POLYVERIFICATION SUITE SETUP AND CONFIGURATION

This document contains the information of Setup and Installation process for PolyVerification suite in Linux/Unix. We have modified some of the open source packages which are added in repository.

Below are list of component and dependencies need to be installed for before start the PolyVerif suite.

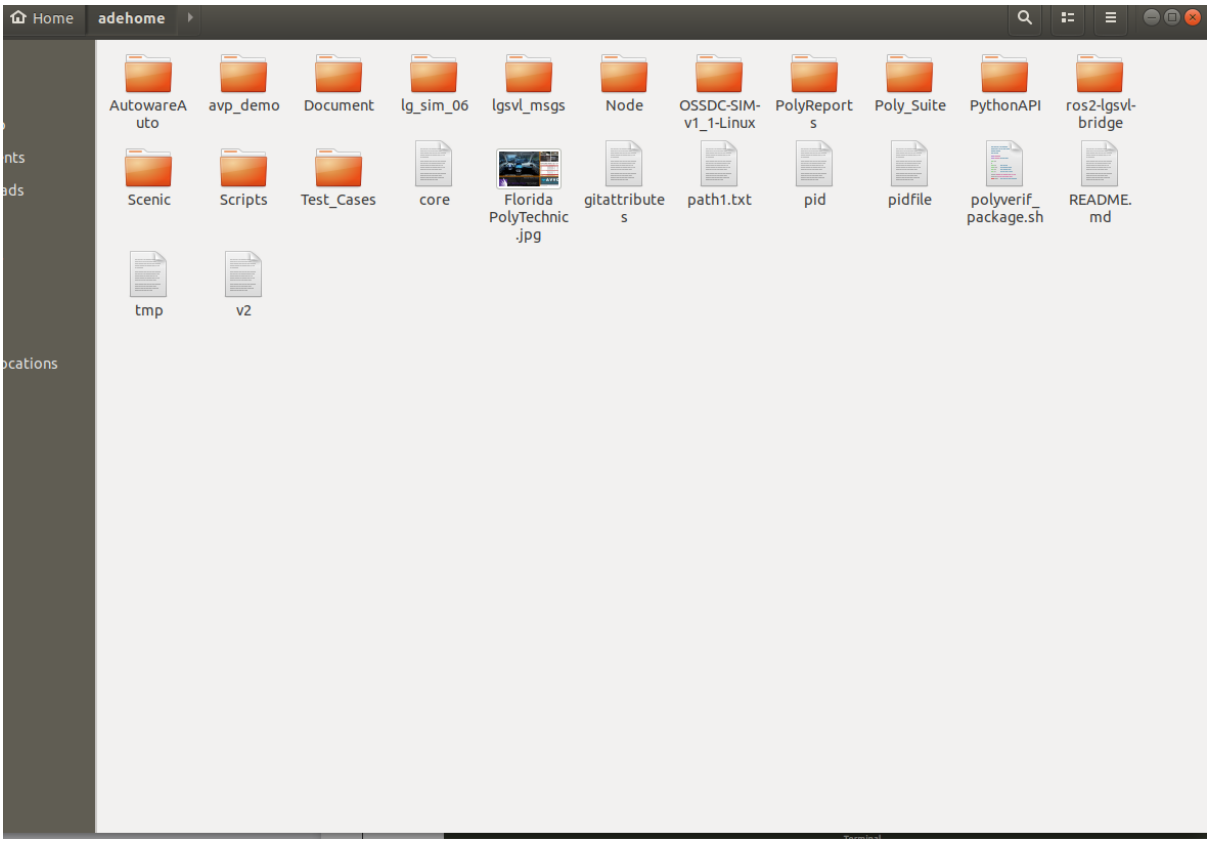
- ✓ AutowareAuto
- ✓ Lgsvl_msgs
- ✓ Ros2-lgsvl-bridge
- ✓ PolyVerif repository
  - PythonAPI
  - Scenic SDL
  - OSSDC-SIM-v1_1-Linux
  - Avp_demo
  - Perception Validation Node
  - Control Validation Node
  - Test_Cases
  - PolyVerif Suite

Above package and module need to be install and configured in the same sequence

And directory structure should look like this –

- **adehome**
  - **AutowareAuto**
  - **lgsvl_msgs**
  - **ros2-lgsvl-bridge**
  - **OSSDC-SIM-v1_1-Linux**
  - **PythonAPI**
  - **Scenic**
  - **Avp_demo**
  - **Node**
    - **Node_Perception_Validation**
    - **Node_Control_Validation**
    - **Node_Localization_Validation**
    - **Node_Path_Planner_Validation**
  - **Test_Cases**
  - **PolyReports**
  - **Poly_Suite**

