RWR 4015

Traffic Simulation for Planning Applications

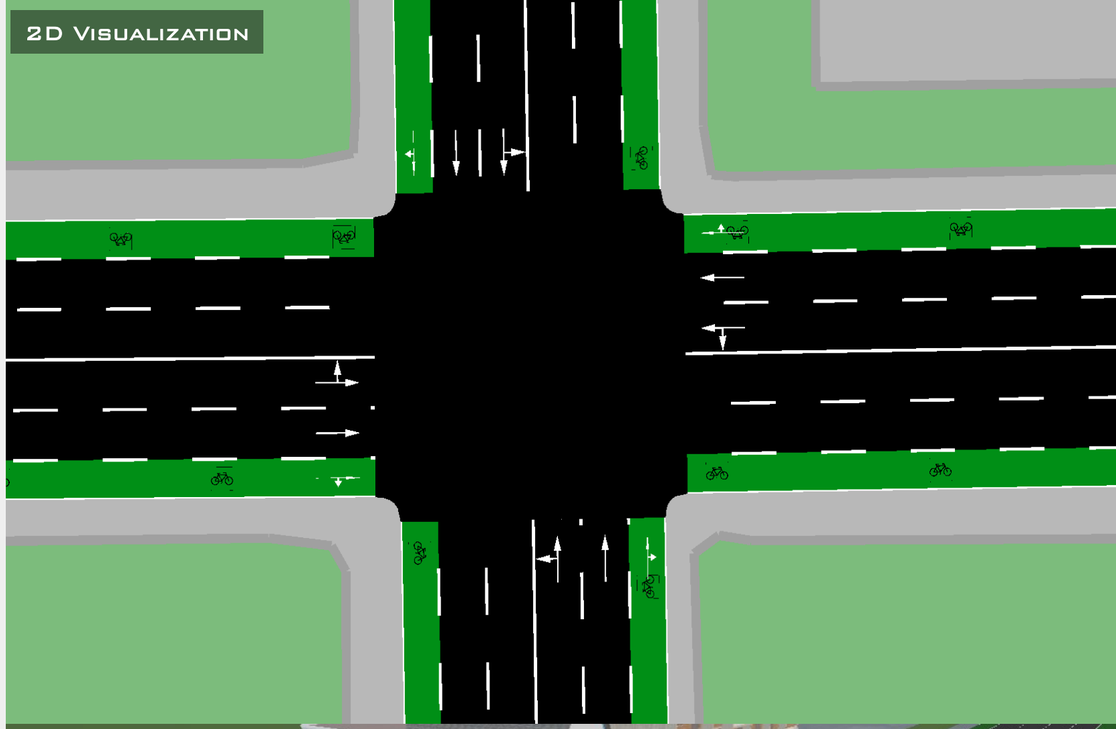
Dr. Ahmad Mohammadi

Week 1 | Hands-on:
Introduction to Traffic Simulation

Fall 2026

RoadwayVR

roadwayvr.github.io/TrafficSimulationforPlanningApplications



Agenda

1. Install Simulation of Urban Mobility (SUMO)

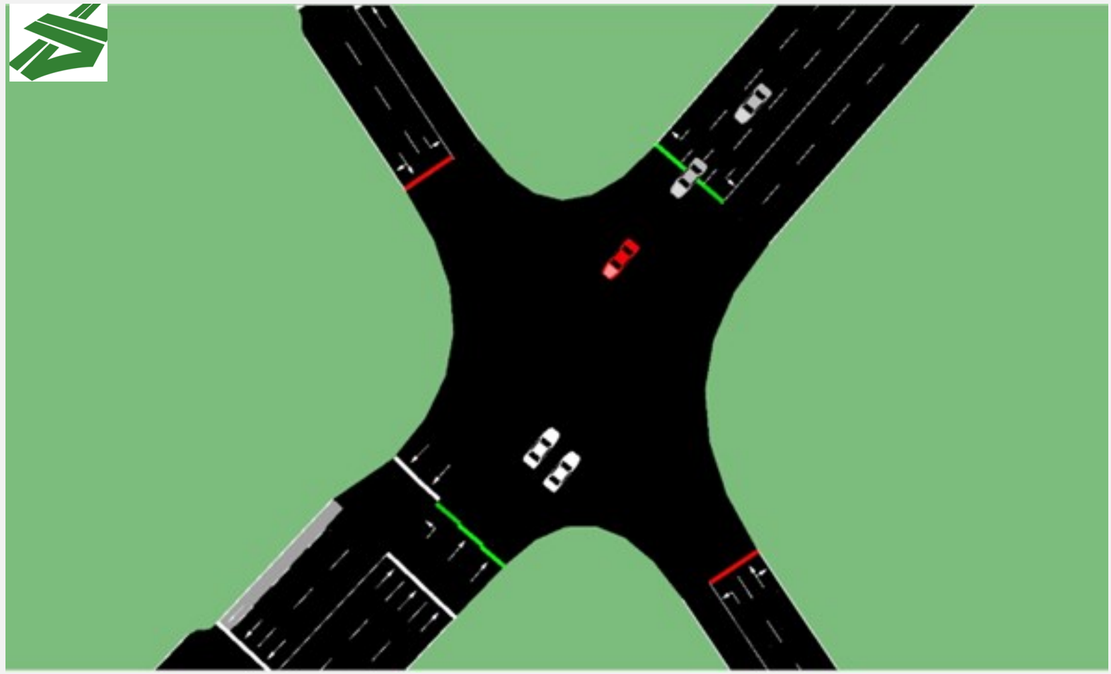
2. Set Up SUMO Environment Variables

3. Install Notepad++

4. SUMO Files and User Interface

5. Create a Simple Network with Car Traffic Demand

6. Add Opposite Traffic Flow

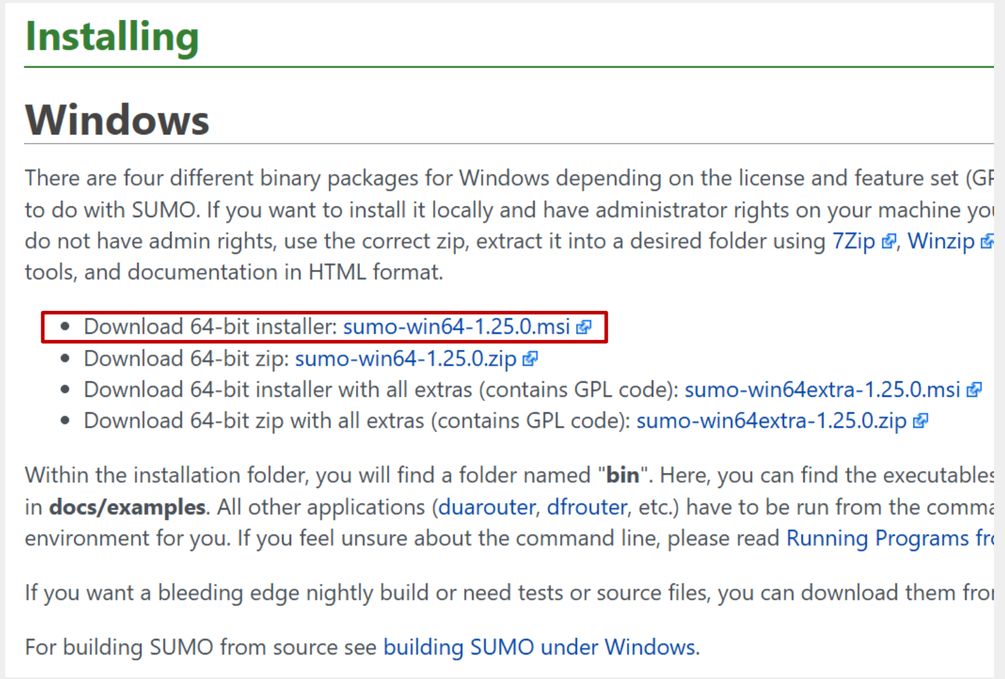


1. Install Simulation of Urban Mobility (SUMO)

1. In Google, search “SUMO Installation”

2. Select sumo.dlr.de that contains sumo installing

3. Download SUMO as in the image



Installing

Windows

There are four different binary packages for Windows depending on the license and feature set (GP
to do with SUMO. If you want to install it locally and have administrator rights on your machine yo
