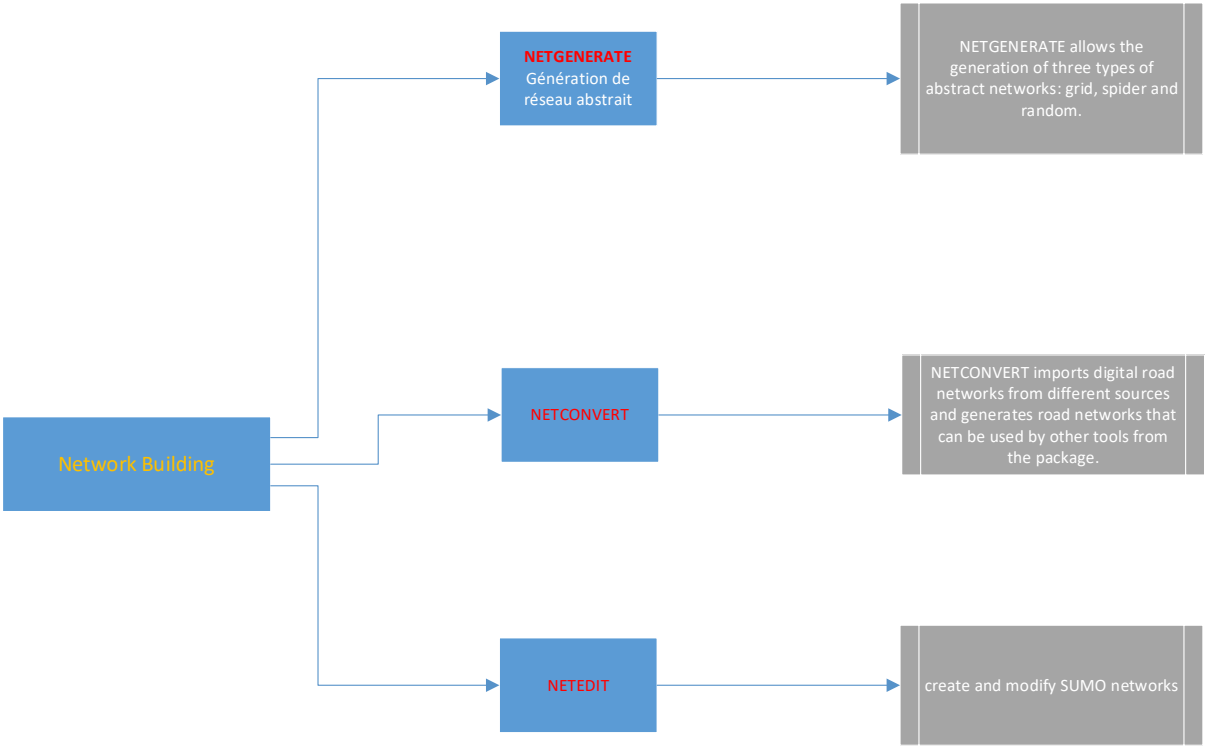
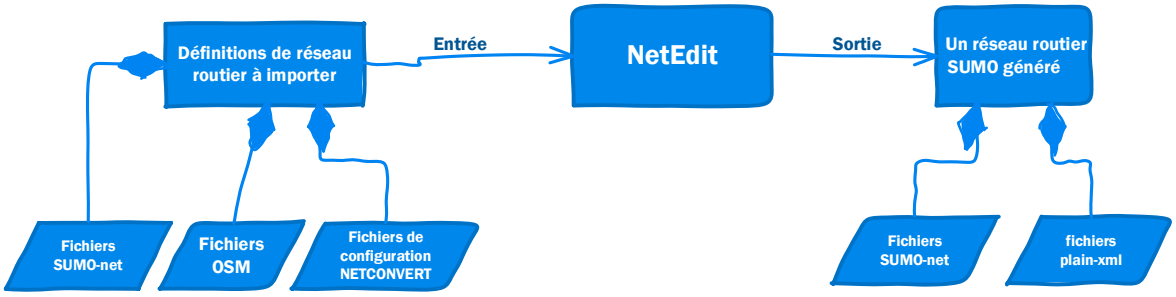
Table des matières

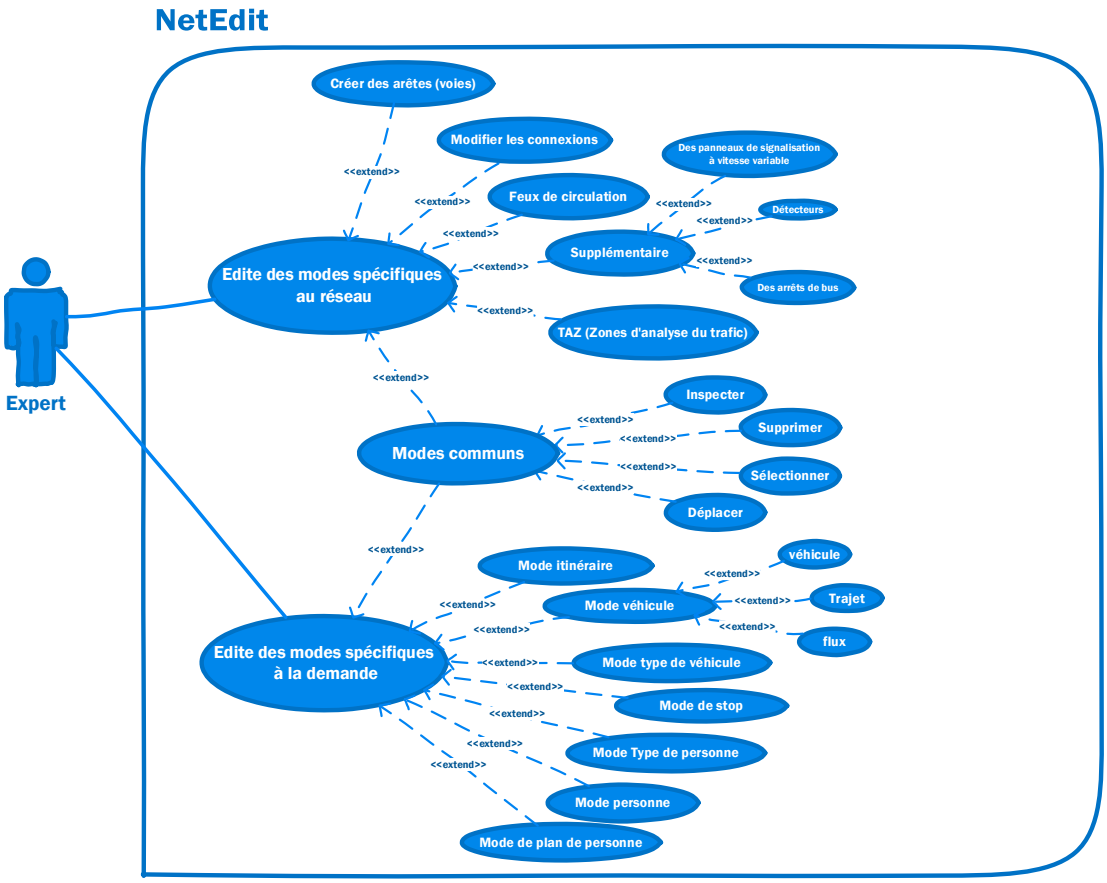
Réseau

SUMO guide 2

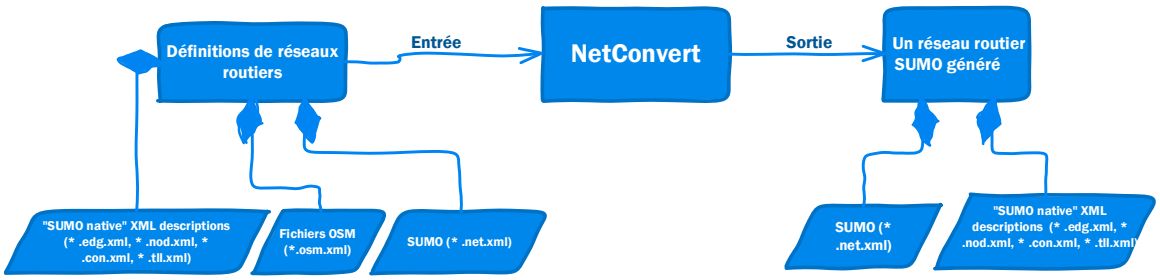


Architecture SUMO



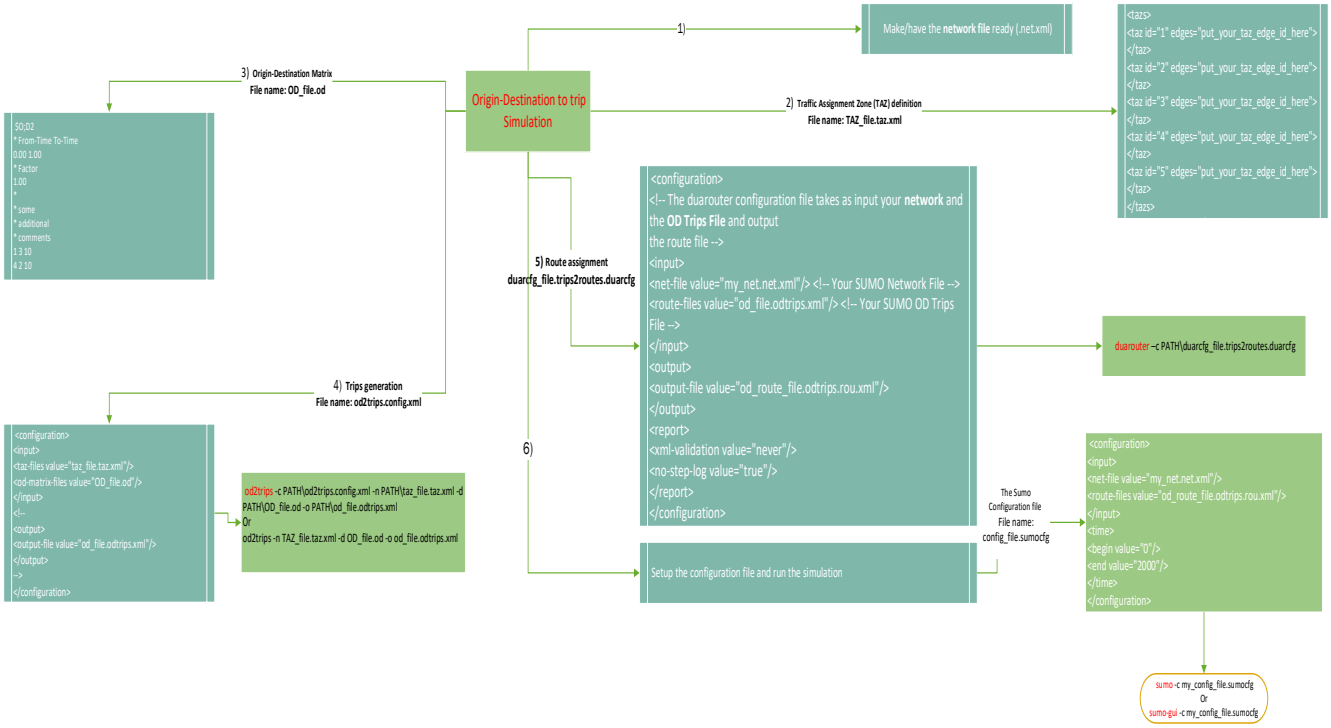


Architecture SUMO

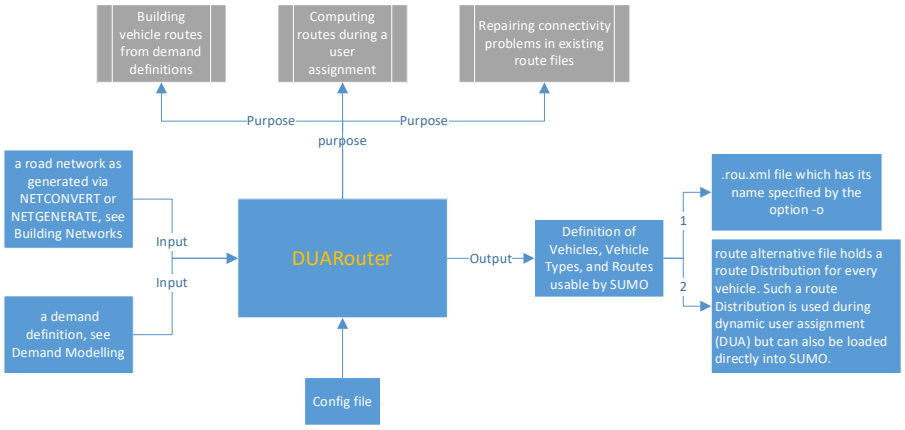


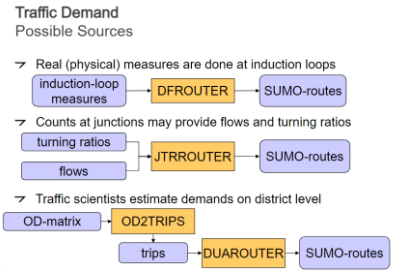
Demande

SUMO guide 1



SUMO guide 2

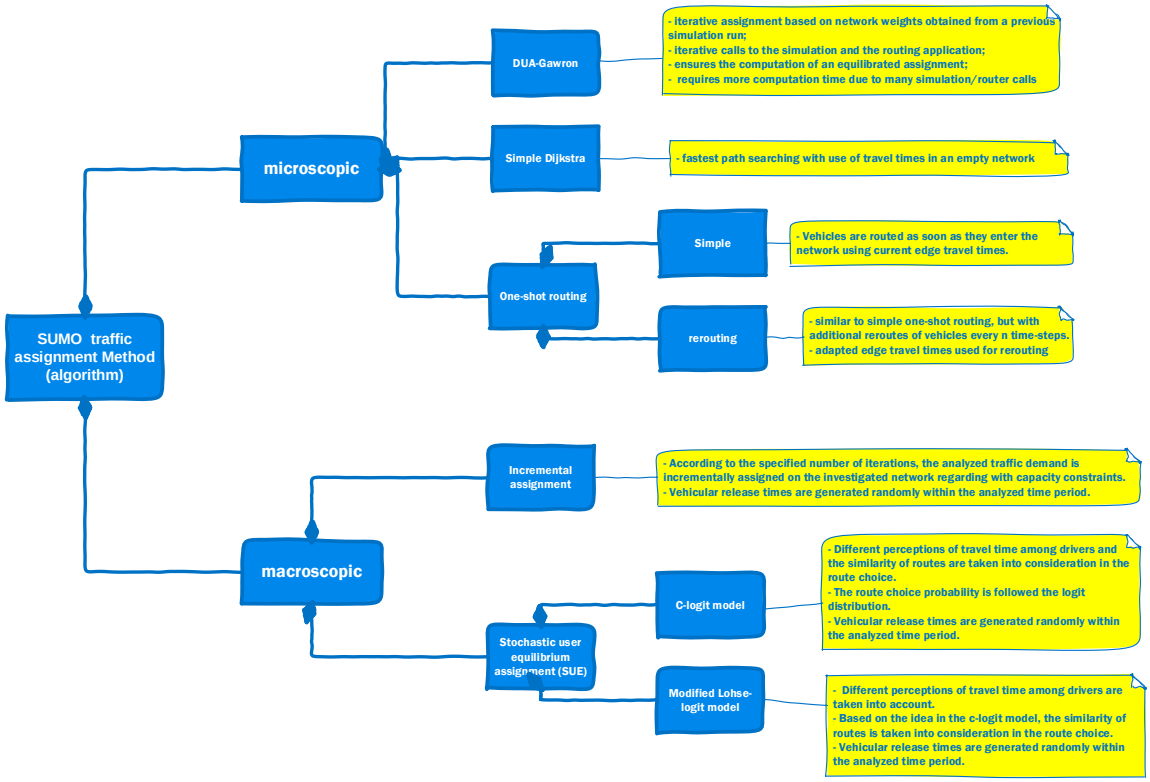




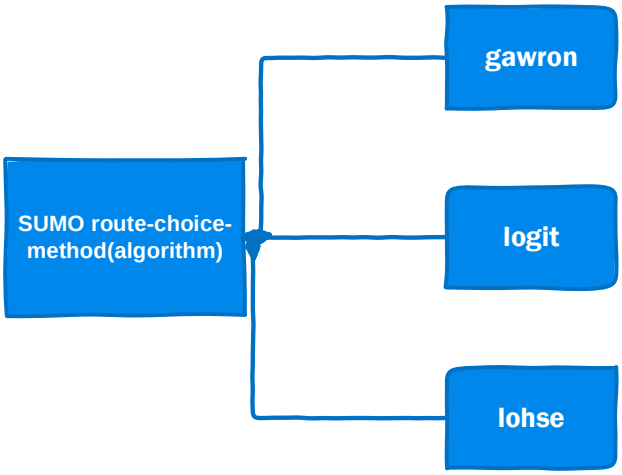
- OD2TRIPS: converter for O/D-matrices
- JTRROUTER: router based on turning ratios
- DUAROUTER: router based on a dynamic user assignment
- DFROUTER: router which uses detector data

Automatic Routing is incremental assignment. This happens automatically when using <trip> input directly in SUMO instead of <vehicle>s with pre-defined routes(or a mix).