Below is the screenshot of the mention structure –



1. Dependencies install in Ubuntu-

Python3.8 –

```
$ sudo apt update
$ sudo apt-get install python3-gi
```

Watchdog –

```
$ sudo apt update
$ pip install watchdog
```

Pandas –

```
$ sudo apt update
$ pip install pandas
```

2. Setup Docker and Install AutowareAuto

The requirement for ADE is to install docker, please follow below steps –

Installation*:*

```
$ cd ${HOME}
$ mkdir adehome
$ cd adehome
$ wget https://gitlab.com/ApexAI/ade-
cli/uploads/85a5af81339fe55555ee412f9a3a734b/ade+x86_64
$ mv ade+x86_64 ade
$ chmod +x ade
$ mv ade ~/.local/bin and /usr/local/bin
$ which ade
$ ade update-cli
$ touch .adehome
$ git clone
https://gitlab.com/autowarefoundation/autoware.auto/AutowareAuto.git

$ cd AutowareAuto/
$ ade start --update --enter   # It will update and start the ade
```

If you face any issue during the process please go through the below link –
https://autowarefoundation.gitlab.io/autoware.auto/AutowareAuto/installation-ade.html

3. Install and Setup lgsvl_msgs package

Install ROS2 LGSVL Messages: lgsvl_msgs is a ROS / ROS2 hybrid package that provides AD stack agnostic message definitions for interfacing with the OSSDC Simulator.

Once the AutowareAuto install successfully, please follow the below steps to install the lgsvl_msgs package

Installation*:*

```
$ cd AutowareAuto/
$ ade start
$ ade enter
$ source /opt/AutowareAuto/setup.bash
$ sudo apt update
$ sudo apt install ros-$ROS_DISTRO-lgsvl_msgs
$ git clone https://github.com/lgsvl/lgsvl_msgs.git
$ cd lgsvl_msgs
$ colcon build
$ source install/setup.bash
```

4. Ros2-lgsvl-bridge

The OSSDC Simulator can publish and subscribe to ROS 2 messages by connecting to the ROS2 LGSVL Bridge.

It requires some package to build, follow the below steps to setup-

Installation*:*

```
$ cd AutowareAuto
$ ade start
$ ade enter
$ source /opt/AutowareAuto/setup.bash
$ sudo apt update
$ sudo apt install python3-colcon-common-extensions
$ sudo apt install libboost-all-dev
$ sudo apt update
$ sudo apt install ros-$ROS_DISTRO-lgsvl-bridge
$ git clone https://github.com/lgsvl/ros2-lgsvl-bridge.git
$ cd ros2-lgsvl-bridge
$ git checkout ${ROS_DISTRO}-devel
$ colcon build --cmake-args '-DCMAKE_BUILD_TYPE=Release'
```

Testing:

```
$ source install/setup.bash
$ lgsvl_bridge
```

5. Install dependencies in ade docker-

Python3.8 –

```
$ cd AutowareAuto
$ ade start
$ ade enter
$ source /opt/AutowareAuto/setup.bash
$ sudo apt update
$ sudo apt-get install python3-gi
```

Watchdog –

```
$ sudo apt update
$ pip install watchdog
```

Pandas –

```
$ sudo apt update
$ pip install pandas
```

6. Download/Clone PolyVerif package from the repository

Below is the list of all the packages of repository required-

- ➔ **OSSDC simulator**
- ➔ **PythonAPI**
- ➔ **Scenic SDL library**
- ➔ **Node**

- **Perception Validation Node**
- **Control Validation Node**

➔ **PolyVerif Suite Binary**
➔ **PolyReports**
➔ **Test_Cases**
➔ **Documentation**

You can download or cloned the updated code (PolyVerif_OSSDC-SIM) from the git repository and placed in the adehome path as mention above.
Below is the link -