do not have admin rights, use the correct zip, extract it into a desired folder using 7Zip, Winzip
tools, and documentation in HTML format.

- Download 64-bit installer: sumo-win64-1.25.0.msi
- Download 64-bit zip: sumo-win64-1.25.0.zip
- Download 64-bit installer with all extras (contains GPL code): sumo-win64extra-1.25.0.msi
- Download 64-bit zip with all extras (contains GPL code): sumo-win64extra-1.25.0.zip

Within the installation folder, you will find a folder named "**bin**". Here, you can find the executables
in **docs/examples**. All other applications (duarouter, dfrouter, etc.) have to be run from the comma
environment for you. If you feel unsure about the command line, please read Running Programs fr

If you want a bleeding edge nightly build or need tests or source files, you can download them fro

For building SUMO from source see building SUMO under Windows.

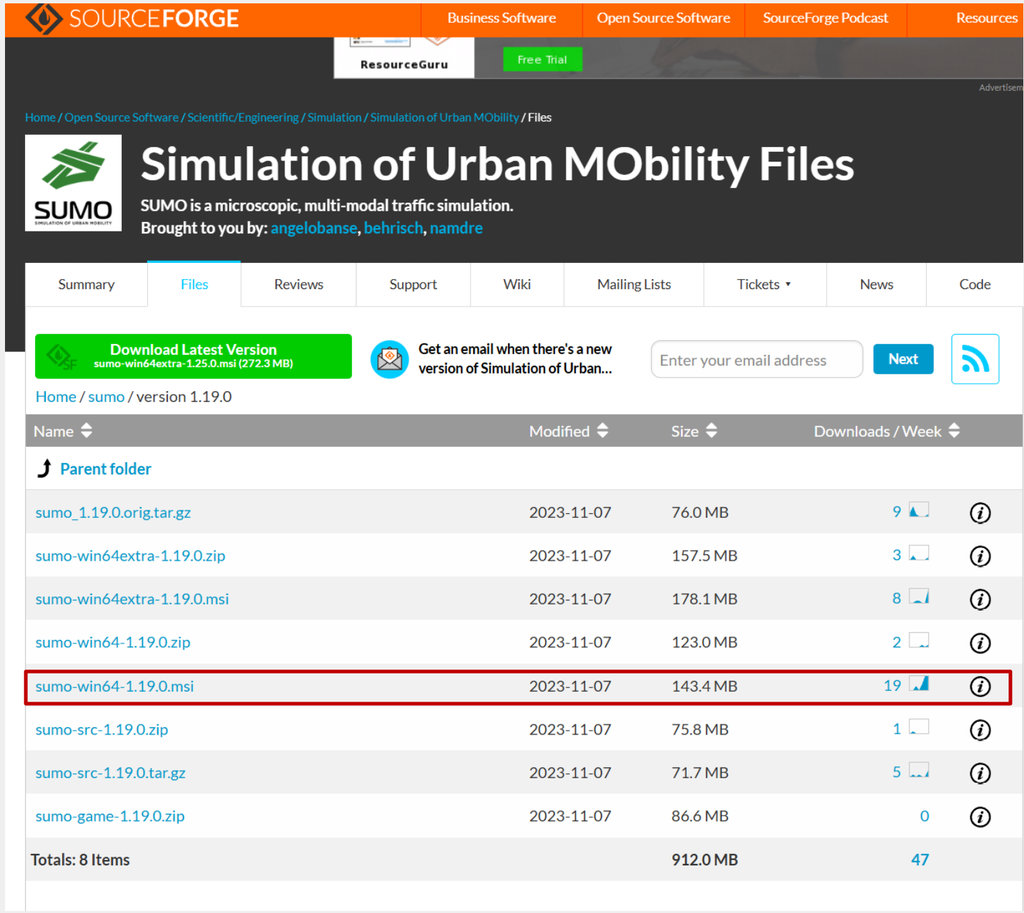
1. Install SUMO (Older Versions)

