

# Carla Installation

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This guide shows how to install the CARLA simulator on Linux (Section 2) and Windows (Section 3) systems. CARLA is designed in a server-client architecture, where the server runs the simulation and renders the scene, while the client is responsible for the interaction between the autonomous agent and the server via sockets. Installing Carla requires to install both the client and the server.

## 1 Requirements

The following requirements should be fulfilled before installing CARLA:

- **System requirements.** CARLA is built for Windows and Linux systems.
- **An adequate GPU.** CARLA aims for realistic simulations, so the server needs at least a 6 GB GPU although 8 GB is recommended, especially when dealing with machine learning.
- **Disk space.** CARLA will use about 20 GB of space.
- **Python.** Python is the main scripting language in CARLA. On Linux, CARLA supports Python 2.7 and Python 3.7. On windows, Python 3.7 only is supported.
- **Pip.** Some installation methods of the CARLA client library require pip or pip3 (depending on your Python version) version 20.3 or higher.

## 2 Linux Installation

The Debian package is available for both Ubuntu 18.04 and Ubuntu 20.04.

### 2.1 Install the Carla Server on Linux

- Set up the Debian repository in the system (each of the two commands below is to be run as a single line):

```
$ sudo apt-key adv --keyserver keyserver.ubuntu.com --recv-keys 1AF1527DE64CB8D9
```

```
$ sudo add-apt-repository "deb [arch=amd64] http://dist.carla.org/carla(lsb_release -sc) main"
```

- Update the package lists and install the Carla server:

```
$ sudo apt-get update
```

```
$ sudo apt-get install carla-simulator
```

- Import additional assets:  
Each Carla release has its own additional package of extra assets and maps. These additional assets can be installed with the command below:

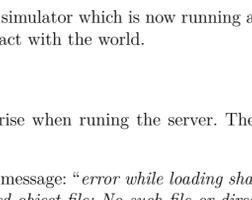
```
$ cd /opt/carla-simulator
```

```
$ ./ImportAssets.sh
```

- Test your server installation:  
You can start the Carla server with the following command:

```
$ ./CarlaUE4.sh
```

A window containing a view over the city will pop up. This is the spectator view. To fly around the city use the mouse and [W][A][D][S] keys, holding down the right mouse button to control the direction.



This is the server simulator which is now running and waiting for a client to connect and interact with the world.

### Troubleshooting

Some problem might arise when running the server. These problem are reviewed below:

- You get the error message: “error while loading shared libraries: libomp.so.5: cannot open shared object file: No such file or directory”.  
This error is solved by installing libomp5:

```
$ sudo apt install libomp5
```

- If you have 2 graphic cards (Intel and Nvidia) installed, Carla tend to select the first active GPU device (which is often Intel GPU), even if you have selected Nvidia in PRIME. This leads to a segmentation fault. To overcome this, you have to tell Carla to prefer the Nvidia GPU:

```
$ ./CarlaUE4.sh -preferNvidia
```

- If you are installing Carla on a remote machine, forwarding the Carla server GUI will fail. To solve this, you will need to start Carla in Off-screen mode. In this mode, unreal Engine is working as usual, rendering is computed but there is no display available. GPU based sensors return data as usual.

```
$ ./CarlaUE4.sh -RenderOffScreen
```

### 2.2 Install Carla Client on Linux

The Carla client API is implemented in Python.

#### 2.2.1 Create a Conda Environment (optional)

It is highly recommended to install the CARLA client library in a conda virtual environment to avoid packages conflicts with your other projects. Note for example that Carla requires python 3.7 (or python 2.7).

If your are not familiar with the Anaconda python distribution, see how to install it on Linux in Appendix 4.2.

Assuming you have Anaconda installed, create a virtual environment (named carla for example) with python 3.7 and activate it:

```
$ conda create -n carla python=3.7
```

```
$ conda activate carla
```

#### 2.2.2 Check your Pip Version

- Pip3 requires version 20.3 or higher. Check your pip3 version:

```
$ pip3 -V
```

If needed, upgrade pip3:

```
$ pip3 install --upgrade pip
```

- Install the python dependencies:

```
$ pip3 install pygame opencv-python
```

```
$ conda install numpy matplotlib
```

