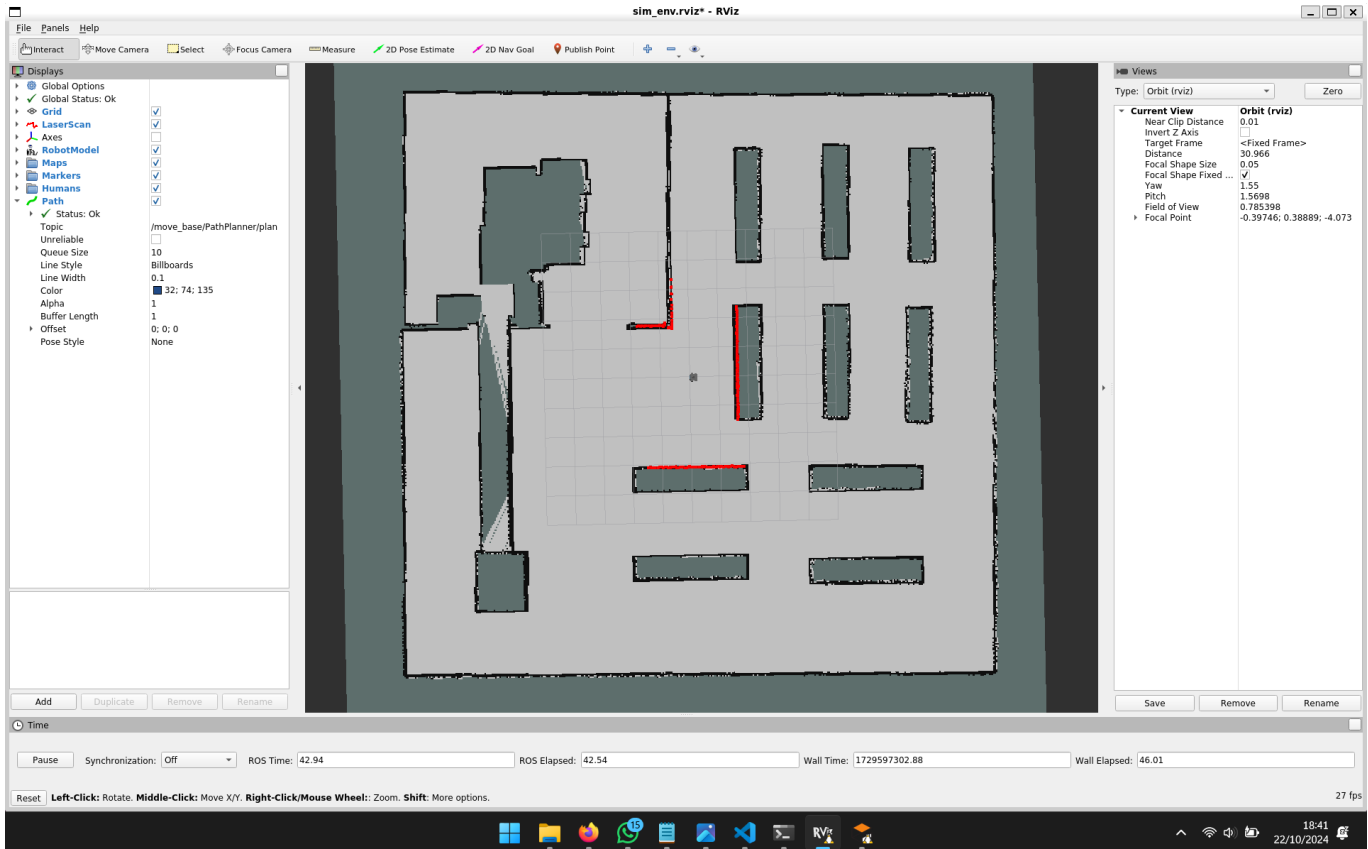
```
fadhildz@DESKTOP-IMTGFNL: ~/ros_motion_planning/script$ ./main.sh
... logging to /home/fadhildz/.ros/log/733953f0-906a-11ef-856b-65c1e53c6eb1/roslaunch-DESKTOP-IMTGFNL-13297.log
Checking log directory for disk usage. This may take a while.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.