4. Sometimes, you need older versions (for example version 1.19):

5. In Google, search “sumo archive download 1.19”

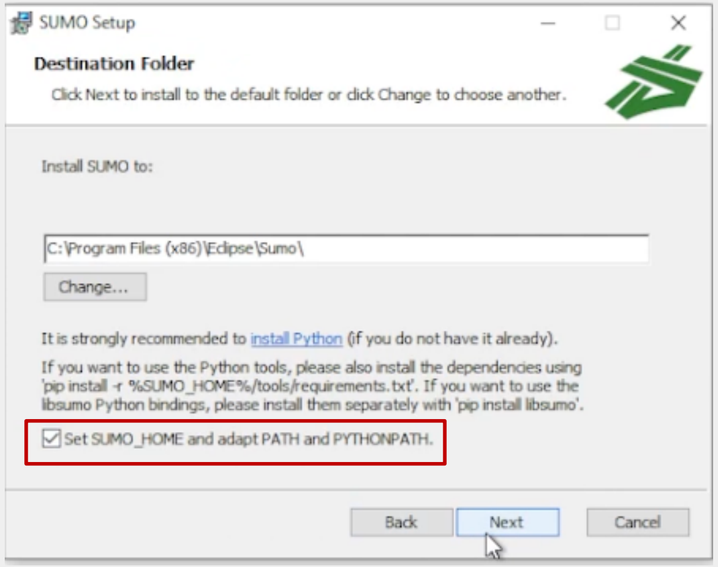
6. Select SourceForge.net that contains sumo archive

7. Download SUMO as in the image



1. Install SUMO

8. When you install, make sure the SUMO_HOME is checked



2. Set Up SUMO Environment Variables

1. SUMO has two only graphical users

2. All other programs must be called using codes! (But I provided all the codes in this course)

3. We set Environment Variables so we can avoid typing SUMO directory in codes (See Next Slides)

Sumo-gui

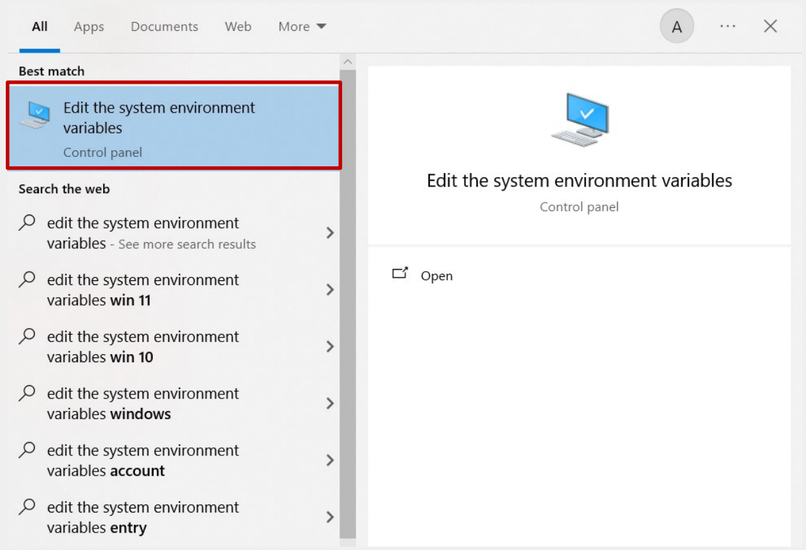
Simulation Visualization Interface

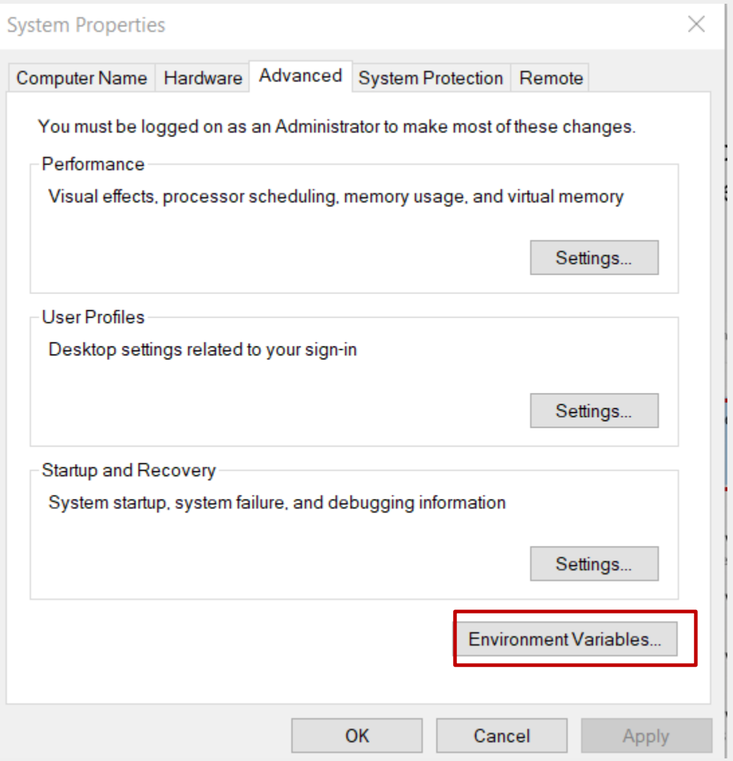
netedit

Simulation Creation Interface

2. Set Up SUMO Environment Variables

4. On the Windows search box (on the Taskbar) search for environment. The best match result should be the "Edit the system environment variables" option. Open it.