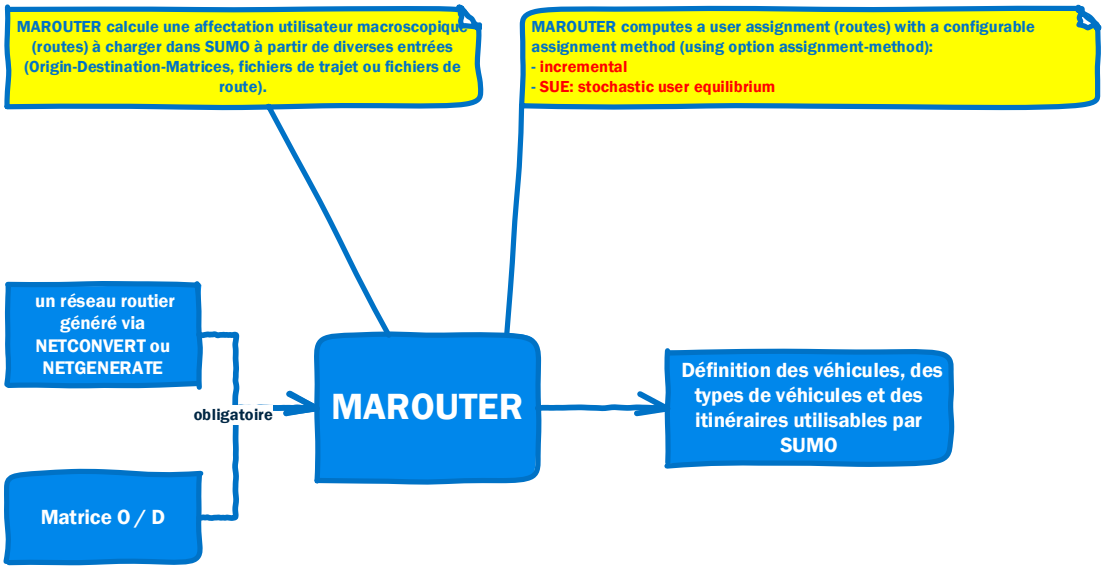
assignment



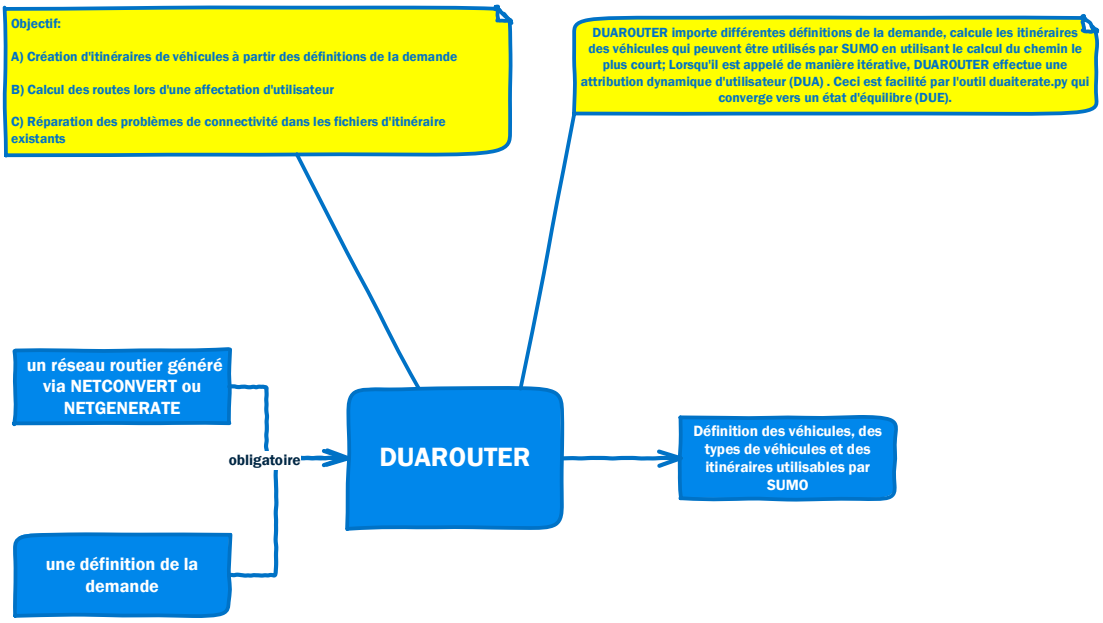
assignment



assignment

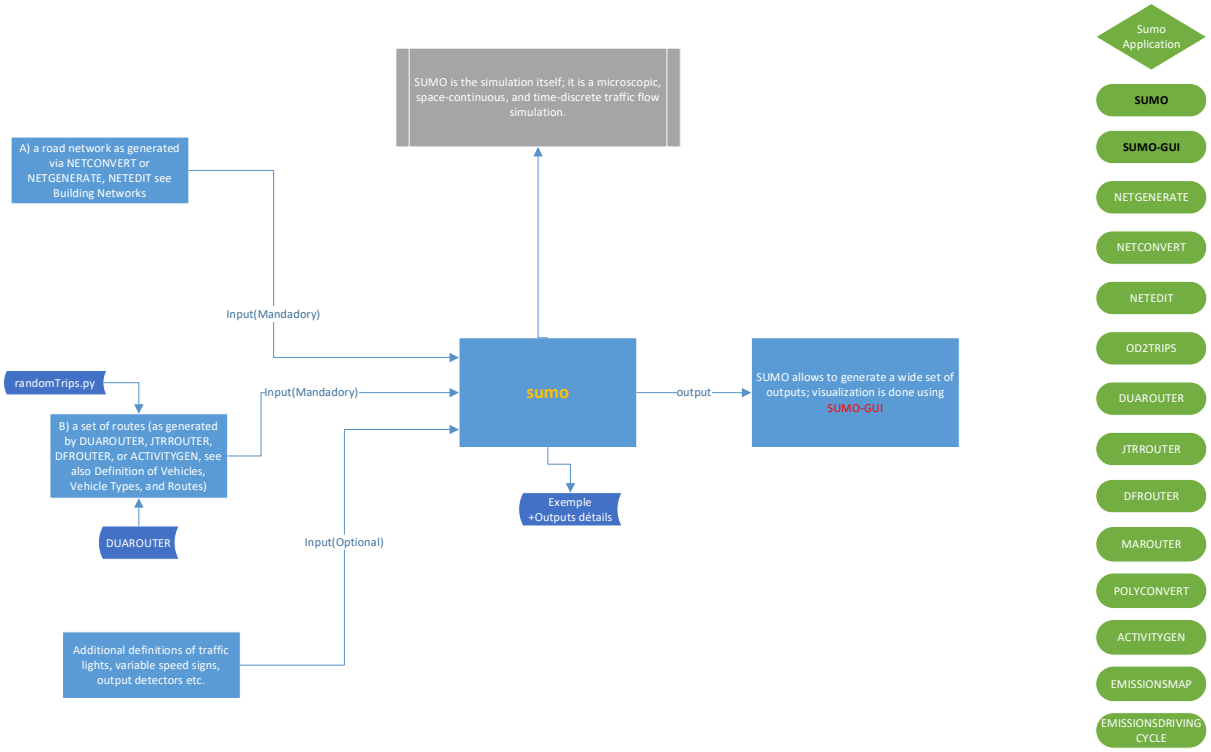


assignment

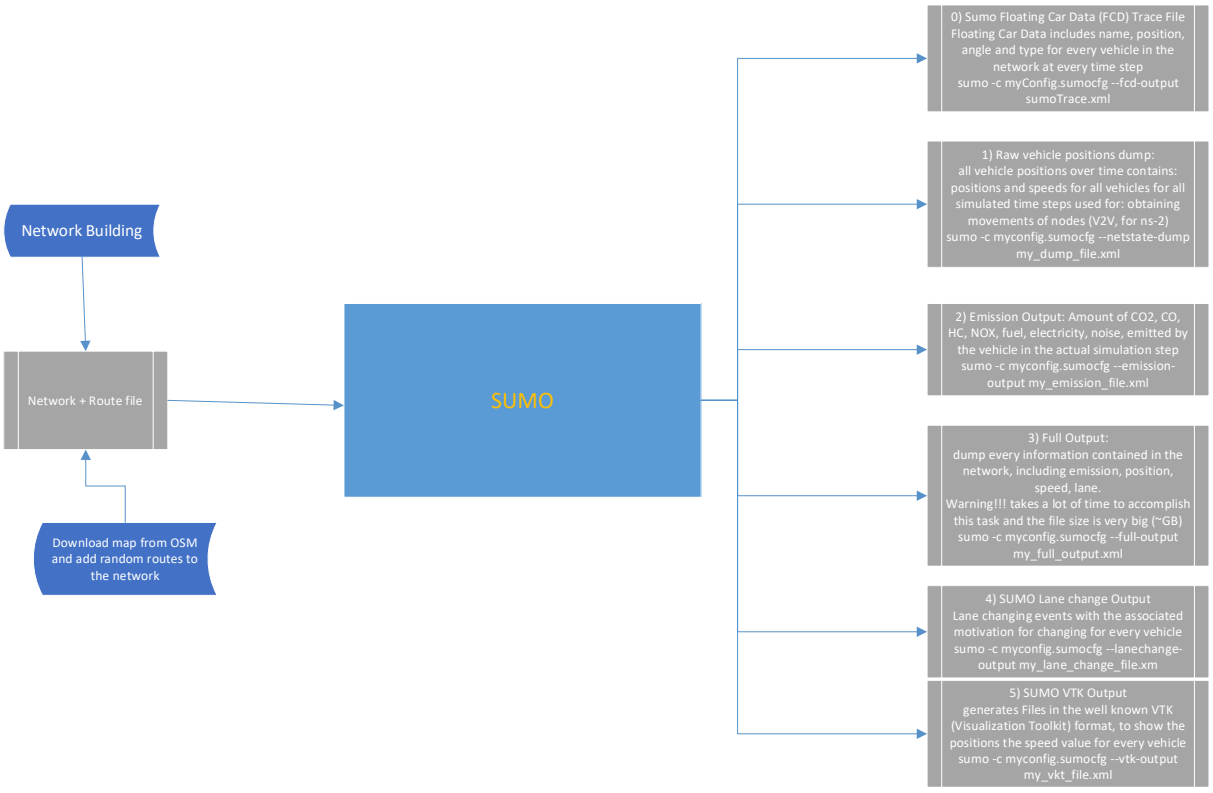


SUMO

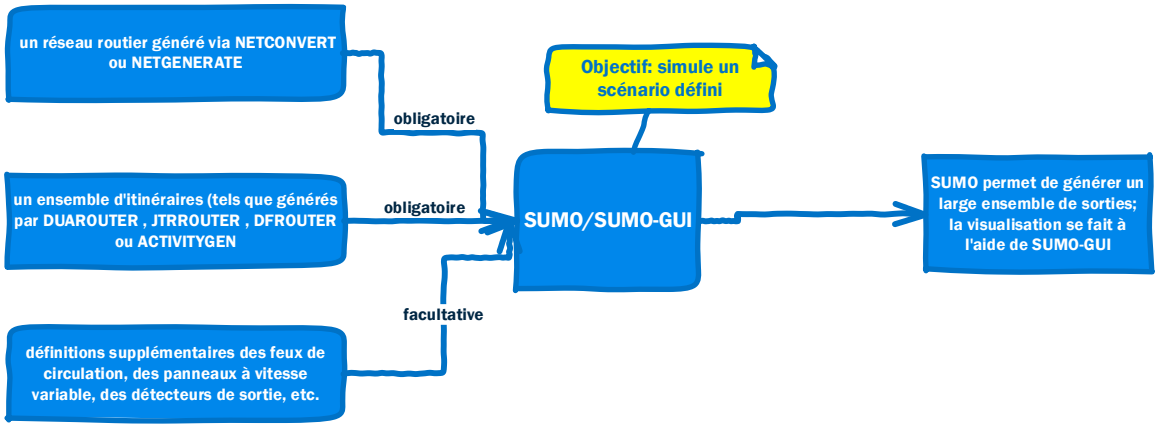
SUMO guide 2



SUMO guide 2

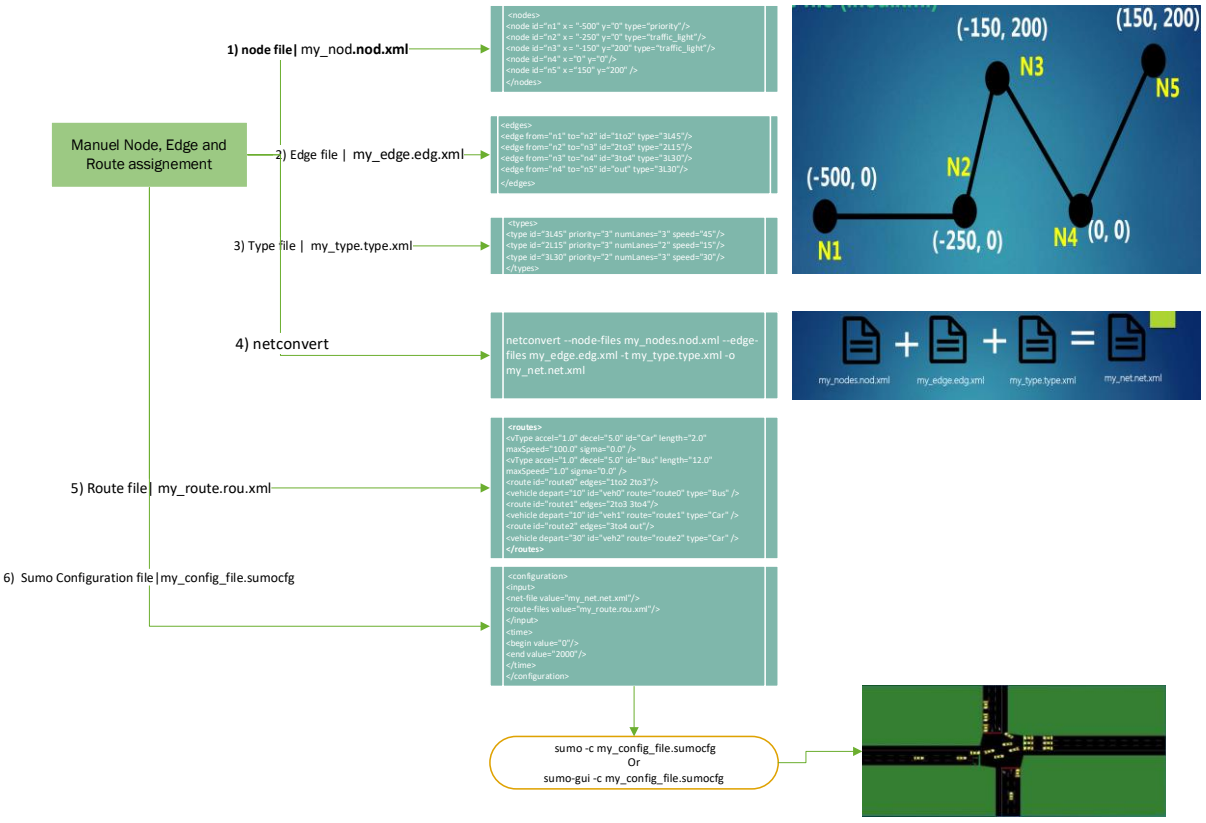


SUMO_SUMO-GUI

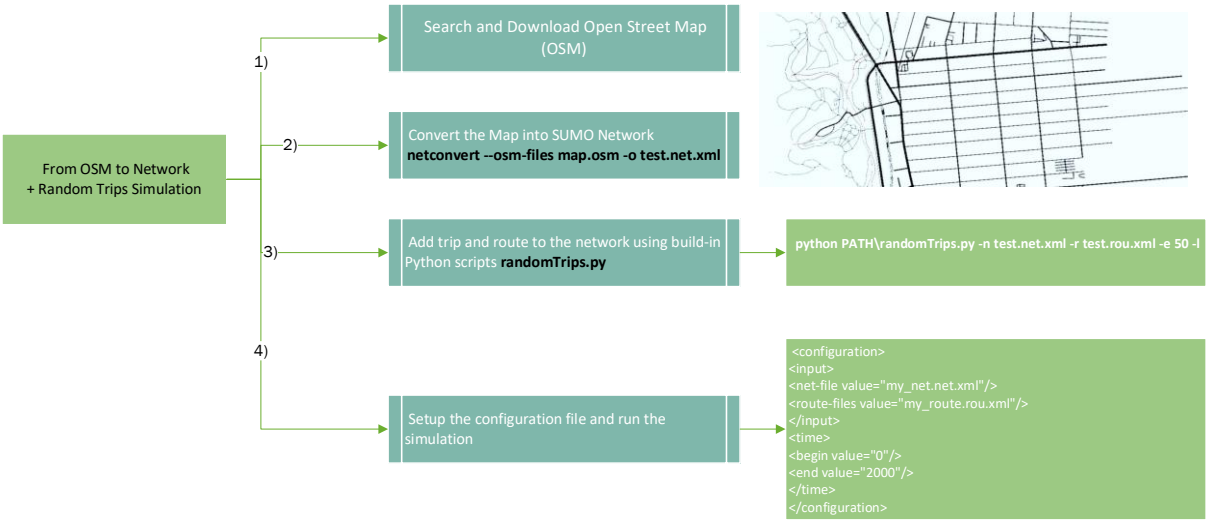

un réseau routier généré via NETCONVERT ou NETGENERATE
obligatoire
Objectif: simule un scénario défini
un ensemble d'itinéraires (tels que générés par DUAROUTER , JTRROUTER , DFROUTER ou ACTIVITYGEN
obligatoire
SUMO/SUMO-GUI
SUMO permet de générer un large ensemble de sorties; la visualisation se fait à l'aide de SUMO-GUI
facultative
définitions supplémentaires des feux de circulation, des panneaux à vitesse variable, des détecteurs de sortie, etc.

Réseau + demande + SUMO

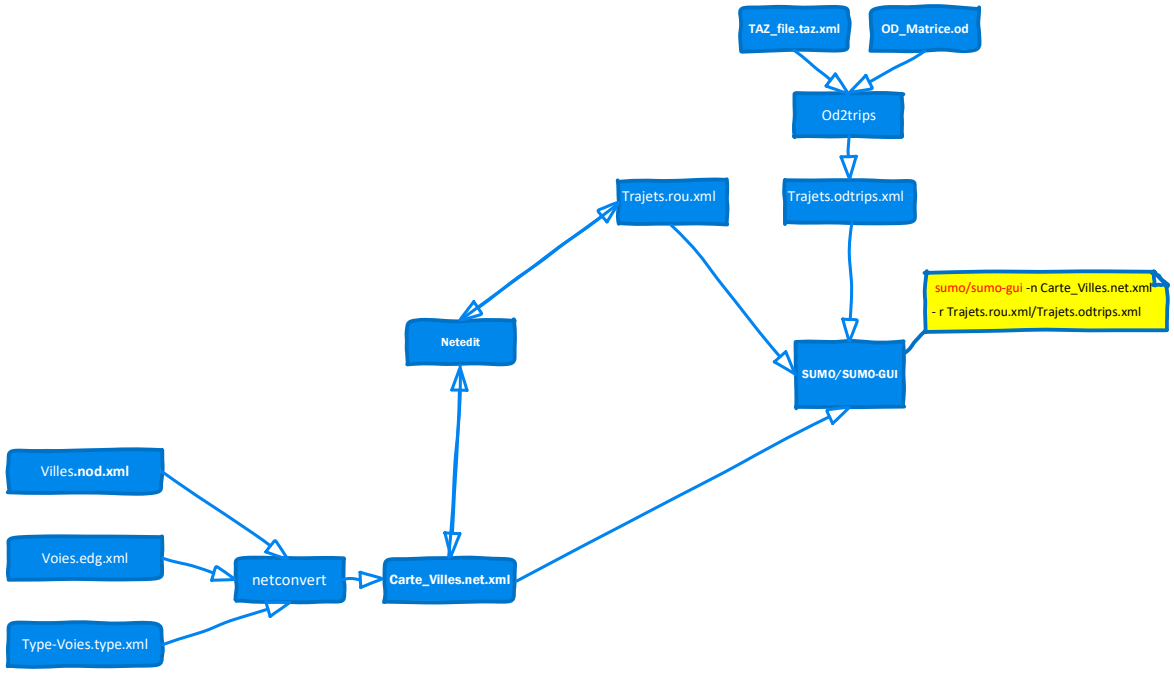
SUMO guide 1



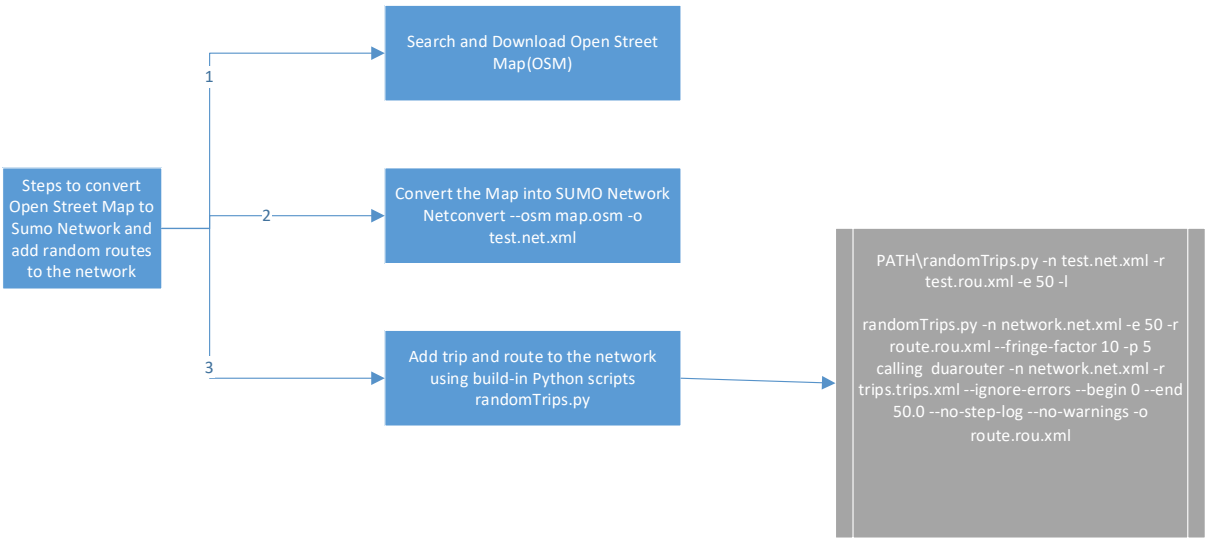
SUMO guide 1



Architecture SUMO



SUMO guide 2



Exemple NetEdit VS SUMO ROUTING :

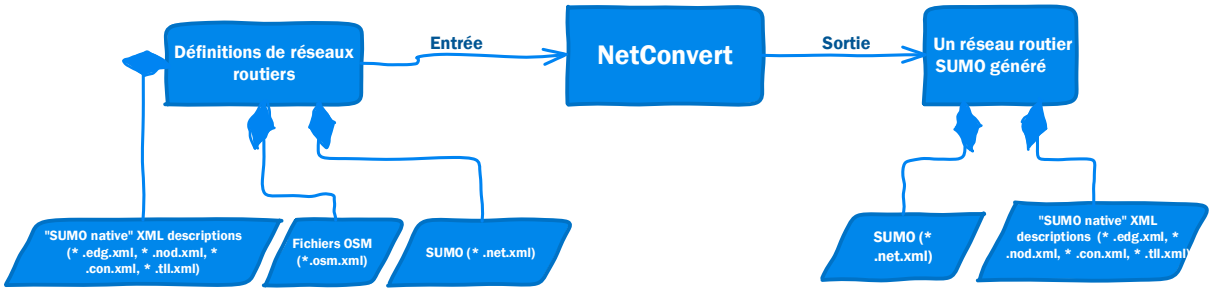
Réseaux / PlainXML

SUMO -Networks a deux représentations:

- Un ensemble de fichiers *plain-xml* qui décrivent la topologie et la géométrie du réseau
- Le fichier *.net.xml* qui est chargé dans la simulation. Il contient de nombreuses informations générées telles que les structures dans une logique d'intersection et de droit de passage.

NETCONVERT peut convertir librement et sans perte d'informations entre ces deux formats. Seul le format *plain-xml* est destiné à être édité par les utilisateurs. En revanche, le format *.net.xml* a beaucoup d'interdépendances subtiles entre ses éléments et ne doit jamais être modifié à la main. Le format *plain-xml* est décrit ci-dessous.