xacro: in-order processing became default in ROS Melodic. You can drop the option.
started roslaunch server http://DESKTOP-IMTGFNL:44945/

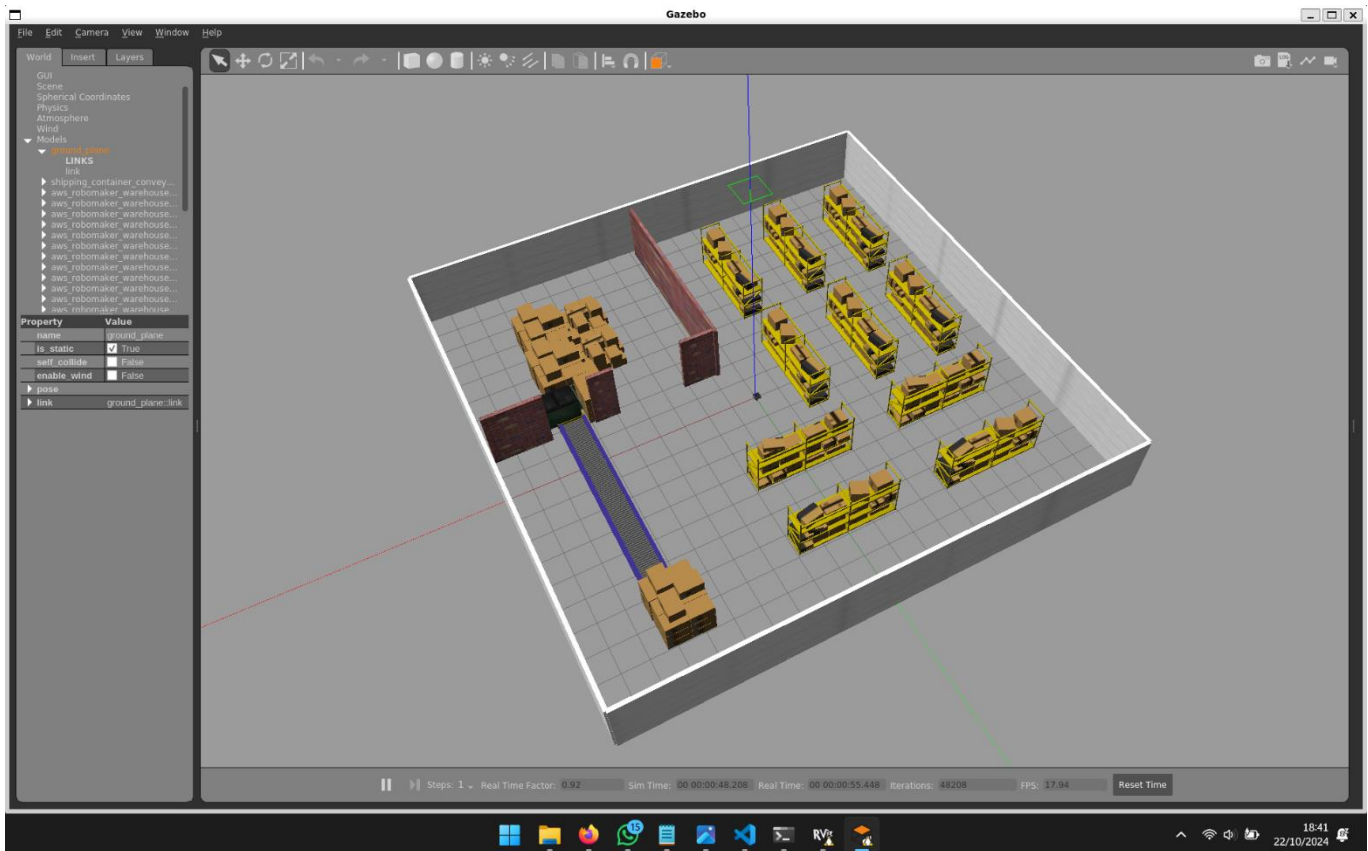
SUMMARY
=====

PARAMETERS
* /amcl/gui_publish_rate: 50.0
* /amcl/initial_pose_x: 0.0
* /amcl/initial_pose_y: 0.0
* /amcl/initial_pose_z: 0.0
* /amcl/kld_err: 0.02
* /amcl/laser_lambda_short: 0.1
* /amcl/laser_likelihood_max_dist: 2.0
* /amcl/laser_max_beams: 180
* /amcl/laser_max_range: 3.5
* /amcl/laser_model_type: likelihood_field
* /amcl/laser_sigma_hit: 0.2
* /amcl/laser_z_hit: 0.5
* /amcl/laser_z_max: 0.05
* /amcl/laser_z_rand: 0.5
* /amcl/laser_z_short: 0.05
* /amcl/max_particles: 3000
* /amcl/min_particles: 500
* /amcl/odom_alpha1: 0.1
* /amcl/odom_alpha2: 0.1
* /amcl/odom_alpha3: 0.1
* /amcl/odom_alpha4: 0.1
* /amcl/odom_model_type: diff
* /amcl/recovery_alpha_fast: 0.0
* /amcl/recovery_alpha_slow: 0.0
* /amcl/resample_interval: 1
* /amcl/transform_tolerance: 0.5
* /amcl/update_min_a: 0.2
* /amcl/update_min_d: 0.2
* /gazebo/enable_ros_network: True
* /move_base/LQRController/Q_matrix_diag: [1.0, 1.0, 1.0]
```

7. Akan muncul RViz dengan tampilan 2D. Pilih 2D Nav Goal lalu klik tempat tujuan robot. Ini akan mengirimkan tujuan ke robot untuk direncanakan dan diikuti.