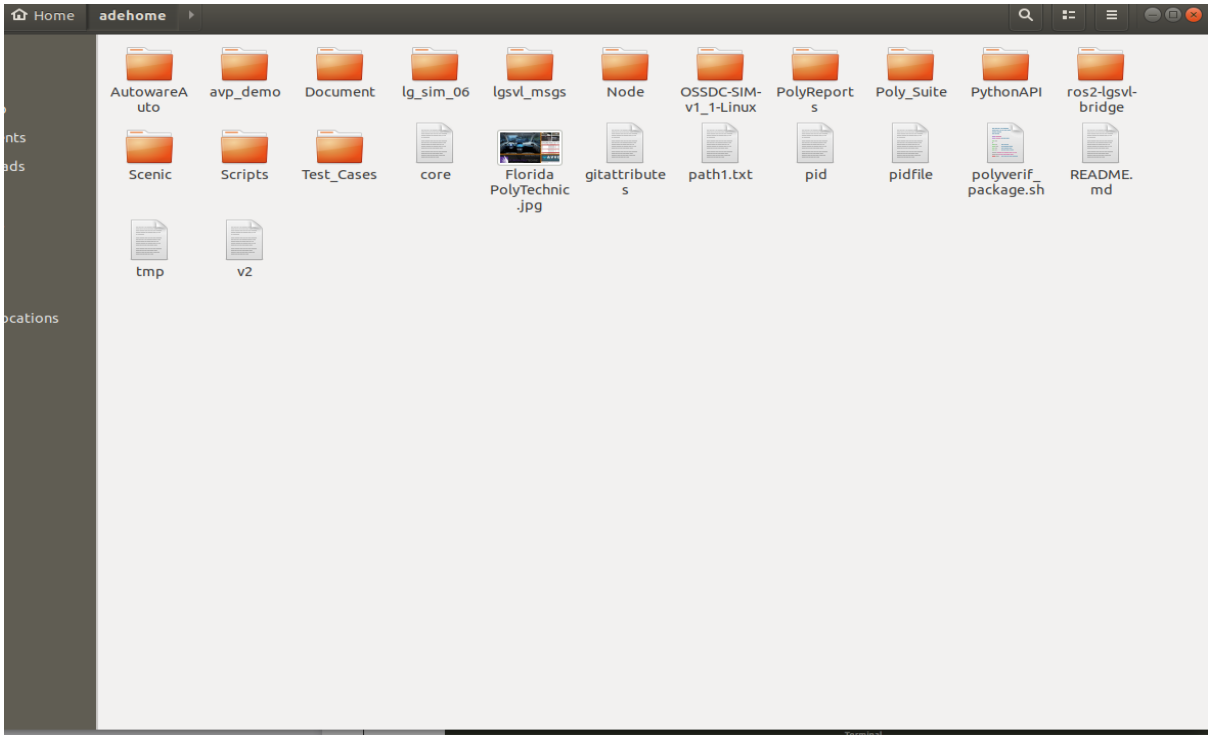
$ git clone --single-branch --branch PolyVerif-OSSDC-SIM https://github.com/MaheshM99/PolyVerif.git

7. OSSDC Simulator

You need to download OSSDC-SIM-v1-1-Linux from below link, extract it and open it. After that you need to copy OSSDC-SIM-V1_1-Linux in adehome directory.

OSSDC-SIM download link

Final directory structure looks like below:



Run following command in OSSDC-SIM-v1_1-Linux directory.

sudo chmod +x run-OSSDC-SIM-v1.sh OSSDC-SIM

Reference link - https://github.com/OSSDC/OSSDC-SIM/releases/tag/OSSDC-SIM-v1.1

8. PythonAPI

Open terminal and go to the Python API folder and enter the below command to install the Python files and necessary dependencies. This is a modified python api's for use.

```
$ cd adehome
$ cd AutowareAuto
$ ade start
$ ade enter
$ source /opt/AutowareAuto/setup.bash
$ cd PythonAPI/
$ python3 -m pip install -r requirements.txt --user -e .
```

Note- Need to start OSSDC simulator in API_Only mode.

9. Scenic SDL library

Scenic is a domain-specific probabilistic programming language for modelling the environments in simulation for autonomous cars. This is a modified scenic package with AutowareAuto support.

```
$ cd adehome
$ cd AutowareAuto
$ ade start
$ ade enter
$ source /opt/AutowareAuto/setup.bash
$ cd Scenic/
$ pip3 install --user -e .
```

Please follow the below link if you face any issue-
https://scenic-lang.readthedocs.io/en/latest/

10. Perception/Detection Validation package

```
$ cd adehome
$ cd AutowareAuto
$ ade start
$ ade enter
$ source /opt/AutowareAuto/setup.bash
$ cd Node/Node_perception_validation_ws
$ colcon build
$ source install/setup.bash
```

Testing: Run the below command to the package is running or not

```
$ ros2 run perception_validation perception_subscriber
```

11. Control Validation package

```
$ cd adehome
```

```
$ cd AutowareAuto
$ ade start
$ ade enter
$ source /opt/AutowareAuto/setup.bash
$ cd Node/Node_control_validation_ws
$ colcon build
$ source install/setup.bash
```

Testing: Run the below command to the package is running or not

```
$ ros2 run control_validation control_subscriber
```

12. Localization Validation package

```
$ cd adehome
$ cd AutowareAuto
$ ade start
$ ade enter
$ source /opt/AutowareAuto/setup.bash
$ cd Node/Node_localization_validation_ws
$ colcon build
$ source install/setup.bash
```

Testing: Run the below command to the package is running or not

```
$ ros2 run localizatation_validation localizatation_node
```

13. Mission/Path Planning Validation package

```
$ cd adehome
$ cd AutowareAuto
$ ade start
$ ade enter
$ source /opt/AutowareAuto/setup.bash
$ cd Node/Node_path_planner_validation_ws
$ colcon build
$ source install/setup.bash
```

Testing: Run the below command to the package is running or not

```
$ ros2 run path_planner_validation path_planner_node
```

14. Avp_Demo

```
$ cd adehome
$ cd AutowareAuto
$ ade start
$ ade enter
$ source /opt/AutowareAuto/setup.bash
$ cd avp_demo/
$ colcon build
$ source install/setup.bash
```

15. PolyVerif Installation and Use

Please follow the **PolyVerification_Suite_UserGuide.docx** document for install and setup.