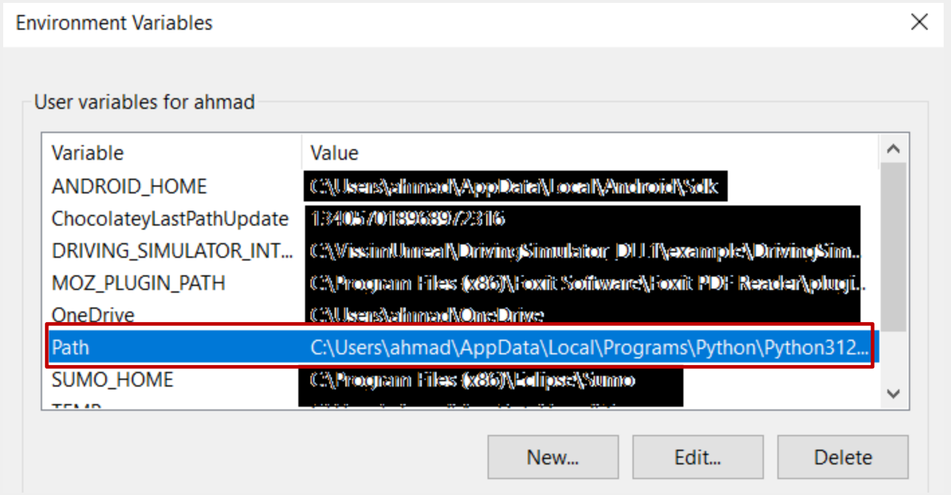




2. Set Up SUMO Environment Variables

5. Under user variables select PATH (or Path - Windows environment variables are case insensitive) and click Edit.

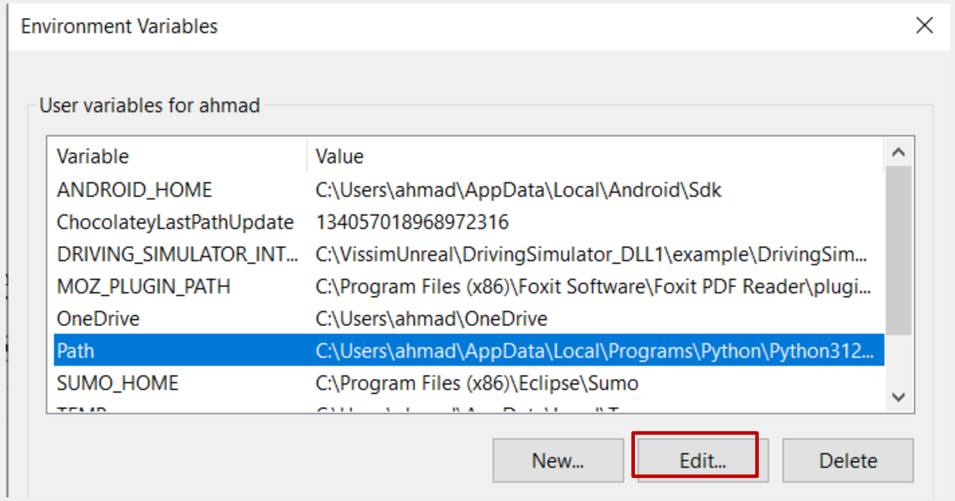
5.1. If no such variable exists, you must create it with the New-Button.

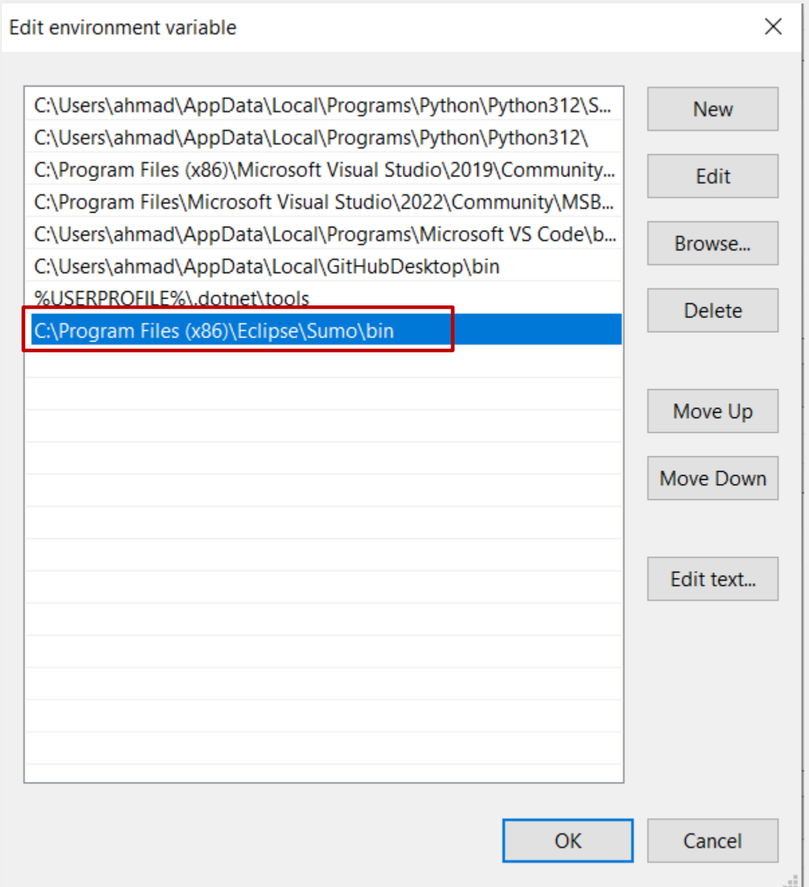


2. Set Up SUMO Environment Variables

6. First, find where you installed SUMO, likely, C:\Program Files (x86)\Eclipse\Sumo\bin
Once you find it, then copy the directory and