8. Akan muncul juga Gazebo dengan tampilan 3D. ini akan menampilkan simulasi robot dalam lingkungan 3 dimensi.



9. Ketika robot sudah sampai tujuan, akan muncul GOAL Reached! di terminal. Ini menandakan bahwa robot telah berhasil mencapai tujuan yang ditentukan.

```
/home/fadhildz/ros_motion_f x + v
[ INFO] [1729598422.310015120, 257.056000000]: Got new plan
[ INFO] [1729598422.869674022, 257.556000000]: Got new plan
[ INFO] [1729598423.460046495, 258.058000000]: Got new plan
[ INFO] [1729598424.061013626, 258.556000000]: Got new plan
[ INFO] [1729598424.608713274, 259.056000000]: Got new plan
[ INFO] [1729598425.241996365, 259.656000000]: Got new plan
[ INFO] [1729598425.679774432, 260.056000000]: Got new plan
[ INFO] [1729598426.326924268, 260.658000000]: Got new plan
[ INFO] [1729598426.774186176, 261.056000000]: Got new plan
[ INFO] [1729598427.345732641, 261.556000000]: Got new plan
[ INFO] [1729598427.926302682, 262.056000000]: Got new plan
[ INFO] [1729598428.476068609, 262.561000000]: Got new plan
[ INFO] [1729598429.009921117, 263.057000000]: Got new plan
[ INFO] [1729598429.623982321, 263.557000000]: Got new plan
[ INFO] [1729598430.202939043, 264.057000000]: Got new plan
[ INFO] [1729598430.800638074, 264.556000000]: Got new plan
[ INFO] [1729598431.377342002, 265.056000000]: Got new plan
[ INFO] [1729598431.939535071, 265.556000000]: Got new plan
[ INFO] [1729598432.463032886, 266.061000000]: Got new plan
[ INFO] [1729598433.006082827, 266.556000000]: Got new plan
[ INFO] [1729598433.546293663, 267.056000000]: Got new plan
[ INFO] [1729598434.097872461, 267.556000000]: Got new plan
[ INFO] [1729598434.662312147, 268.056000000]: Got new plan
[ INFO] [1729598435.228572422, 268.557000000]: Got new plan
[ INFO] [1729598435.766340841, 269.057000000]: Got new plan
[ INFO] [1729598436.324875884, 269.556000000]: Got new plan
[ INFO] [1729598436.884687028, 270.057000000]: Got new plan
[ INFO] [1729598437.454952605, 270.558000000]: Got new plan
[ INFO] [1729598437.993047322, 271.056000000]: Got new plan
[ INFO] [1729598438.582525741, 271.556000000]: Got new plan
[ INFO] [1729598439.154935403, 272.056000000]: Got new plan
[ INFO] [1729598439.840197523, 272.556000000]: Got new plan
[ INFO] [1729598440.454301560, 273.056000000]: Got new plan
[ INFO] [1729598440.985959667, 273.556000000]: Got new plan
[ INFO] [1729598441.564217460, 274.057000000]: Got new plan
[ INFO] [1729598442.116811484, 274.557000000]: Got new plan
[ INFO] [1729598442.729840104, 275.057000000]: Got new plan
[ INFO] [1729598443.366480068, 275.556000000]: Got new plan
[ INFO] [1729598443.920145669, 276.057000000]: Got new plan
[ INFO] [1729598444.443810477, 276.556000000]: Got new plan
[ INFO] [1729598444.987529340, 277.056000000]: Got new plan
[ INFO] [1729598445.097205404, 277.156000000]: GOAL Reached!
```