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 opensource packages which are added in repository.

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

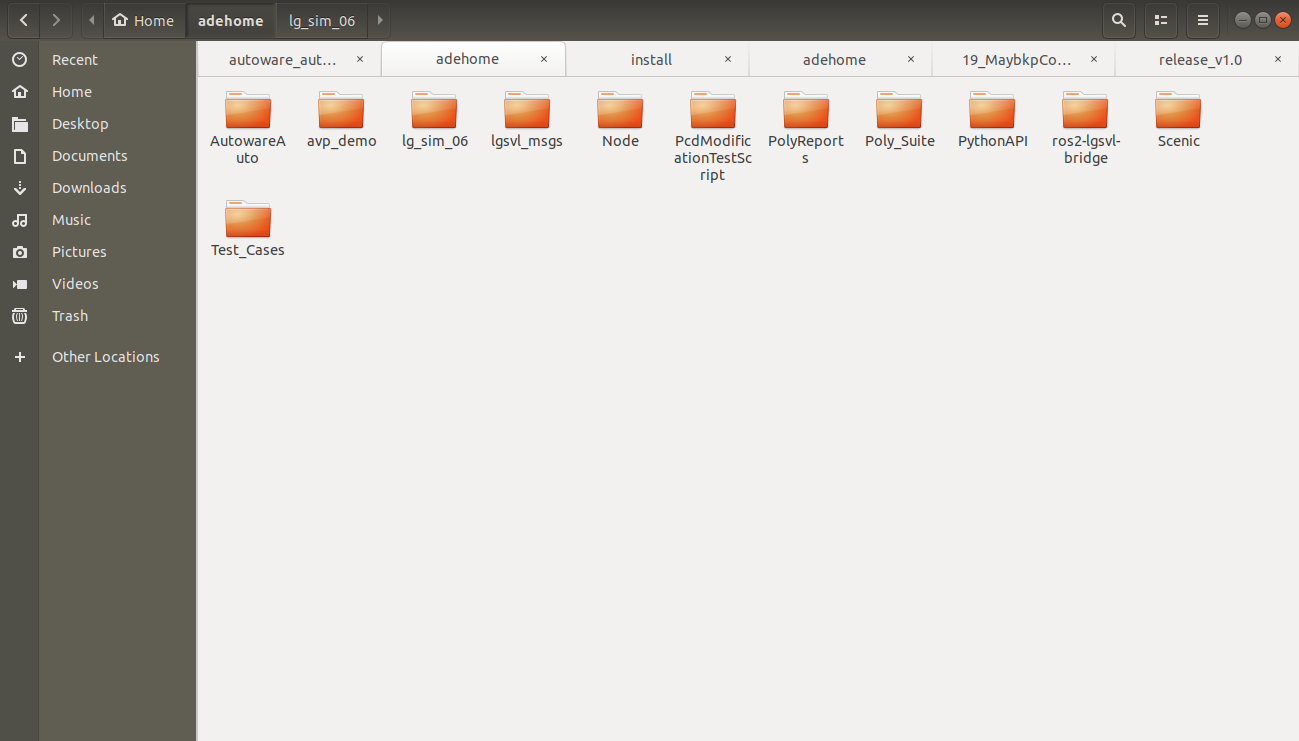
* AutowareAuto
* Lgsvl\_msgs
* Ros2-lgsvl-bridge
* PolyVerif repository
  + PythonAPI
  + Scenic SDL
  + Lgsvl Simulator 2020.06
  + Avp\_demo
  + Perception Validation Node
  + Control Validation Node
  + Test\_Cases
  + PolyVerif Suite

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**
  + **lg\_sim\_06**
    - **lgsvlsimulator-linux64-2020.06**
    - **poly\_ lgsvlsimulator-linux64-2020.06**
  + **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 –



## 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**

## 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**

**$ which ade**

**$ ade update-cli**

**$ touch .adehome**

**$ git clone** [**https://gitlab.com/autowarefoundation/autoware.auto/AutowareAuto.git**](https://gitlab.com/autowarefoundation/autoware.auto/AutowareAuto.git)

**$ cd AutowareAuto/**

**$ ade start --update --enter # It will update and start the ade**

Now if you should see the following in your prompt then it successfully installs the autoware:

**Testing:**

**<your\_username>@ade:~$**

Check the distro of autoware auto by running the below command-

**@ade:~$ ls /opt**

**Expected Output: -**

**AutowareAuto # image: binary-foxy:master**

**lgsvl # image: ade-lgsvl/foxy:2020.06**

**ros # image: ade-foxy:master**

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

## 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 LGSVL 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**

Please check below link If you face any issue while installing the lgsvl\_msgs package-

https://www.svlsimulator.com/docs/archive/2020.06/lgsvl-msgs/

## Ros2-lgsvl-bridge

The SVL Simulator can publish and subscribe to ROS 2 messages by connecting to the [ROS2 LGSVL Bridge](https://github.com/lgsvl/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**](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**

Please check the below link if you face any issue-

https://www.svlsimulator.com/docs/system-under-test/ros2-bridge/

## 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**

## Download/Clone PolyVerif package from the repository

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

* **Lgsvl 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 (release-v1.0) from the git repository and placed in the adehome path as mention above.

Below is the link -

**$ git clone https://github.com/MaheshM99/PolyVerif.git**

## LGSVL Simulator

Please follow the **Lgsvl\_Simulator\_Setup.docx** document for install and setup the lgsvl simulator.

There are two version of lgsvl simulator-

* Lgsvl simulator from the svl website (follow the document to install and replace in **adehome/lg\_sim\_06** directory)
* Modified lgsvl simulator (added in the repository)

## Install Node and Package

User can install all the below mention packages using the single script or if there is any issue while installing, it can be install individually also.

Open terminal and go to the adehome and enter the below commands-

**$ cd adehome**

**$ cd AutowareAuto**

**$ ade start**

**$ ade enter**

**$ ./polyverif\_package.sh**

The above script will build and install all the below packages and if you face any issue while installing please install package individually using the below steps.

## 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/**

**$ pip3 install --user -e .**

Run the following example to see the API in action:

**$ python3 ./quickstart/<any\_test\_script>.py**

**Note-** Need to start lgsvl simulator in API\_Only mode.

## 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/**](https://scenic-lang.readthedocs.io/en/latest/)

## 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**

## 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**

## 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**

## 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**

## Avp\_Demo

**$ cd adehome**

**$ cd AutowareAuto**

**$ ade start**

**$ ade enter**

**$ source /opt/AutowareAuto/setup.bash**

**$ cd avp\_demo/**

**$ colcon build**

## PolyVerif Installation and Use

Please follow the **PolyVerification\_Suite\_UserGuide.docx** document for install and setup.