16. Select PATH → Edit → New → paste the “C:\Program Files (x86)\Eclipse\Sumo\bin” → Select Okay

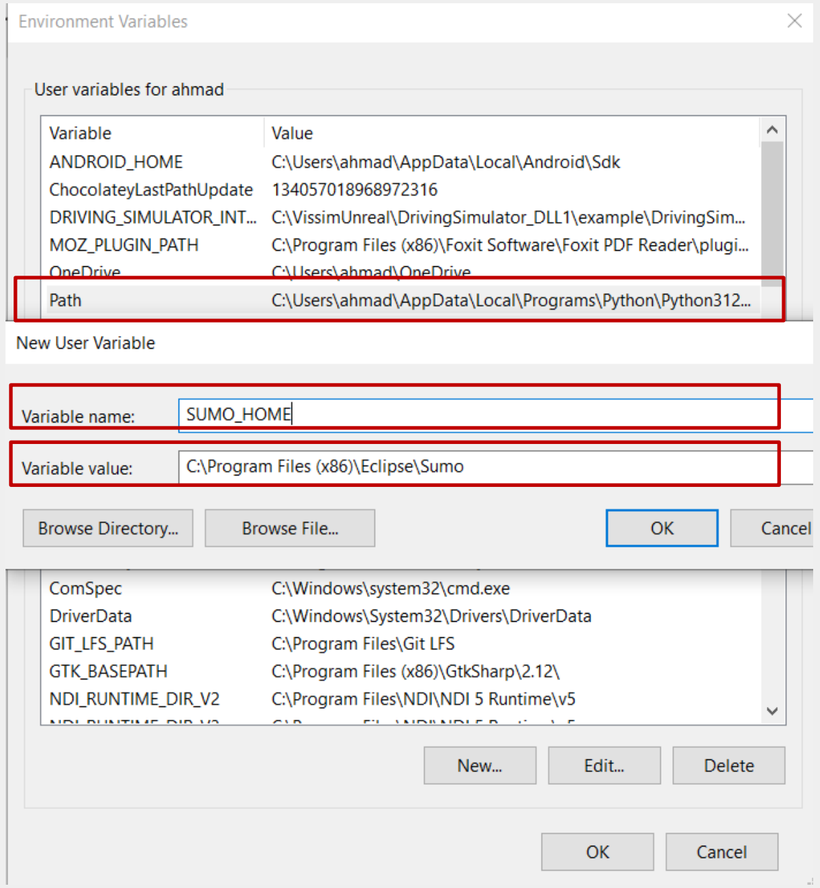




2. Set Up SUMO Environment Variables

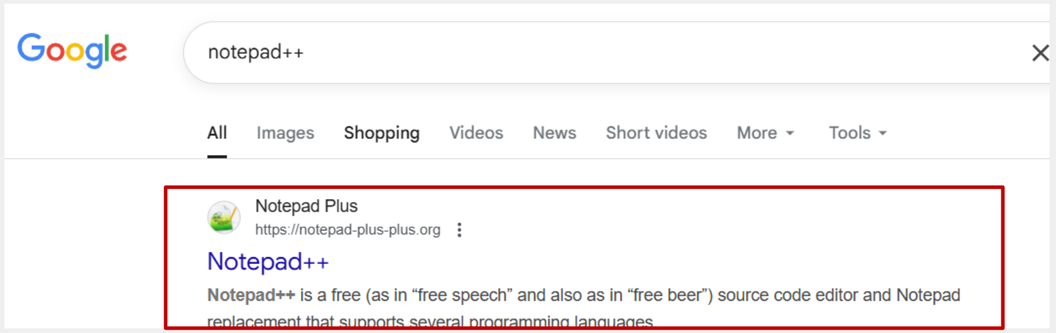
17. Select Path → New → fill variable name and variable value as in the image

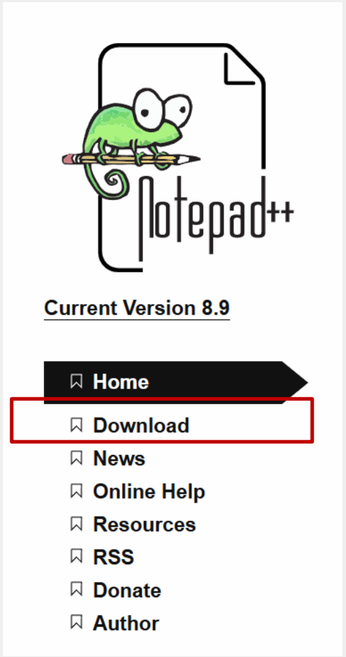
Variable name: SUMO_HOME
Variable value: C:\Program Files (x86)\Eclipse\Sumo



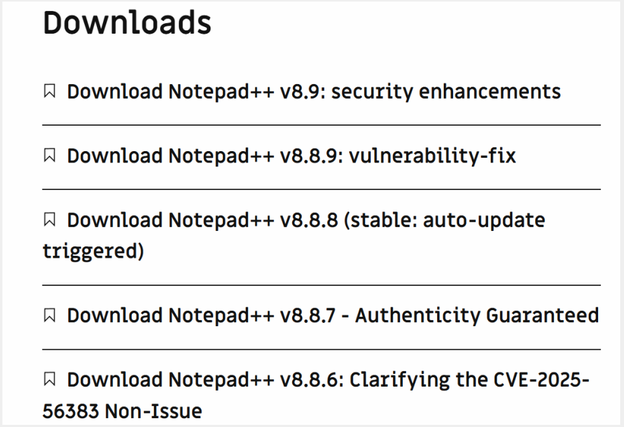
3. Install Notepad++

1. In Google, Search Notepad ++





Download most recent version (version is not important)



4. SUMO Files and User Interfaces

Sample.net.xml
Sample.netecfg
Sample.rou.xml
Sample.sumocfg

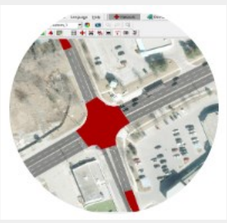
Codes → Heart of SUMO (We do not touch this)

Codes → adding Traffic Volume → (We do not touch this)