Il est possible de charger un fichier *net.xml* avec des fichiers correctifs *plain-xml* dans NETCONVERT pour modifier certains aspects d'un réseau existant.



1. Création manuel de réseau routière (nœuds et segments)

a. **nodes file|** Villes**.nod.xml**

```xml
<nodes>
<node id="Ariana" x = "-375" y="0"/>
<node id="Tunis" x = "-125" y="0"/>
<node id="Marsa" x = "0" y="125"/>
<node id="Bardo" x = "0" y="-125"/>
<node id="Benarous" x = "125" y="0"/>
<node id="Rades" x = "375" y="0"/>
</nodes>
```

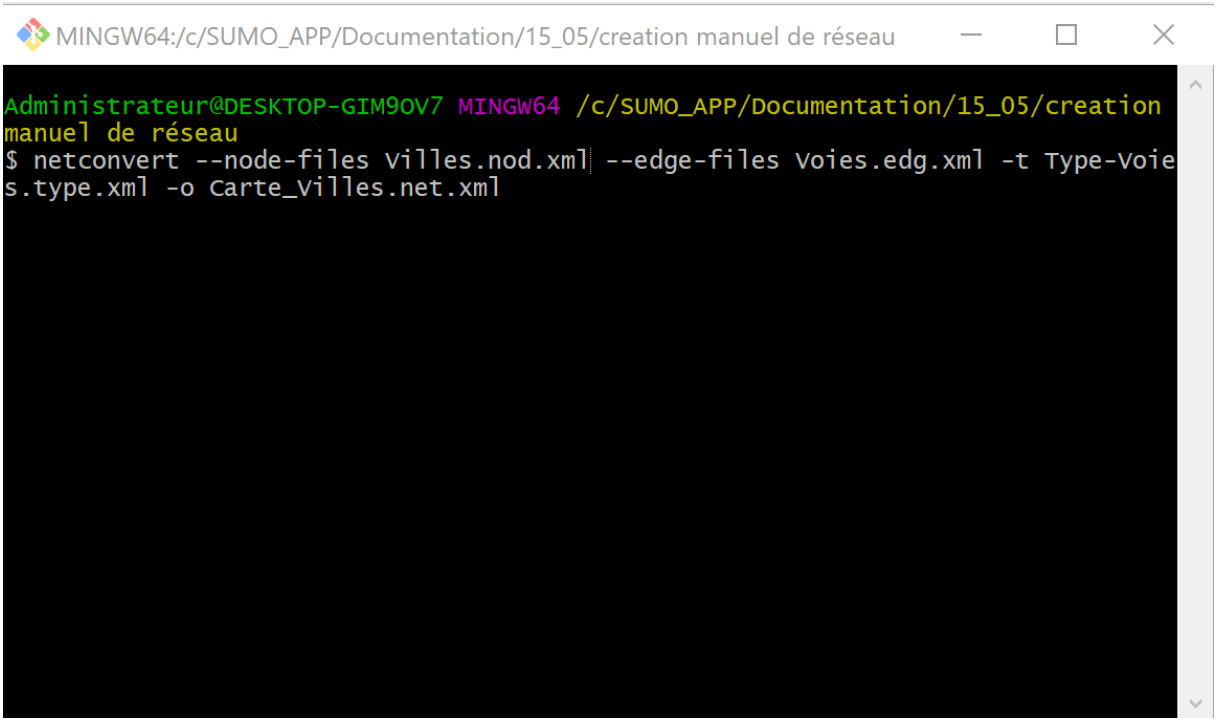
b. edges file | Voies.edg.xml

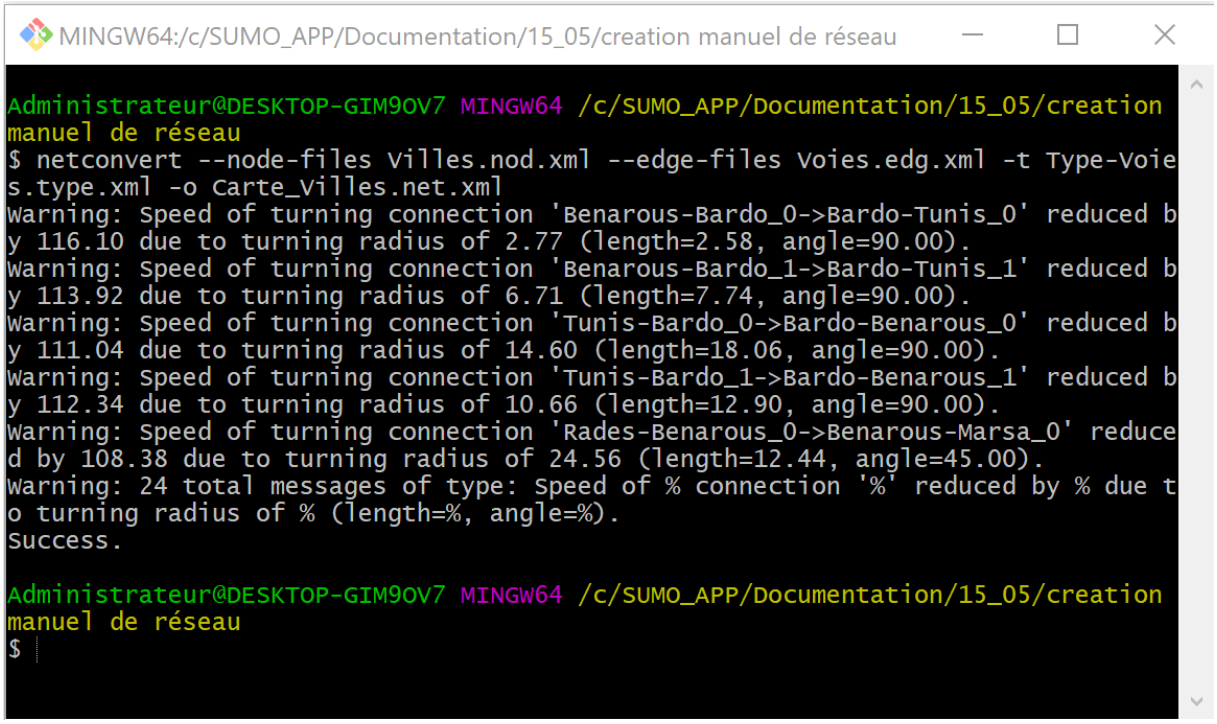
```xml
<edges>
<edge from="Ariana" to="Tunis" id="Ariana-Tunis" type="Type-Ariana-Tunis"/>
<edge from="Tunis" to="Ariana" id="Tunis-Ariana" type="Type-Tunis-Ariana"/>
<edge from="Tunis" to="Marsa" id="Tunis-Marsa" type="Type-Tunis-Marsa"/>
<edge from="Marsa" to="Tunis" id="Marsa-Tunis" type="Type-Marsa-Tunis"/>
<edge from="Tunis" to="Bardo" id="Tunis-Bardo" type="Type-Tunis-Bardo"/>
<edge from="Bardo" to="Tunis" id="Bardo-Tunis" type="Type-Bardo-Tunis"/>
<edge from="Marsa" to="Benarous" id="Marsa-Benarous" type="Type-Marsa-Benarous"/>
<edge from="Benarous" to="Marsa" id="Benarous-Marsa" type="Type-Benarous-Marsa"/>
<edge from="Bardo" to="Benarous" id="Bardo-Benarous" type="Type-Bardo-Benarous"/>
<edge from="Benarous" to="Bardo" id="Benarous-Bardo" type="Type-Benarous-Bardo"/>
<edge from="Benarous" to="Rades" id="Benarous-Rades" type="Type-Benarous-Rades"/>
<edge from="Rades" to="Benarous" id="Rades-Benarous" type="Type-Rades-Benarous"/>
</edges>
```