#### 2.2.3 Install the Client

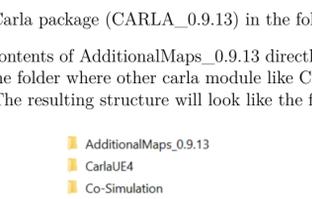
You are now ready to install the carla client in your created virtual environment. CARLA provides .whl files for different Python versions. There can be found in PythonAPI/carla/dist/. There is one file per supported Python version, indicated by the file name. Install the one corresponding to your carla server- and python version (0.9.13 & 3.7 at the time of writing):

```
$ cd /opt/carla-simulator/PythonAPI/carla/dist
```

```
$ pip3 install carla-0.9.13-cp37-cp37m-manylinux_2_27_x86_64.whl
```

## 2.3 Test your Complete Linux Installation

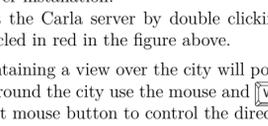
You can test your complete installation (client & server) by running the *demo\_run\_carla.py* script provided with this installation guide. An Opencv windows will pop up displaying a car driving around. Note that you must run this script within your carla conda environment and the server has to be running (started via ./CarlaUE4.sh).



## 3 Windows Installation

### 3.1 Download the Carla Server for Windows

- Download the latest release (0.9.13 at the time of writing) of the carla package as well as the AdditionalMaps from [here](#) in the figure below:

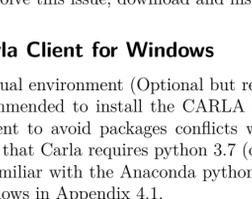


- Extract the Carla package (CARLA\_0.9.13) in the folder of your choice.
- Extract the contents of AdditionalMaps\_0.9.13 directly in the carla root folder, that is the folder where other carla module like CarlaUE4, Engine, etc, are located. The resulting structure will look like the figure below:



- Test your server installation:  
You can start the Carla server by double clicking on the executable *CarlaUE4.exe* circled in red in the figure above.

A window containing a view over the city will pop up. This is the spectator view. To fly around the city use the mouse and [W][A][D][S] keys, holding down the right mouse button to control the direction.



This is the server simulator which is now running and waiting for a client to connect and interact with the world.

### Troubleshooting

You get an error “The following component(s) are required to run this program DirectX Runtime”. To solve this issue, download and install directX from [here](#).

### 3.2 Install the Carla Client for Windows

- Create conda virtual environment (Optional but recommended):  
It is highly recommended to install the CARLA client library in a conda virtual environment to avoid packages conflicts with your other projects. Note for example that Carla requires python 3.7 (or python 2.7).

If your are not familiar with the Anaconda python distribution, see how to install it on Windows in Appendix 4.1.

Assuming you have Anaconda installed, create a conda virtual environment (named carla for example) with python 3.7 and activate it:

```
$ conda create -n carla python=3.7
```

```
$ conda activate carla
```

- Install the python dependencies:

```
$ pip3 install pygame opencv-python
```

```
$ conda install numpy matplotlib
```

- Install the client via the whl file:

CARLA provides .whl files for different Python versions. There can be found in PythonAPI/carla/dist/. There is one file per supported Python version, indicated by the file name.

In the conda command prompt, navigate to the directory where you extracted Carla, then navigate to PythonAPI/carla/dist/ and run the following command to install the client corresponding to your carla server- and python version (0.9.13 & 3.7 at the time of writing):

```
$ pip3 install carla-0.9.13-cp37-cp37m-win_amd64.whl
```

The process is shown in the figure below:



### 3.3 Test your Complete Windows Installation

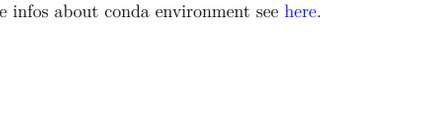
You can test your complete installation (client & server) by running the *demo\_run\_carla.py* script provided with this installation guide. An Opencv windows will pop up displaying a car driving around. Note that you must run this script within your carla conda environment and the server has to be running (started via CarlaUE4.exe).



## 4 Appendix

### 4.1 Anaconda installation On Windows

- Download anaconda from [here](#) and install it.
- Start the anaconda prompt by searching it in the windows app search bar. In your Anaconda prompt, you can create environments and manage them.



### 4.2 Anaconda installation On Linux

- Download the anaconda .deb file from [here](#).

- install it with the following command:

```
$ bash Anaconda3-2021.11-Linux-x86_64.sh
```

### 4.3 Creating Conda Environments on Linux & Windows

- During the Anaconda installation you can accept the request for the base environment to be automatically activated or you can activate it manually via:

```
$ conda activate
```

- To install an environment with a specific python version (3.7 for example), do:

```
$ conda create -n myenv_name python=3.7
```

For more infos about conda environment see [here](#).