sumo-gui

Simulation Visualization Interface

netedit



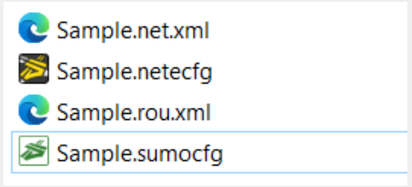
Simulation Creation Interface

4.1. Simulation Visualization Interface (SUMO GUI)

1. Download Folder “SUMOSample” from Github

2. Extract the folder in Download folder

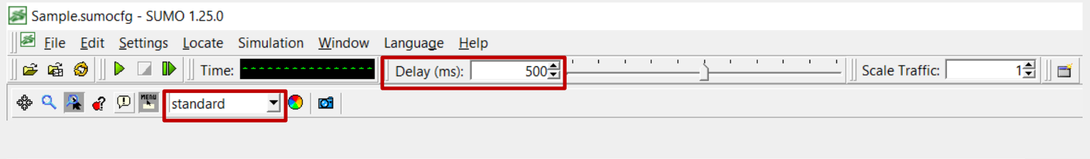
3. You should have four files as below

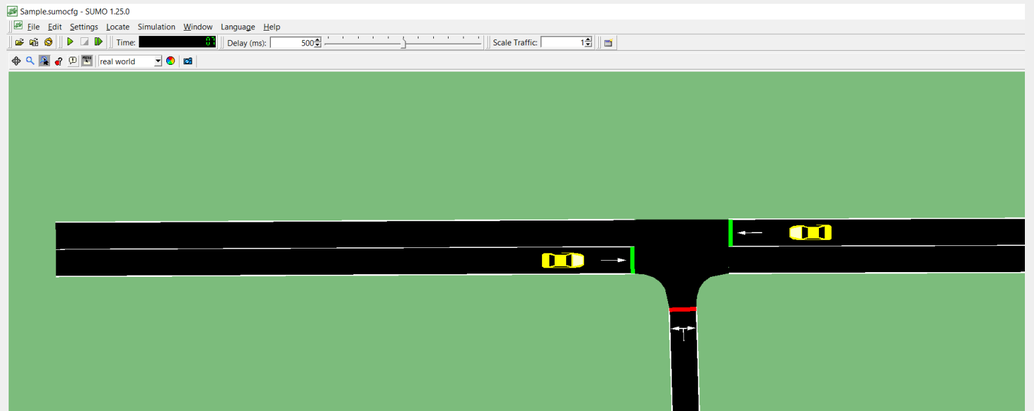


4. Run Sample.sumocfg → Increase delay to 500

5. Change Gui shape from “Standard” to “Real-World”

6. Hit “Play Button”



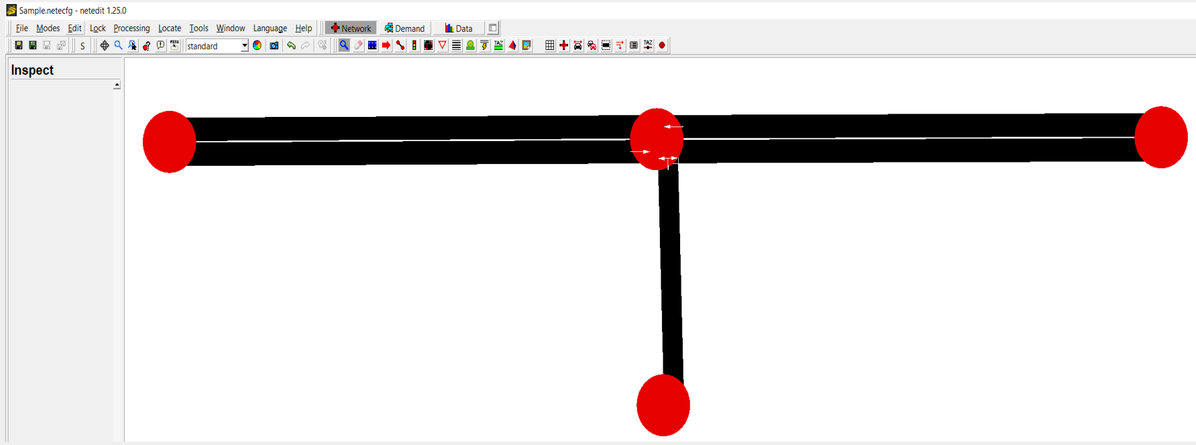


4.2. Simulation Creation Interface (SUMO netedit)

7. Run Sample.netecfg

8. Open netedit → this is interface we can change road