c. Type edges file| Type-Voies.type.xml

```xml
<types>
<type id="Type-Ariana-Tunis" priority="-1" numLanes="2" speed="120"/>
<type id="Type-Tunis-Ariana" priority="-1" numLanes="2" speed="120"/>
<type id="Type-Tunis-Marsa" priority="-1" numLanes="2" speed="120"/>
<type id="Type-Marsa-Tunis" priority="-1" numLanes="2" speed="120"/>
<type id="Type-Tunis-Bardo" priority="-1" numLanes="2" speed="120"/>
<type id="Type-Bardo-Tunis" priority="-1" numLanes="2" speed="120"/>
<type id="Type-Marsa-Benarous" priority="-1" numLanes="2" speed="120"/>
<type id="Type-Benarous-Marsa" priority="-1" numLanes="2" speed="120"/>
<type id="Type-Bardo-Benarous" priority="-1" numLanes="2" speed="120"/>
<type id="Type-Benarous-Bardo" priority="-1" numLanes="2" speed="120"/>
<type id="Type-Benarous-Rades" priority="-1" numLanes="2" speed="120"/>
<type id="Type-Rades-Benarous" priority="-1" numLanes="2" speed="120"/>
</types>
```

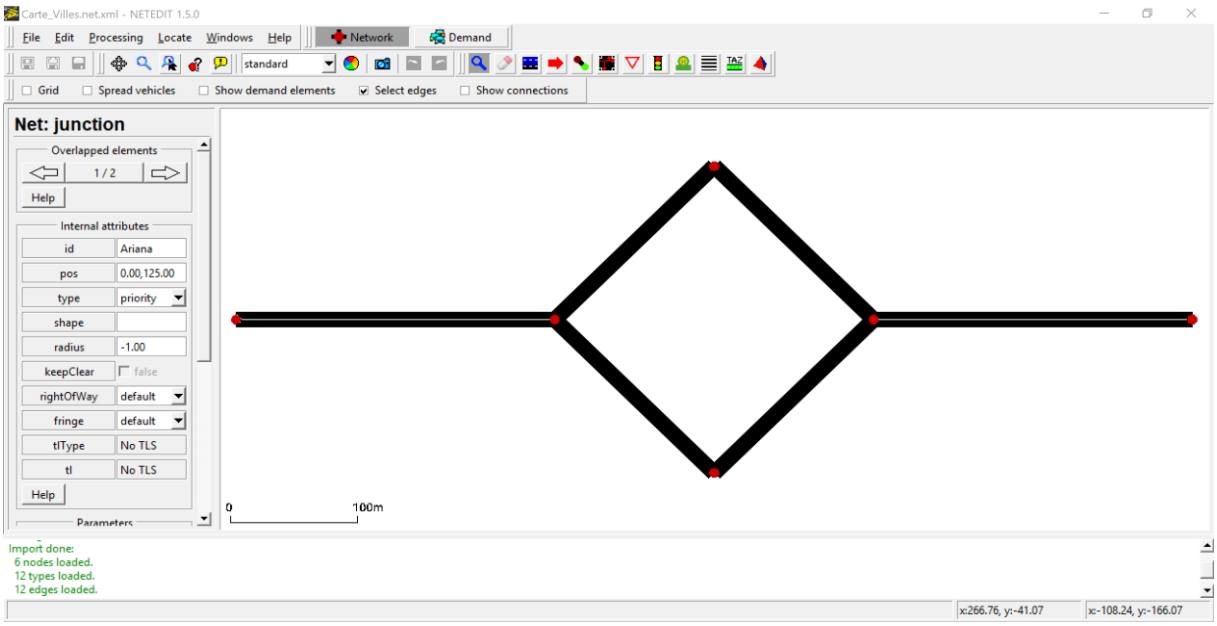
d. Application netconvert





e. Carte_Villes.net.xml:

```
"http://sumo.dlr.de/xsd/net_file.xsd">

    <location netOffset="375.00,125.00" convBoundary="0.00,0.00,750.00,250.00" origBoundary="-375.00,-125.00,375.00,125.00" projParameter="!"/>

    <type id="Type-Ariana-Tunis" priority="-1" numLanes="2" speed="120.00"/>
    <type id="Type-Bardo-Benarous" priority="-1" numLanes="2" speed="120.00"/>
    <type id="Type-Bardo-Tunis" priority="-1" numLanes="2" speed="120.00"/>
    <type id="Type-Benarous-Bardo" priority="-1" numLanes="2" speed="120.00"/>
    <type id="Type-Benarous-Marsa" priority="-1" numLanes="2" speed="120.00"/>
    <type id="Type-Benarous-Rades" priority="-1" numLanes="2" speed="120.00"/>
    <type id="Type-Marsa-Benarous" priority="-1" numLanes="2" speed="120.00"/>
    <type id="Type-Marsa-Tunis" priority="-1" numLanes="2" speed="120.00"/>
    <type id="Type-Rades-Benarous" priority="-1" numLanes="2" speed="120.00"/>
    <type id="Type-Tunis-Ariana" priority="-1" numLanes="2" speed="120.00"/>
    <type id="Type-Tunis-Bardo" priority="-1" numLanes="2" speed="120.00"/>
    <type id="Type-Tunis-Marsa" priority="-1" numLanes="2" speed="120.00"/>

    <edge id=":Ariana_0" function="internal">
        <lane id=":Ariana_0_0" index="0" speed="3.65" length="4.67" shape="0.00,126.60 -1.20,125.80 -1.60,125.00 -1.20,124.20 0.00,123.40"/>
    </edge>
    <edge id=":Bardo_0" function="internal">
        <lane id=":Bardo_0_0" index="0" speed="3.90" length="2.58" shape="376.13,7.92 375.57,7.50 375.00,7.35 374.43,7.50 373.87,7.92"/>
    </edge>
    <edge id=":Bardo_1" function="internal">
        <lane id=":Bardo_1_0" index="0" speed="6.08" length="7.74" shape="378.39,5.66 376.70,4.38 375.00,3.96 373.30,4.38 371.61,5.66"/>
    </edge>
    <edge id=":Bardo_2" function="internal">
        <lane id=":Bardo_2_0" index="0" speed="8.96" length="18.06" shape="367.08,1.13 371.04,-1.84 375.00,-2.83 378.96,-1.84 382.92,1.13"/>
    </edge>
    <edge id=":Bardo_3" function="internal">
        <lane id=":Bardo_3_0" index="0" speed="7.66" length="12.90" shape="369.34,3.39 372.17,1.27 375.00,0.57 377.83,1.27 380.66,3.39"/>
    </edge>
    <edge id=":Benarous_0" function="internal">
        <lane id=":Benarous_0_0" index="0" speed="11.62" length="12.44" shape="506.65,129.80 504.24,130.17 501.67,131.29 498.93,133.15 496.04,135.75"/>
    </edge>
    <edge id=":Benarous_1" function="internal">
        <lane id=":Benarous_1_0" index="0" speed="12.70" length="14.95" shape="506.65,126.60 503.60,127.03 500.44,128.32 497.16,130.47 493.78,133.49"/>
```



2. Ajout de la demande(O/D)

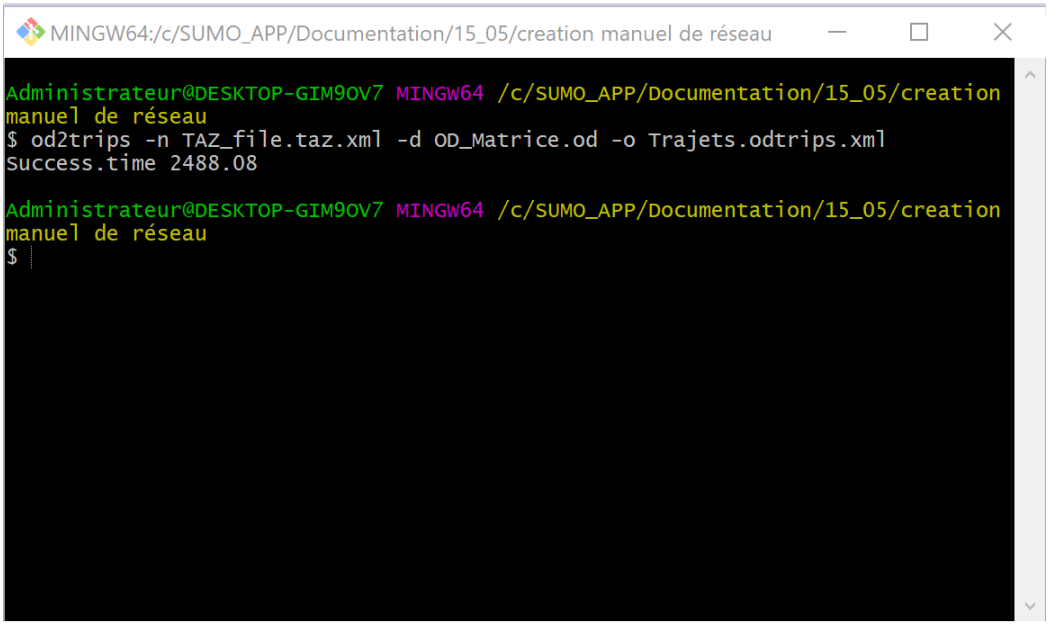
a. Traffic Assignment Zone (TAZ) definition File| TAZ_file.taz.xml

```
<additional>
<tazs>
<taz id="1" edges="Ariana-Tunis">
</taz>
<taz id="2" edges="Benarous-Rades">
</taz>
</tazs>
</additional>
```

b. Origin-Destination Matrix File | OD_Matrice.od

```
$O;D2
* From-Time To-Time
0.00 1.00
* Factor
1.00
*
* some
* additional
* comments
1 2 1
```

c. Application Od2trips



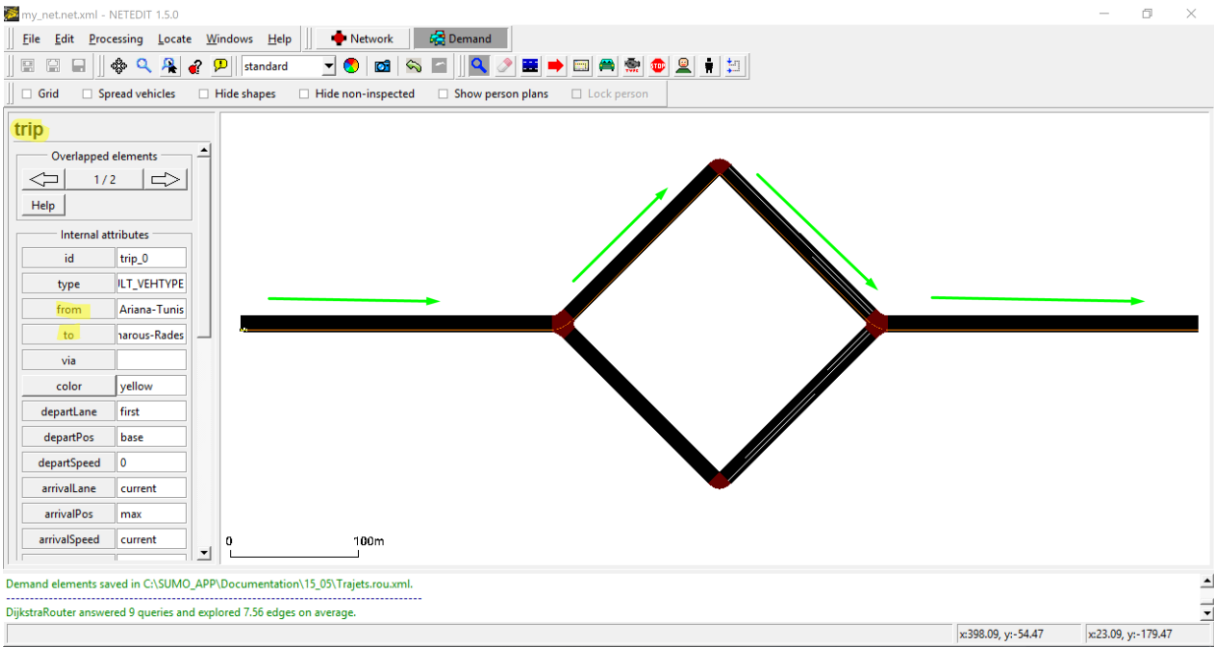
d. Trajets.odtrips.xml

```xml
<?xml version="1.0" encoding="UTF-8"?>

<!-- generated on 05/15/20 13:46:24 by Eclipse SUMO od2trips Version 1.5.0
<configuration xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="http://sumo.dlr.de/xsd/od2tripsConfiguration.xsd">

    <input>
        <taz-files value="TAZ_file.taz.xml"/>
        <od-matrix-files value="OD_Matrice.od"/>
    </input>

    <output>
        <output-file value="Trajets.odtrips.xml"/>
    </output>

</configuration>
-->

<routes xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="http://sumo.dlr.de/xsd/routes_file.xsd">
    <trip id="0" depart="2488.08" from="Ariana-Tunis" to="Benarous-Rades" fromTaz="1" toTaz="2" departLane="free" departSpeed="max"/>
</routes>