network and add/modify traffic light, add cars



5. Create a Simple Network

1. Create a Folder called “Exercise1”

2. On the Windows search box (on the Taskbar) search for “netEdit” and open it

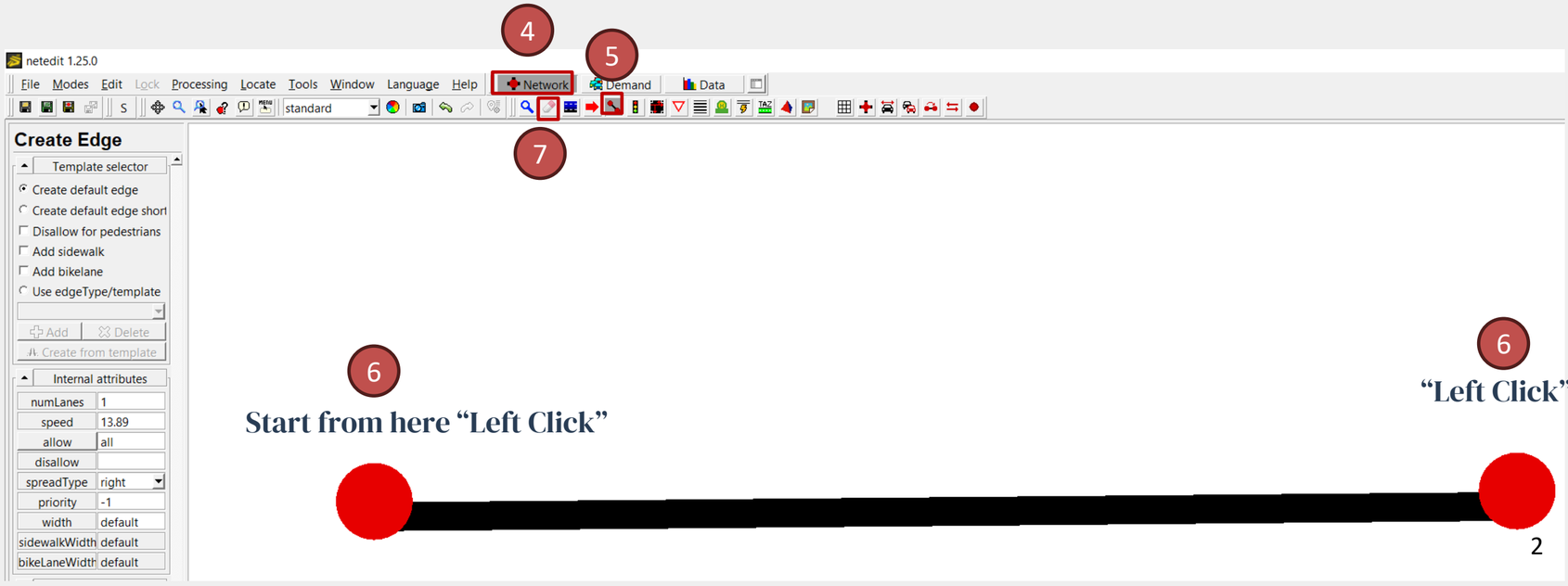
3. In netEdit → File → New Network

4. Select Network

5. Select “Creating junctions and edges”

6. Create below road (left click)

7. If Mistaken, use eraser



5. Create a Simple Network

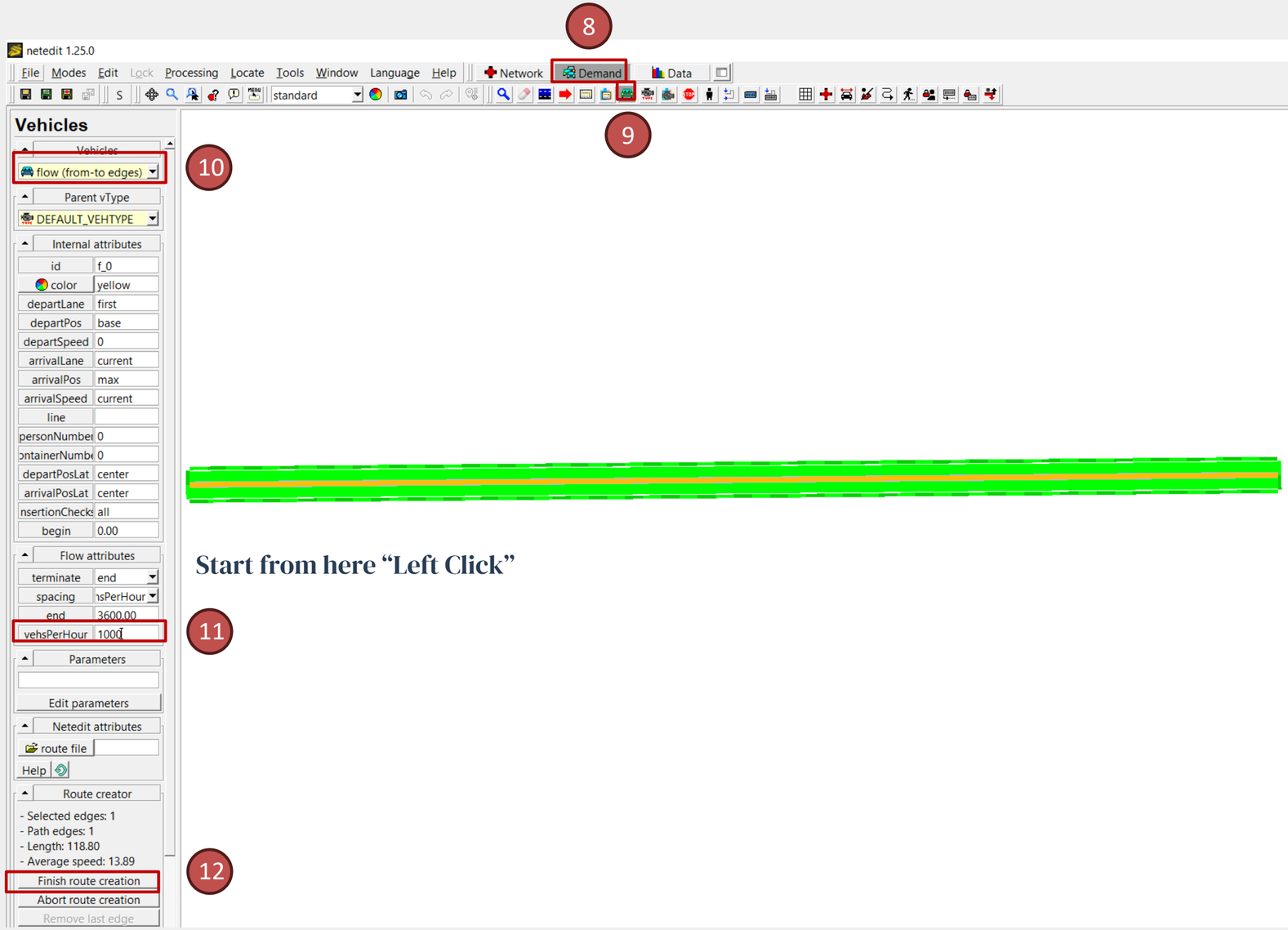
8. Add Traffic Volume by Selecting Demand

9. Select Vehicle

10. Change “trip” to “flow”

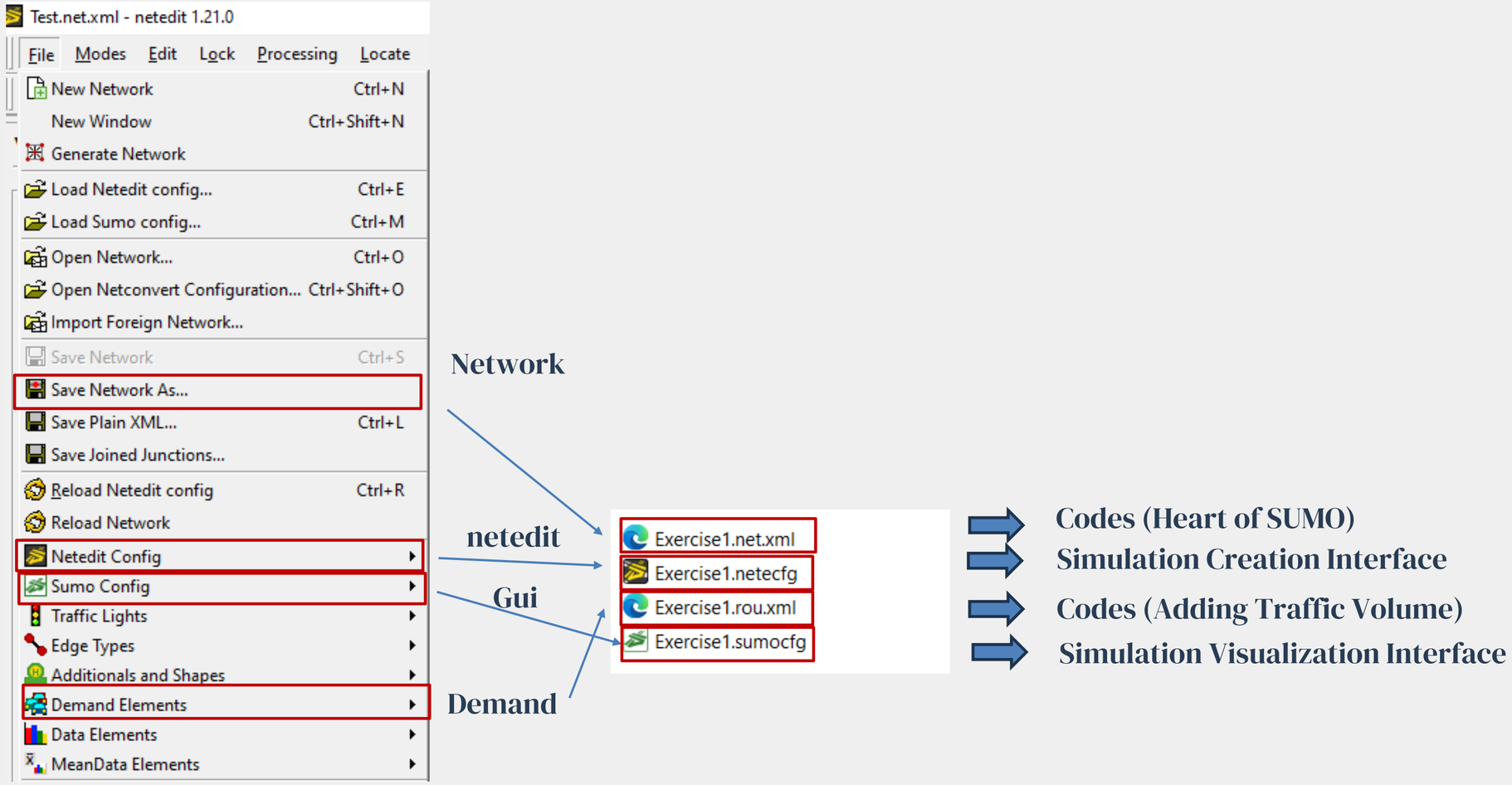
11. Change the Volume per Hour to “1000”