```

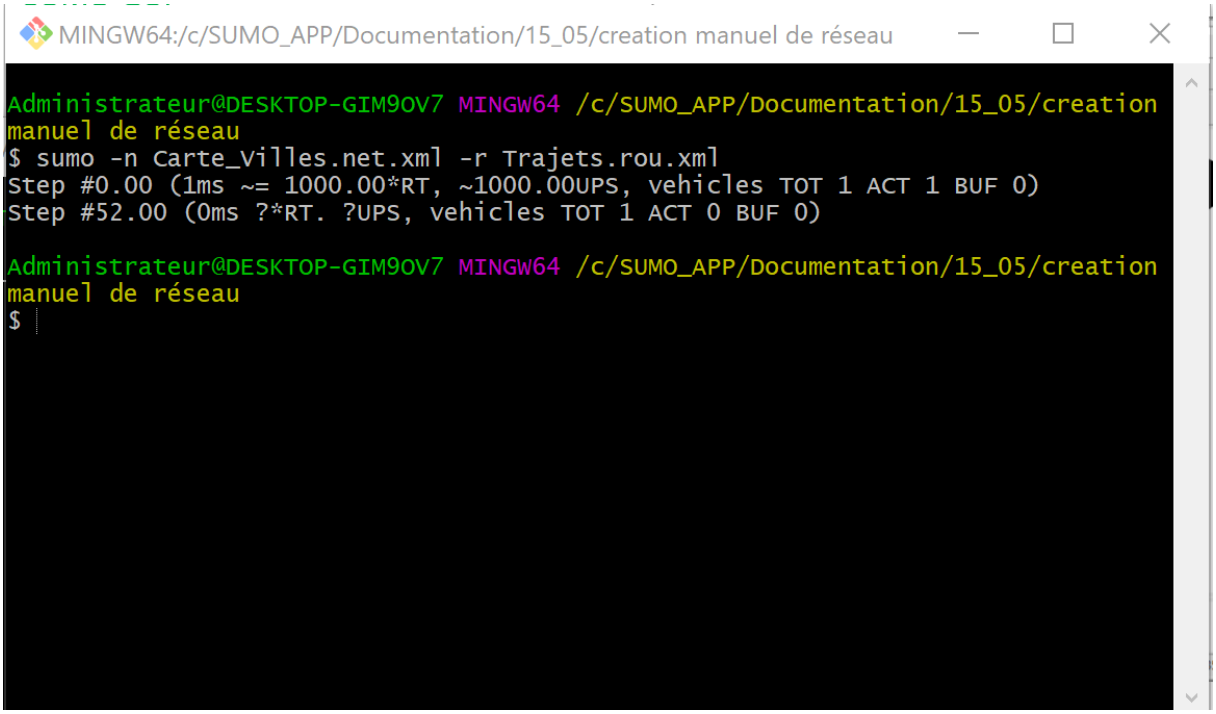
e. Fichier route Trajets.rou.xml

```xml
<?xml version="1.0" encoding="UTF-8"?>

<routes xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="http://sumo.dlr.de/xsd/routes_file.xsd">
    <trip id="0" depart="2488.08" from="Ariana-Tunis" to="Benarous-Rades" fromTaz="1" toTaz="2" departLane="free" departSpeed="max"/>
</routes>

```

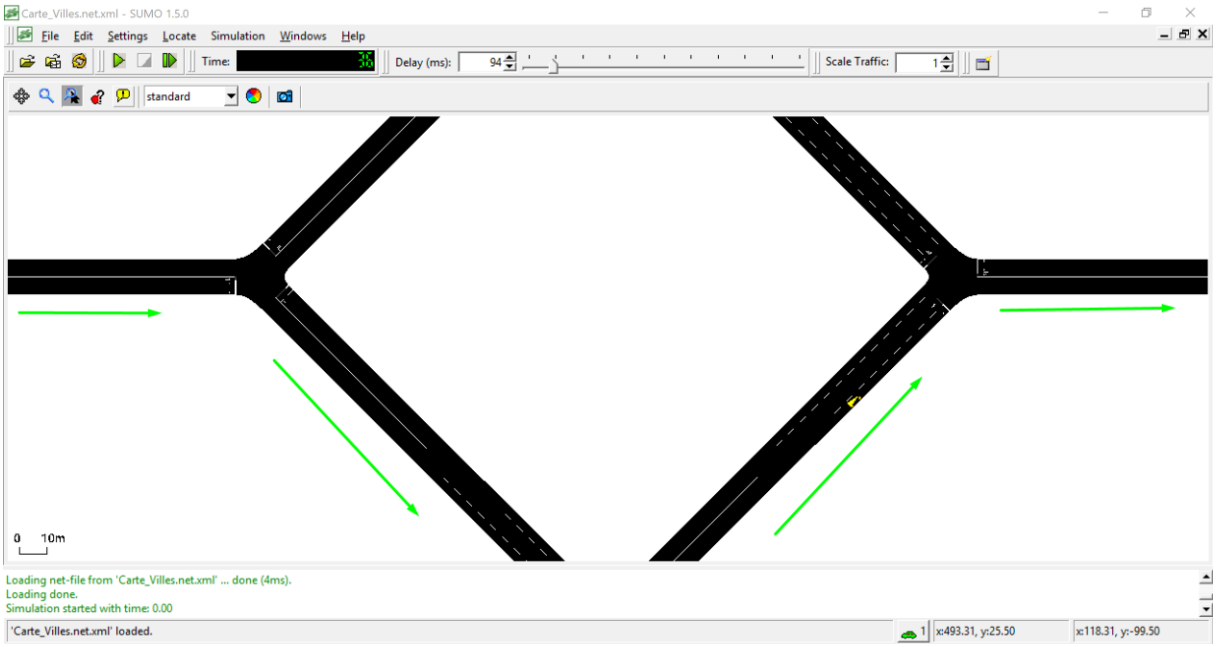
3. Ouvrir la carte et la demande dans l'application Netedit(optionnel) :


my_net.net.xml - NETEDIT 1.5.0
File Edit Processing Locate Windows Help
Network
Demand
standard
Grid
Spread vehicles
Hide shapes
Hide non-inspected
Show person plans
Lock person
trip
Overlapped elements
1 / 2
Help
Internal attributes
id
trip_0
type
ILT_VEHTYPE
from
Ariana-Tunis
to
arous-Rades
via
color
yellow
departLane
first
departPos
base
departSpeed
0
arrivalLane
current
arrivalPos
max
arrivalSpeed
current
0
100m
Demand elements saved in C:\SUMO_APP\Documentation\15_05\Trajets.rou.xml.
DijkstraRouter answered 9 queries and explored 7.56 edges on average.
x:398.09, y:-54.47
x:23.09, y:-179.47

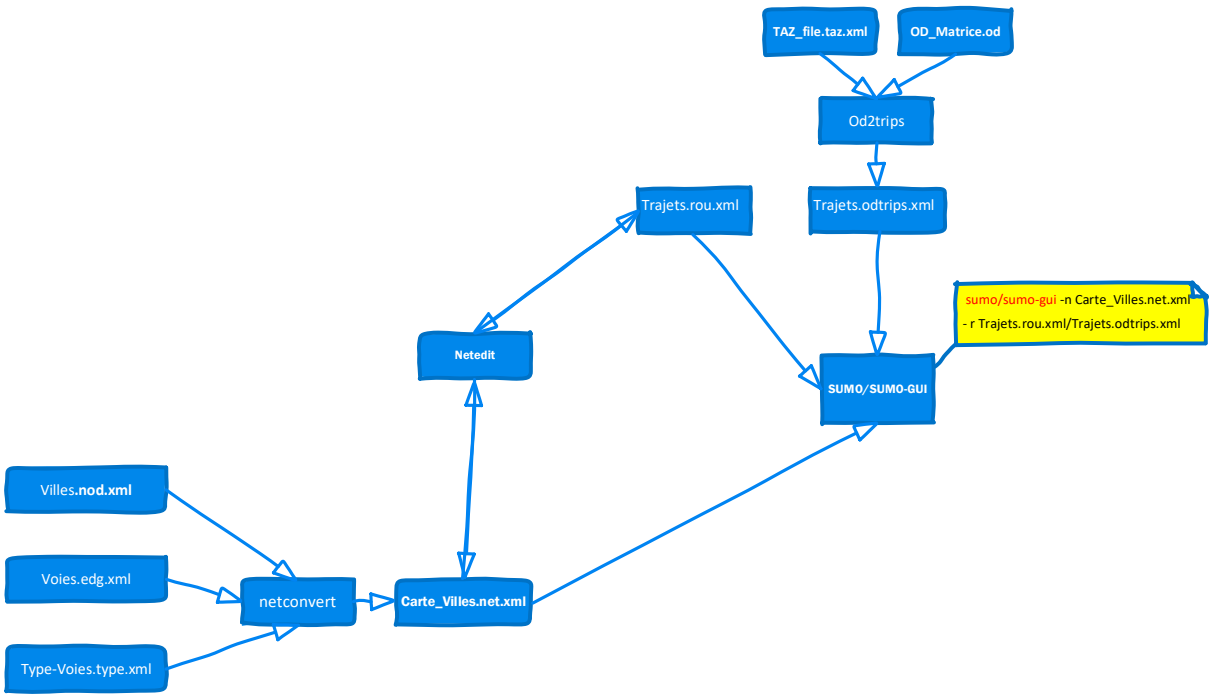
4. SUMO


MINGW64:/c/SUMO_APP/Documentation/15_05/creation manuel de réseau
Administrateur@DESKTOP-GIM9OV7 MINGW64 /c/SUMO_APP/Documentation/15_05/creation manuel de réseau
$ sumo -n Carte_Villes.net.xml -r Trajets.rou.xml
Step #0.00 (1ms ~= 1000.00*RT, ~1000.00UPS, vehicles TOT 1 ACT 1 BUF 0)
Step #52.00 (0ms ?*RT. ?UPS, vehicles TOT 1 ACT 0 BUF 0)
Administrateur@DESKTOP-GIM9OV7 MINGW64 /c/SUMO_APP/Documentation/15_05/creation manuel de réseau
$

5. SUMO-GUI

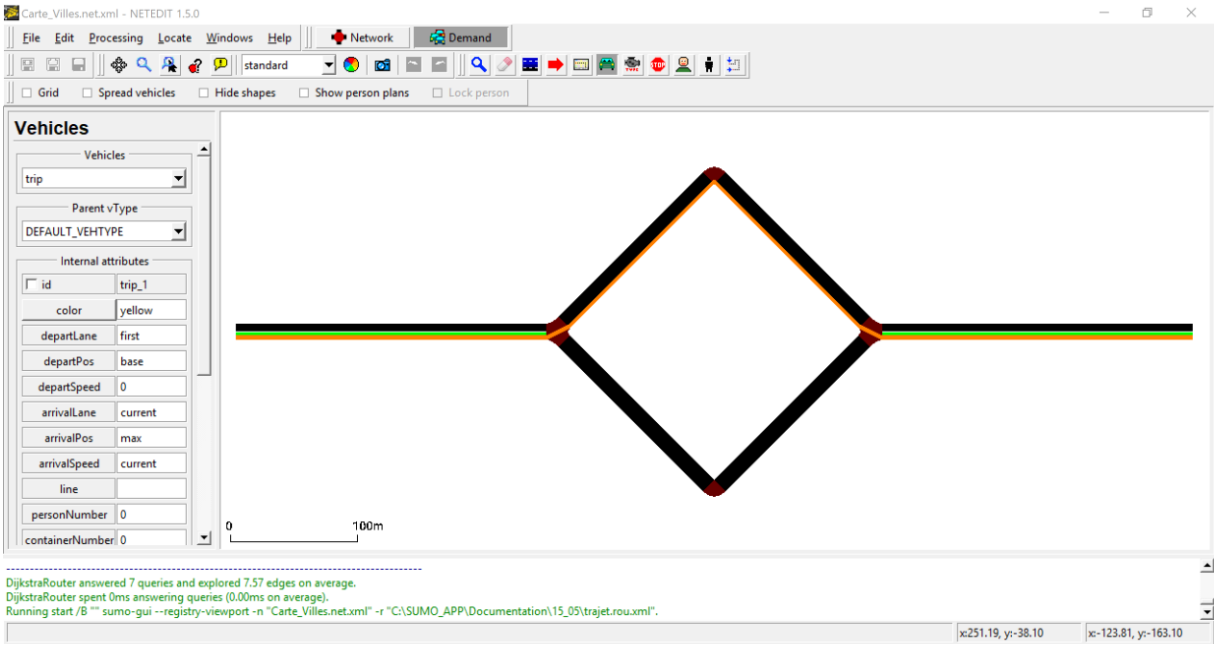


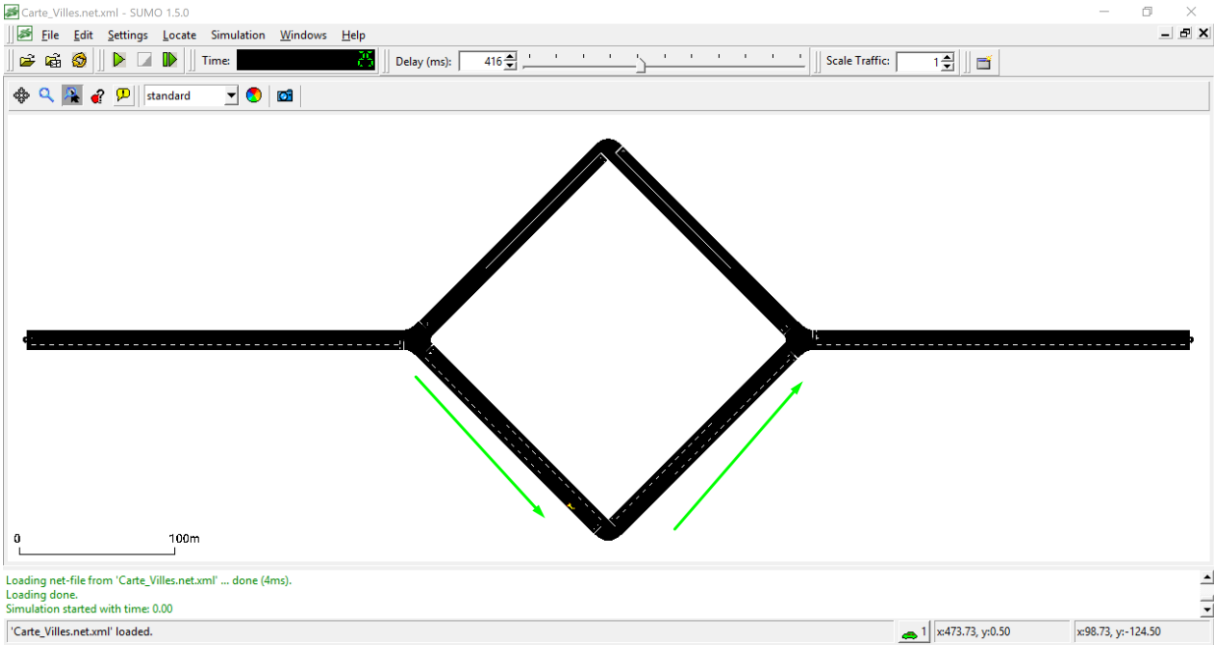
6. Organigramme explicatif



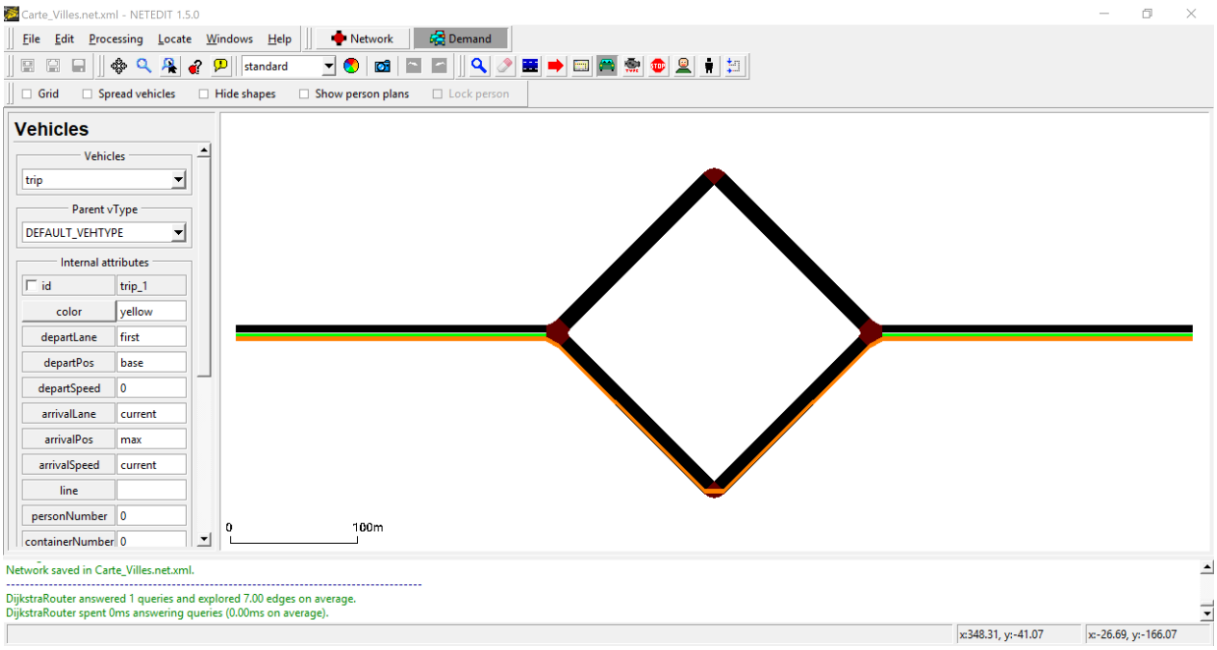
7. Evaluation

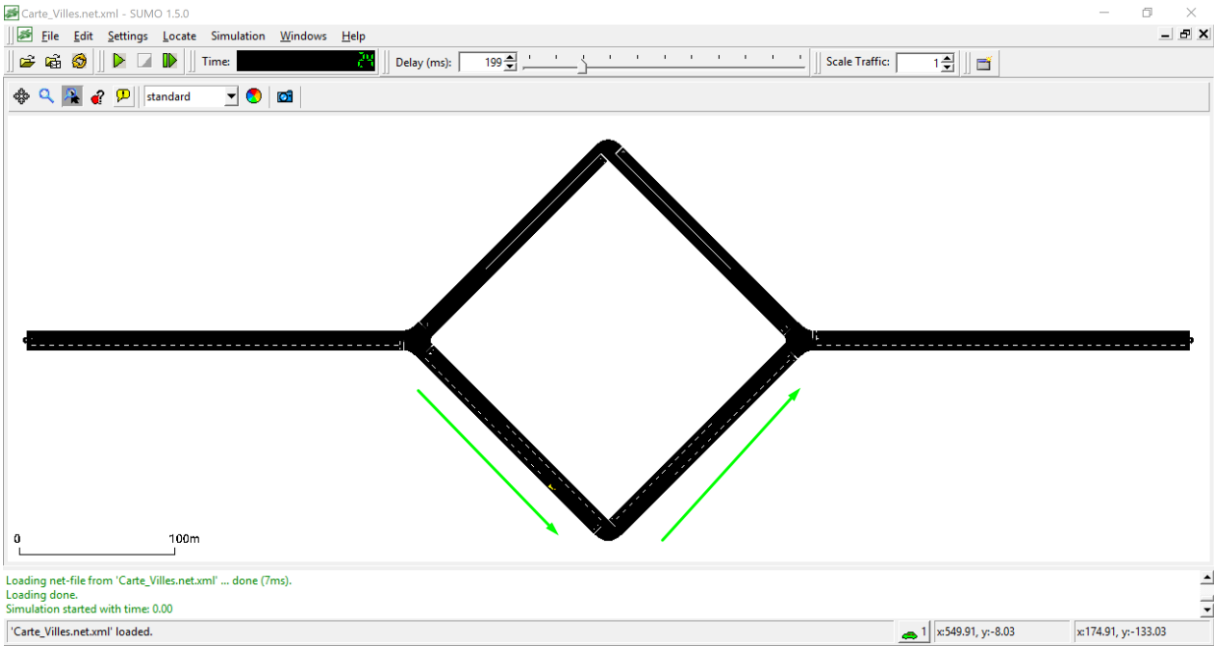
Speed =120 (Tunis-Marsa et Marsa-Benarous)



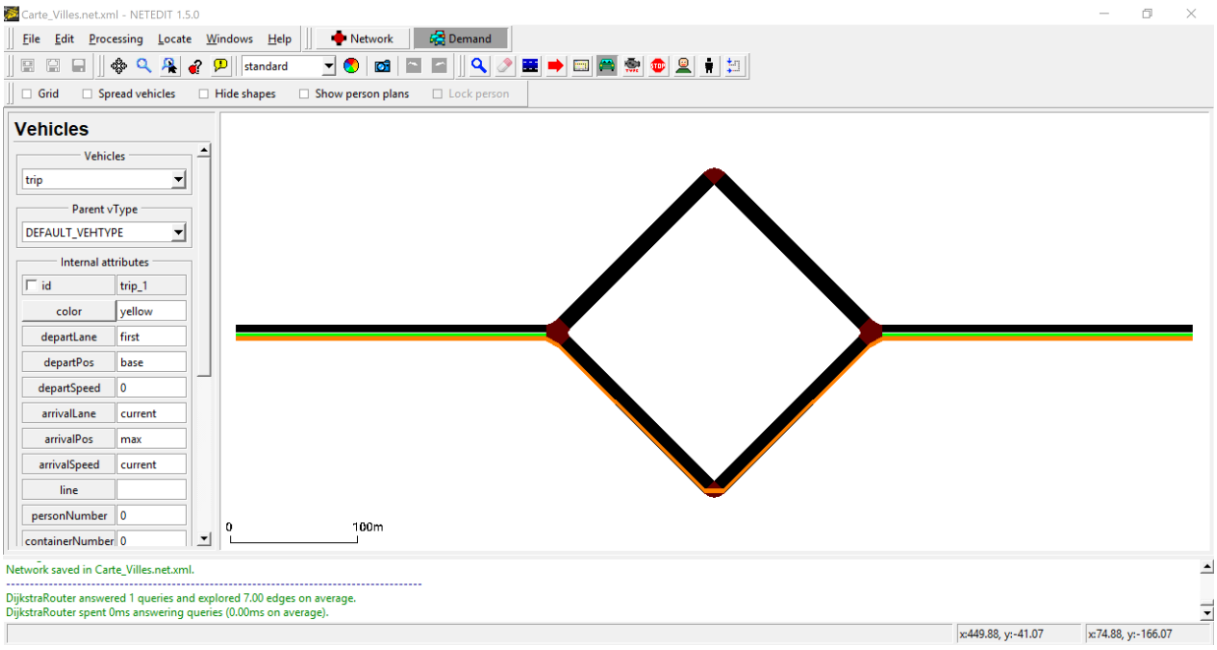


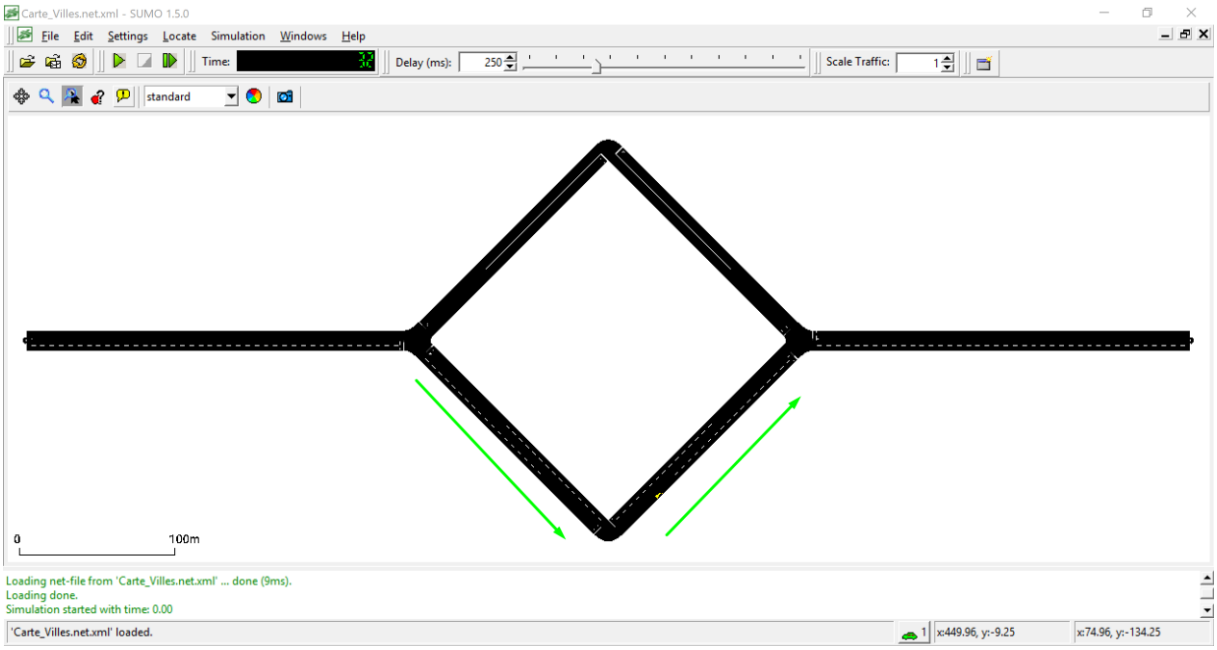
Speed = 60


Carte_Villes.net.xml - NETEDIT 1.5.0
File Edit Processing Locate Windows Help
Network
Demand
standard
Grid
Spread vehicles
Hide shapes
Show person plans
Lock person
Vehicles
Vehicles
trip
Parent vType
DEFAULT_VEHTYPE
Internal attributes
id
trip_1
color
yellow
departLane
first
departPos
base
departSpeed
0
arrivalLane
current
arrivalPos
max
arrivalSpeed
current
line
personNumber
0
containerNumber
0
0
100m
Network saved in Carte_Villes.net.xml.
DijkstraRouter answered 1 queries and explored 7.00 edges on average.
DijkstraRouter spent 0ms answering queries (0.00ms on average).
x:348.31, y:-41.07
x:-26.69, y:-166.07

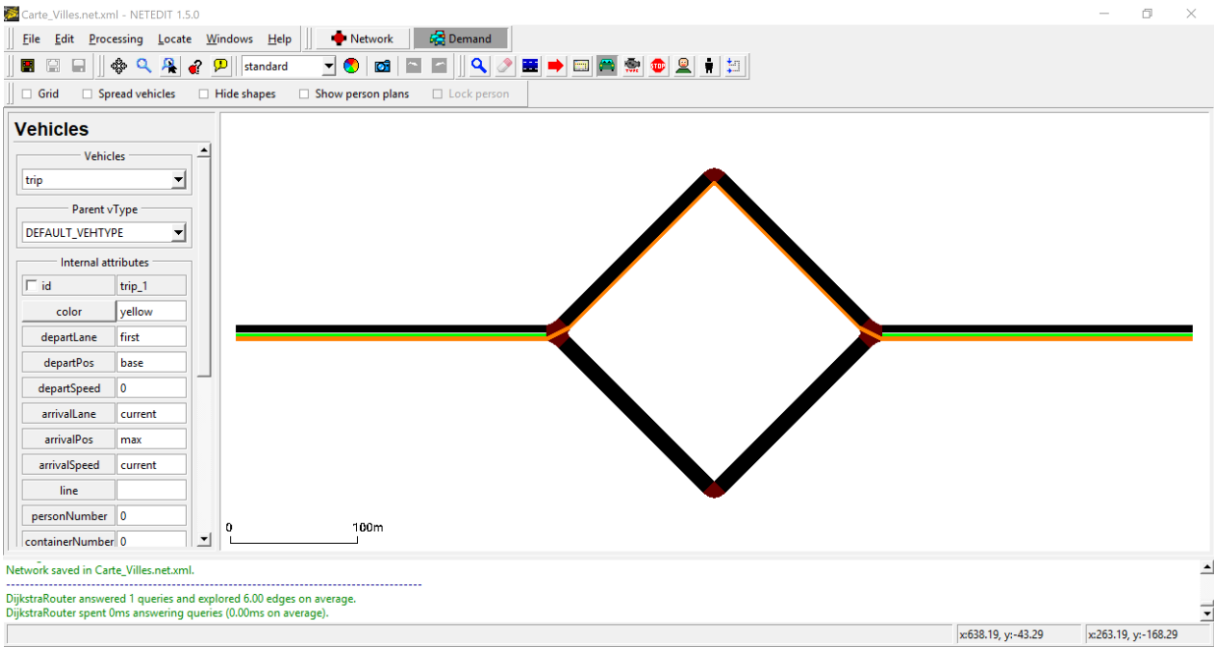

Carte_Villes.net.xml - SUMO 1.5.0
File Edit Settings Locate Simulation Windows Help
Time:
Delay (ms):
199
Scale Traffic:
1
standard
0
100m
Loading net-file from 'Carte_Villes.net.xml' ... done (7ms).
Loading done.
Simulation started with time: 0.00
'Carte_Villes.net.xml' loaded.
1
x:549.91, y:-8.03
x:174.91, y:-133.03