12. Finish Route Creation



5. Create a Simple Network

13. Save SUMO Files in Folder “Exercise1” as below (name each file as “Exercise1”)



5. Create a Simple Network

14. Run SUMO Gui (Exercise1.sumocfg)

15. Increase delay to 200

16. Gui shape from “Standard” to “Real-World”

6. Add Opposite Traffic Flow

❑ Open netedit (Exercise1.netecfg) and do the following actions:

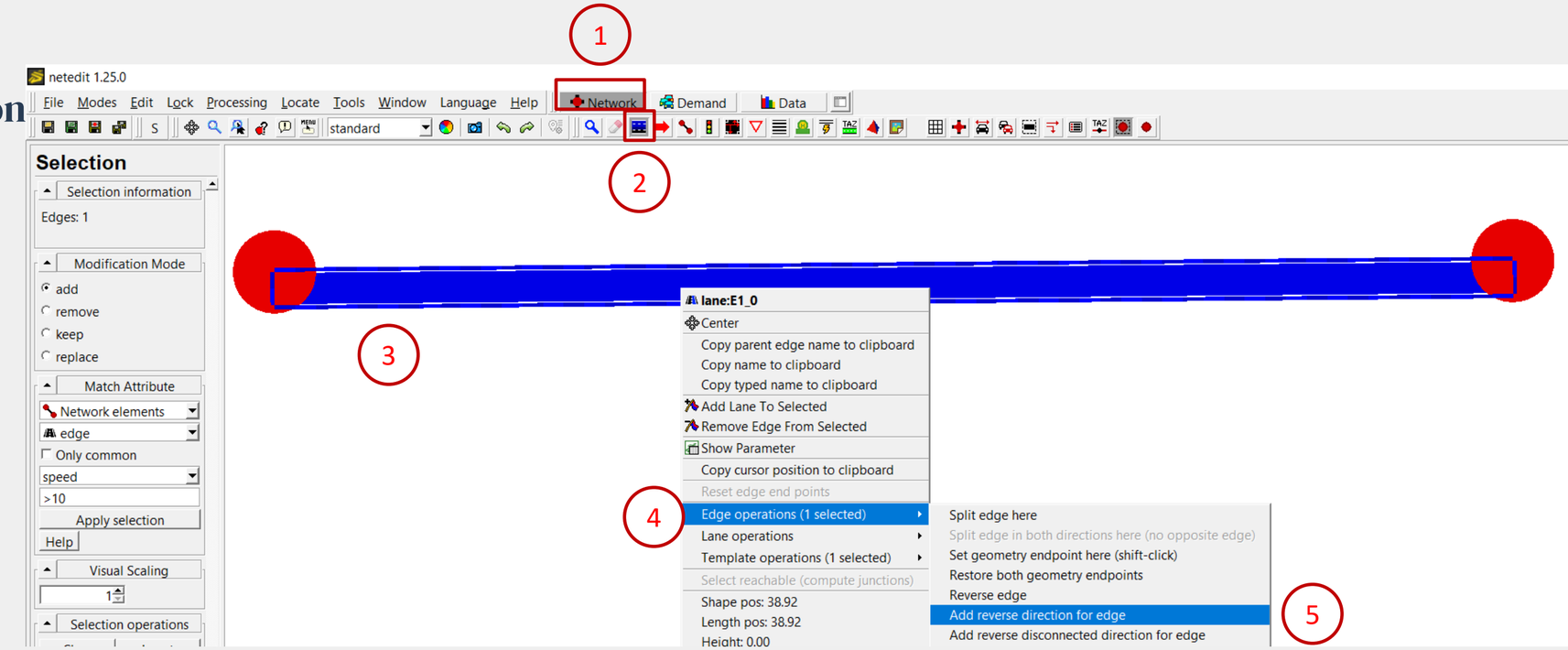
1. Select Network

2. Select “ Selecting element”

3. Left click on the road

4. Right click and select Edge operation

5. Add reverse direction for edge



6. Add Opposite Traffic Flow

6. The output should look like this

7. In fact, you added a reverse lane

8. Add opposite traffic flow input to the

reverse direction with traffic volume of 1000

9. Save the files

10. Run SUMO Gui

11. The output should look like below:

6. Add Opposite Traffic Flow

➢ For Deselecting a lane, do the following:

1. Select Network

2. Select “ Selecting element”

3. Press “Escape”