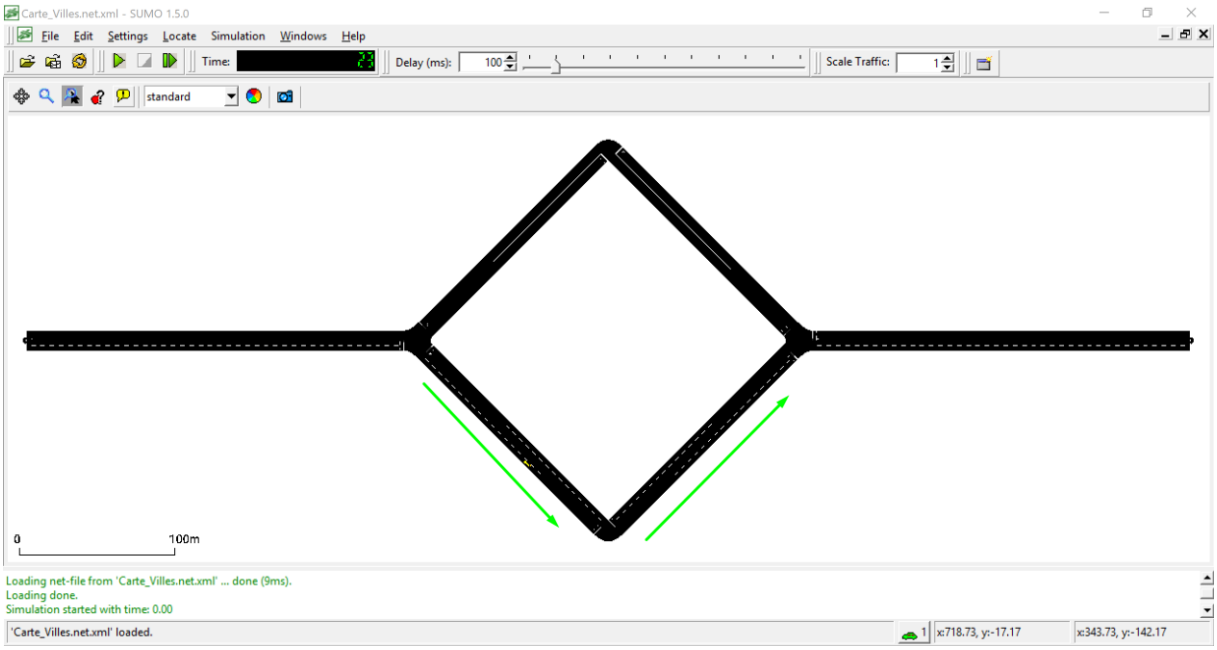
Speed = 20



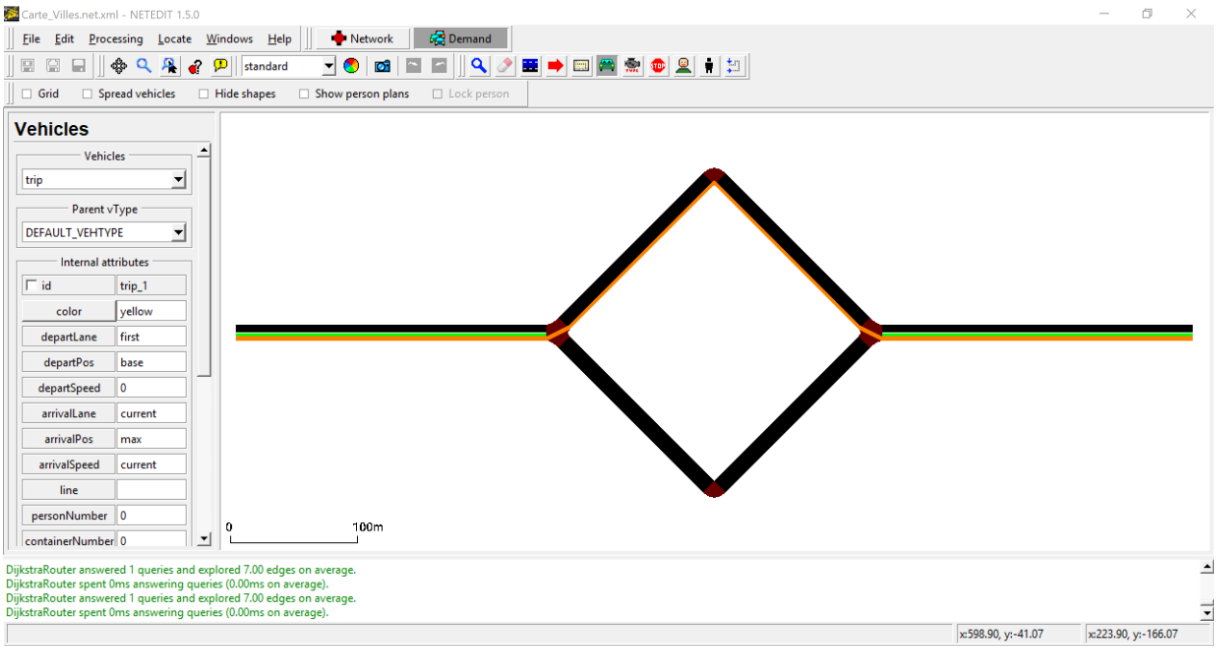


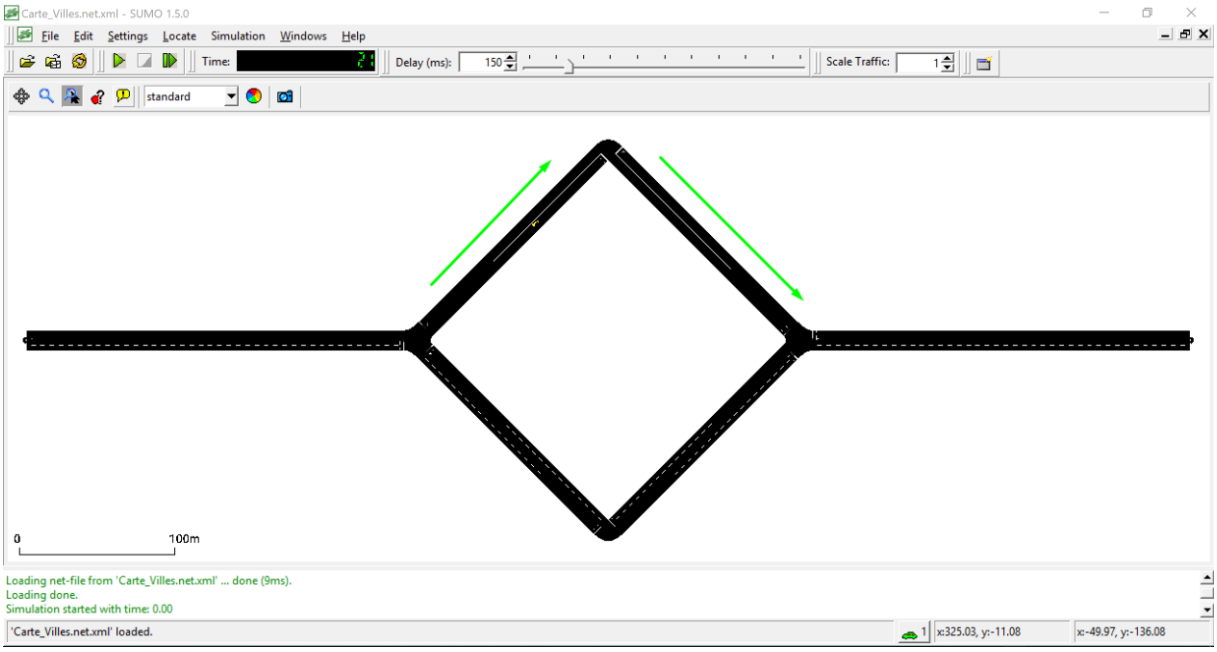
Length = 159.98


Carte_Villes.net.xml - NETEDIT 1.5.0
File Edit Processing Locate Windows Help
Network
Demand
standard
Grid
Spread vehicles
Hide shapes
Show person plans
Lock person
Vehicles
Vehicles
trip
Parent vType
DEFAULT_VEHTYPE
Internal attributes
id trip_1
color yellow
departLane first
departPos base
departSpeed 0
arrivalLane current
arrivalPos max
arrivalSpeed current
line
personNumber 0
containerNumber 0
0
100m
Network saved in Carte_Villes.net.xml.
DijkstraRouter answered 1 queries and explored 6.00 edges on average.
DijkstraRouter spent 0ms answering queries (0.00ms on average).
x:638.19, y:-43.29
x:263.19, y:-168.29

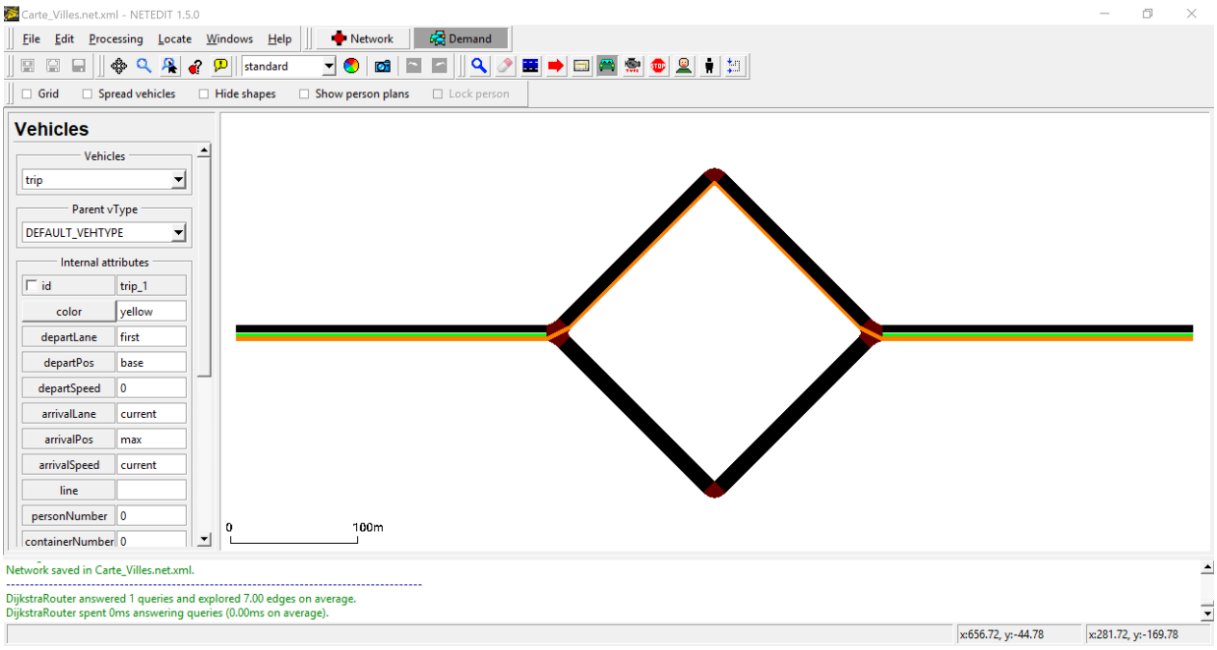

Carte_Villes.net.xml - SUMO 1.5.0
File Edit Settings Locate Simulation Windows Help
Time:
Delay (ms):
100
Scale Traffic:
1
standard
0
100m
Loading net-file from 'Carte_Villes.net.xml' ... done (9ms).
Loading done.
Simulation started with time: 0.00
'Carte_Villes.net.xml' loaded.
x:718.73, y:-17.17
x:343.73, y:-142.17

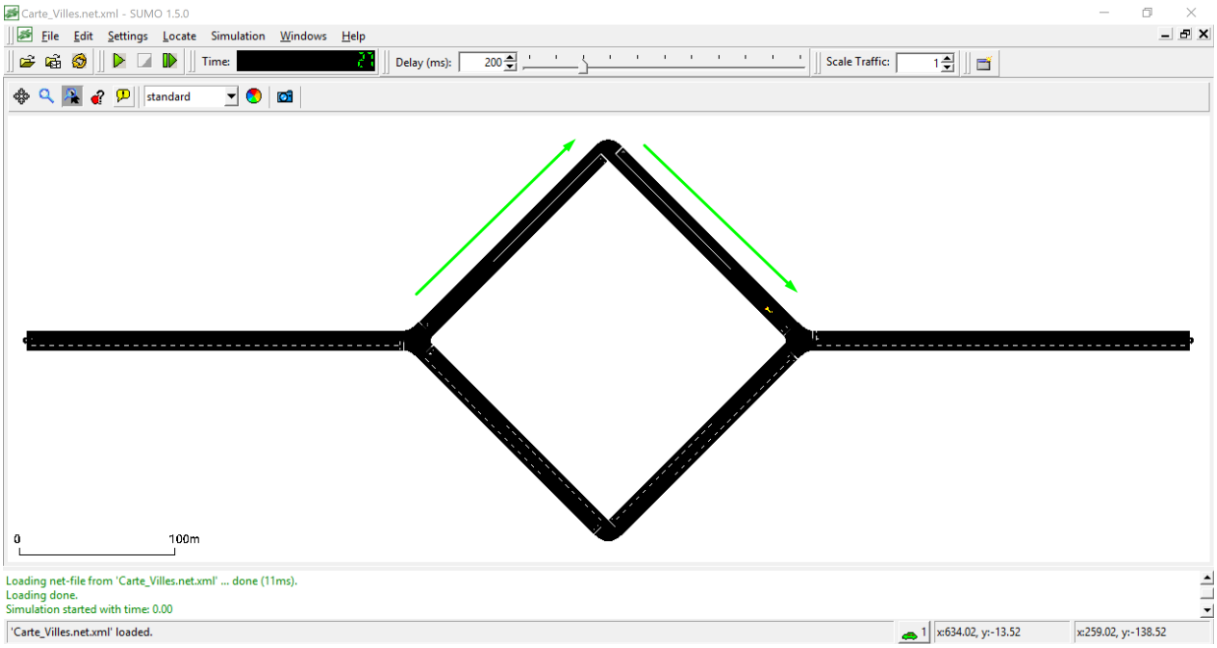
Length = 100


Carte_Villes.net.xml - NETEDIT 1.5.0
File Edit Processing Locate Windows Help
Network
Demand
standard
Grid
Spread vehicles
Hide shapes
Show person plans
Lock person
Vehicles
Vehicles
trip
Parent vType
DEFAULT_VEHTYPE
Internal attributes
id trip_1
color yellow
departLane first
departPos base
departSpeed 0
arrivalLane current
arrivalPos max
arrivalSpeed current
line
personNumber 0
containerNumber 0
0
100m
DijkstraRouter answered 1 queries and explored 7.00 edges on average.
DijkstraRouter spent 0ms answering queries (0.00ms on average).
DijkstraRouter answered 1 queries and explored 7.00 edges on average.
DijkstraRouter spent 0ms answering queries (0.00ms on average).
x:598.90, y:-41.07
x:223.90, y:-166.07

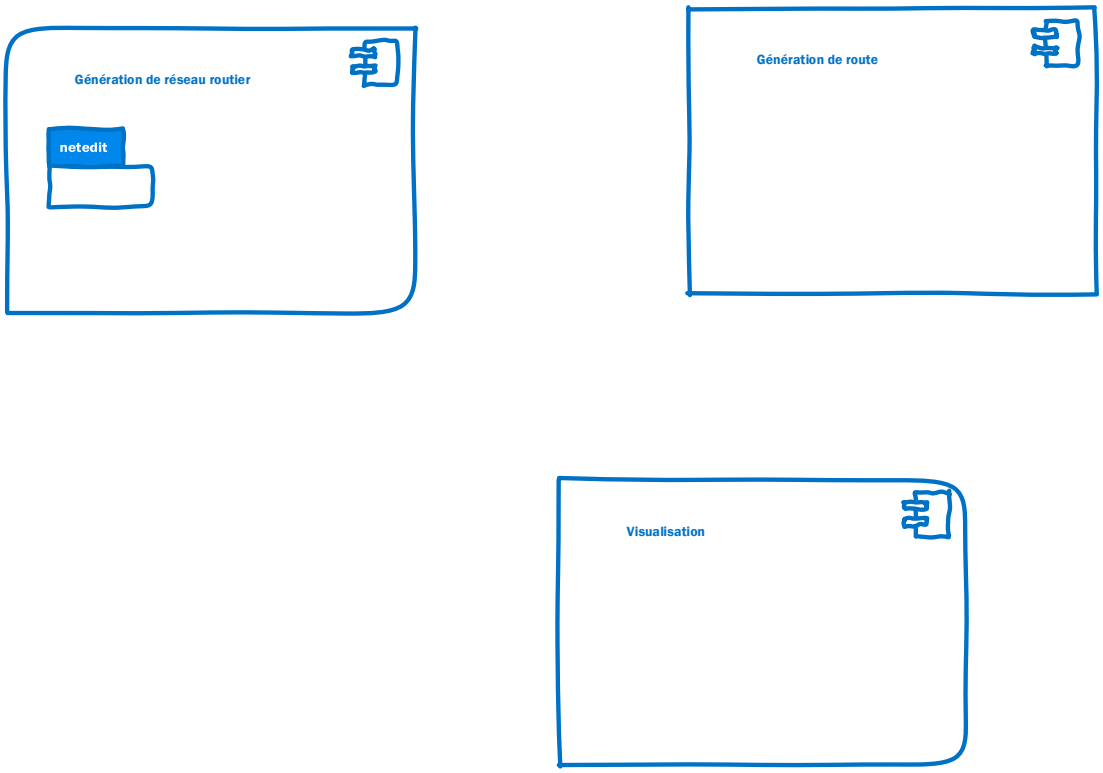

Carte_Villes.net.xml - SUMO 1.5.0
File Edit Settings Locate Simulation Windows Help
Time:
Delay (ms):
150
Scale Traffic:
1
standard
0
100m
Loading net-file from 'Carte_Villes.net.xml' ... done (9ms).
Loading done.
Simulation started with time: 0.00
'Carte_Villes.net.xml' loaded.
1
x:325.03, y:-11.08
x:-49.97, y:-136.08

Length = 50

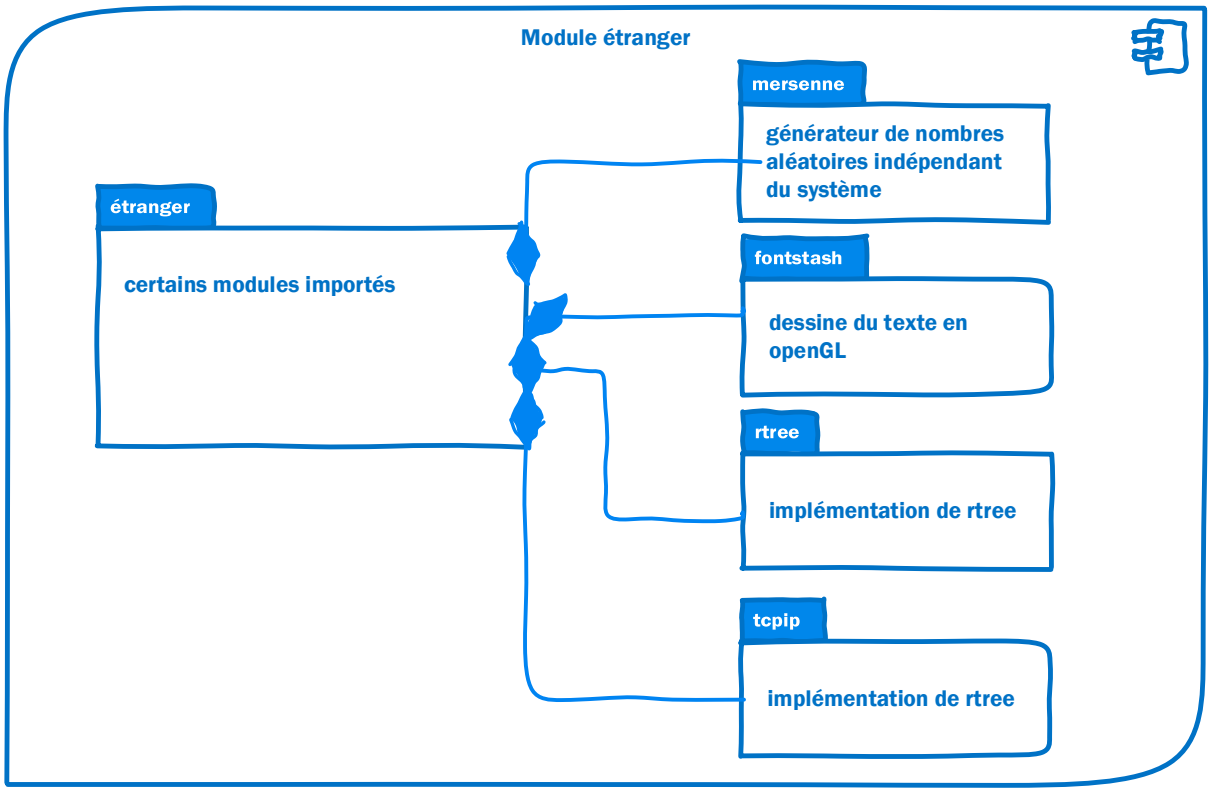

Carte_Villes.net.xml - NETEDIT 1.5.0
File Edit Processing Locate Windows Help
Network
Demand
standard
Grid
Spread vehicles
Hide shapes
Show person plans
Lock person
Vehicles
Vehicles
trip
Parent vType
DEFAULT_VEHTYPE
Internal attributes
id trip_1
color yellow
departLane first
departPos base
departSpeed 0
arrivalLane current
arrivalPos max
arrivalSpeed current
line
personNumber 0
containerNumber 0
0
100m
Network saved in Carte_Villes.net.xml.
DijkstraRouter answered 1 queries and explored 7.00 edges on average.
DijkstraRouter spent 0ms answering queries (0.00ms on average).
x:656.72, y:-44.78
x:281.72, y:-169.78

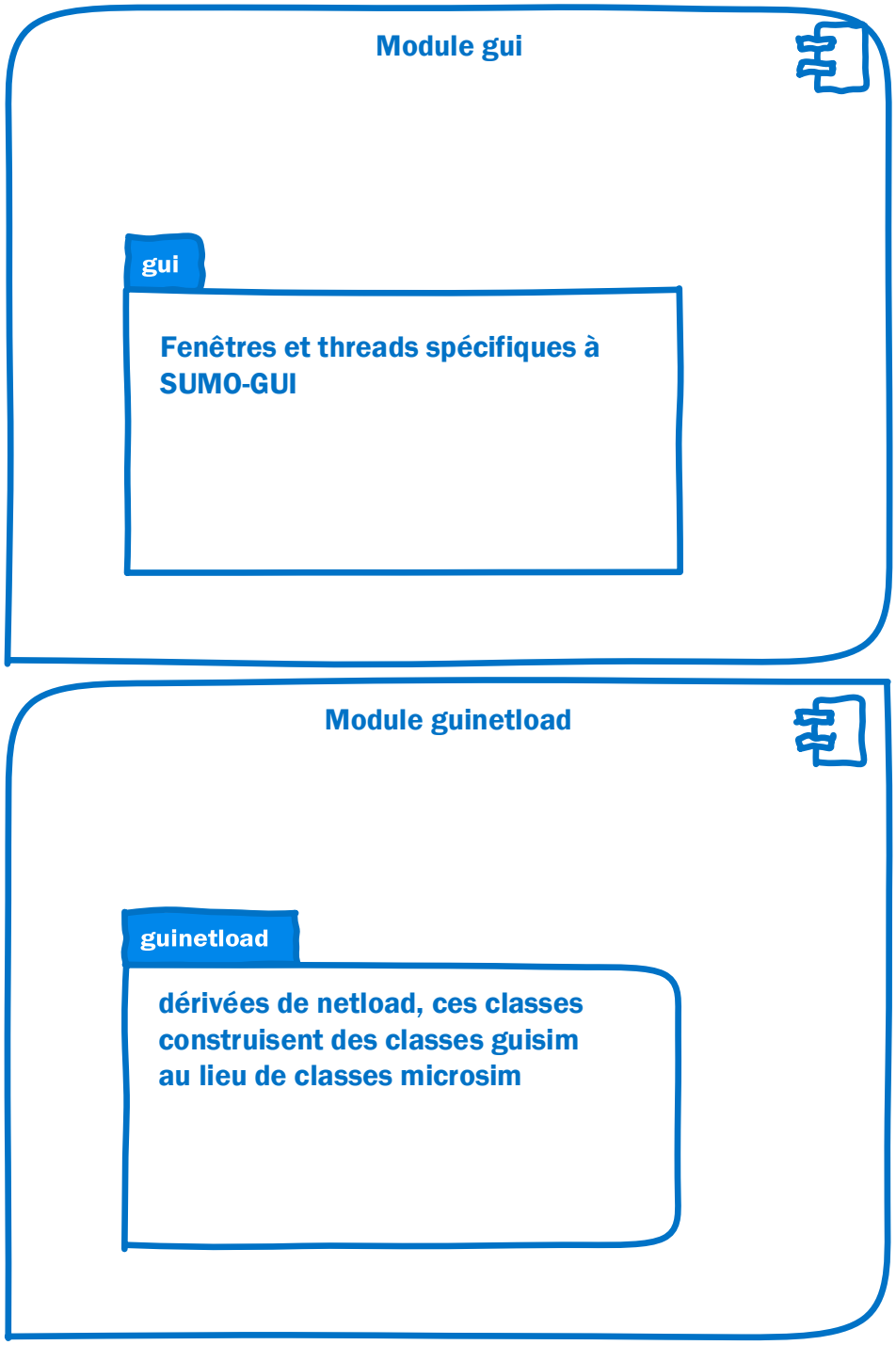

Carte_Villes.net.xml - SUMO 1.5.0
File Edit Settings Locate Simulation Windows Help
Time:
Delay (ms):
200
Scale Traffic:
1
standard
0
100m
Loading net-file from 'Carte_Villes.net.xml' ... done (11ms).
Loading done.
Simulation started with time: 0.00
'Carte_Villes.net.xml' loaded.
1
x:634.02, y:-13.52
x:259.02, y:-138.52

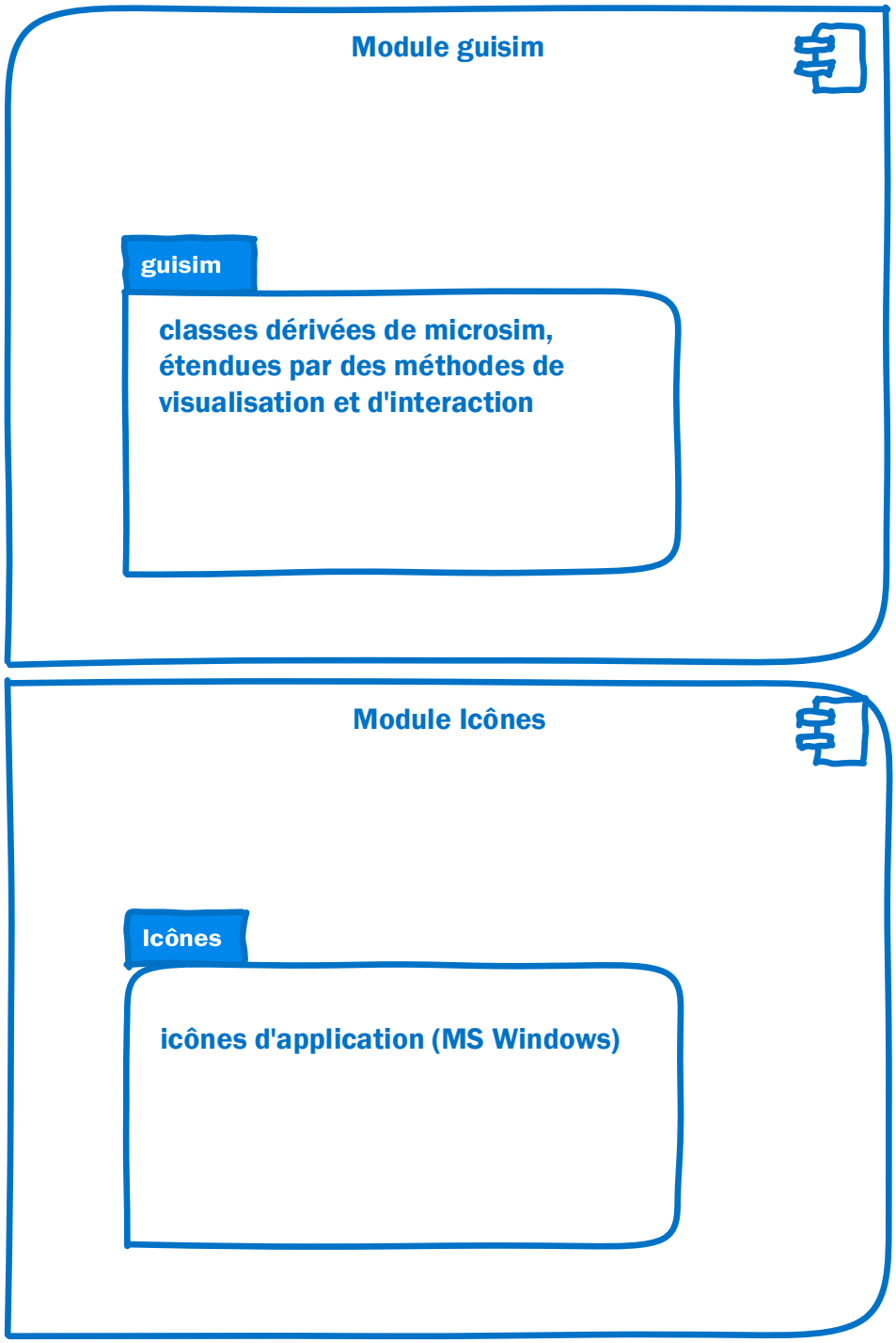
Architecture SUMO (les modules)

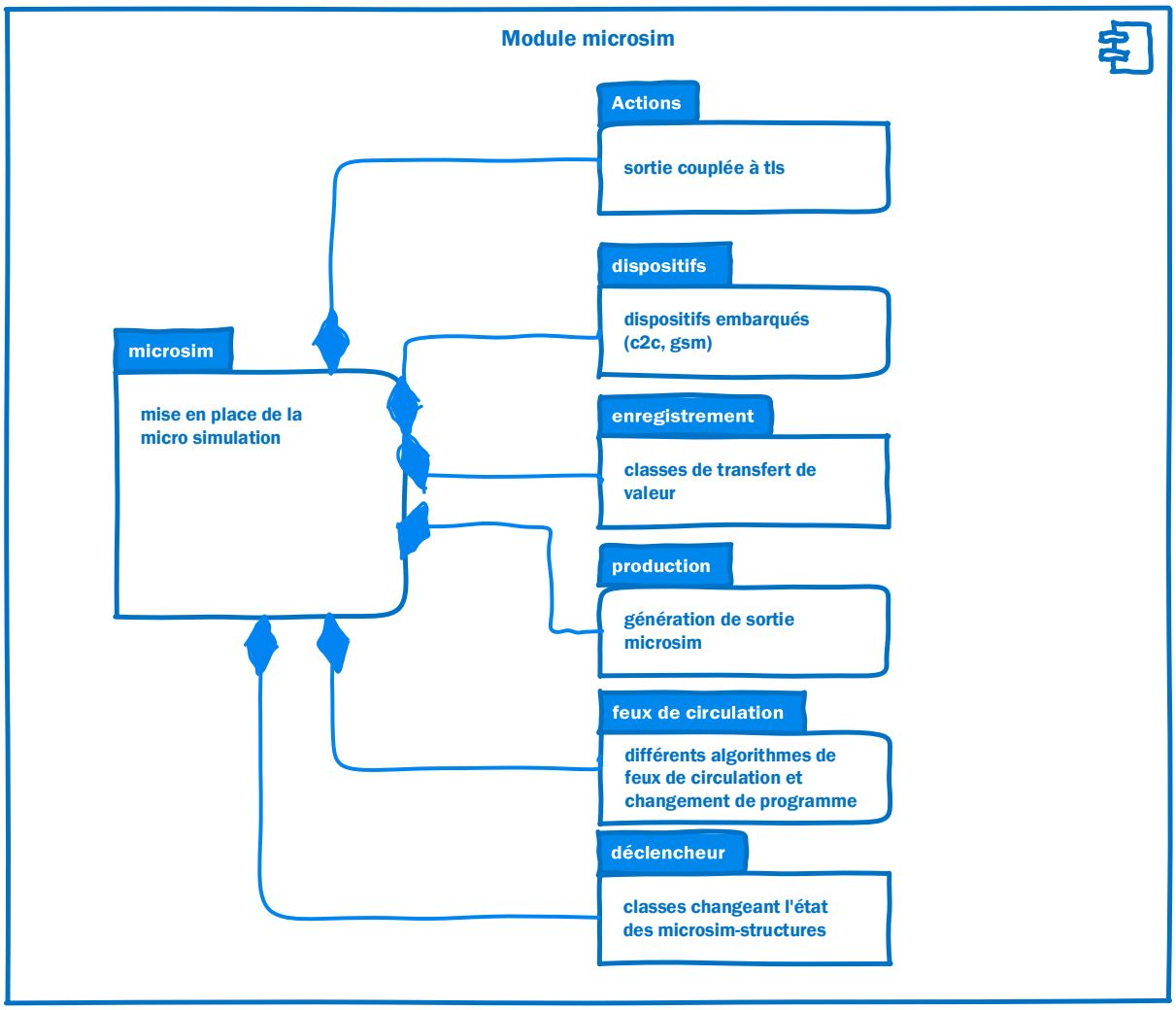


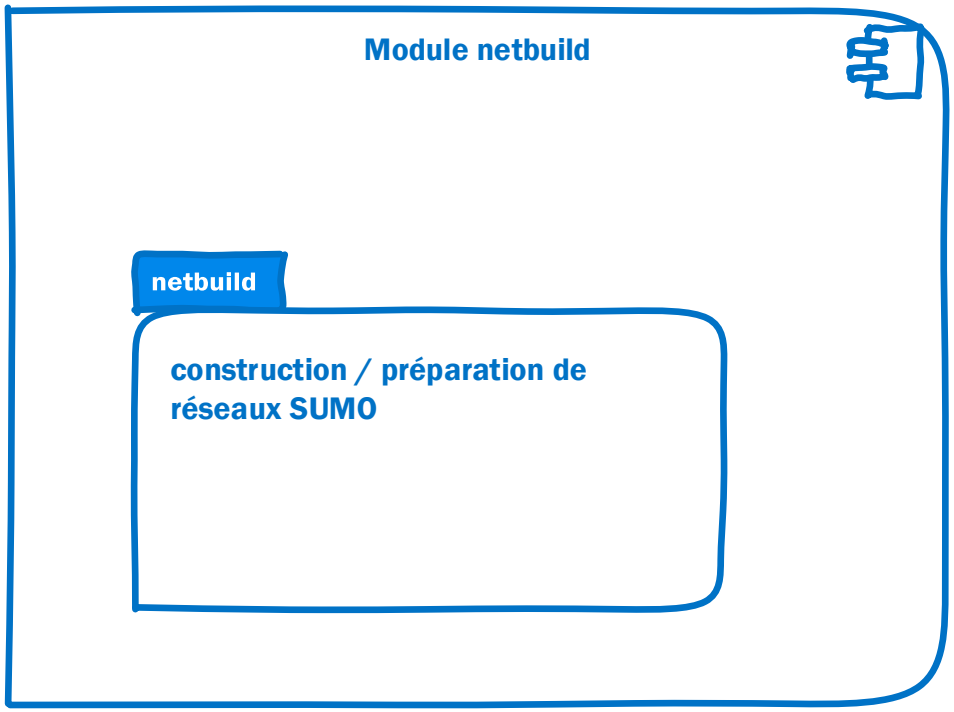
Architecture SUMO

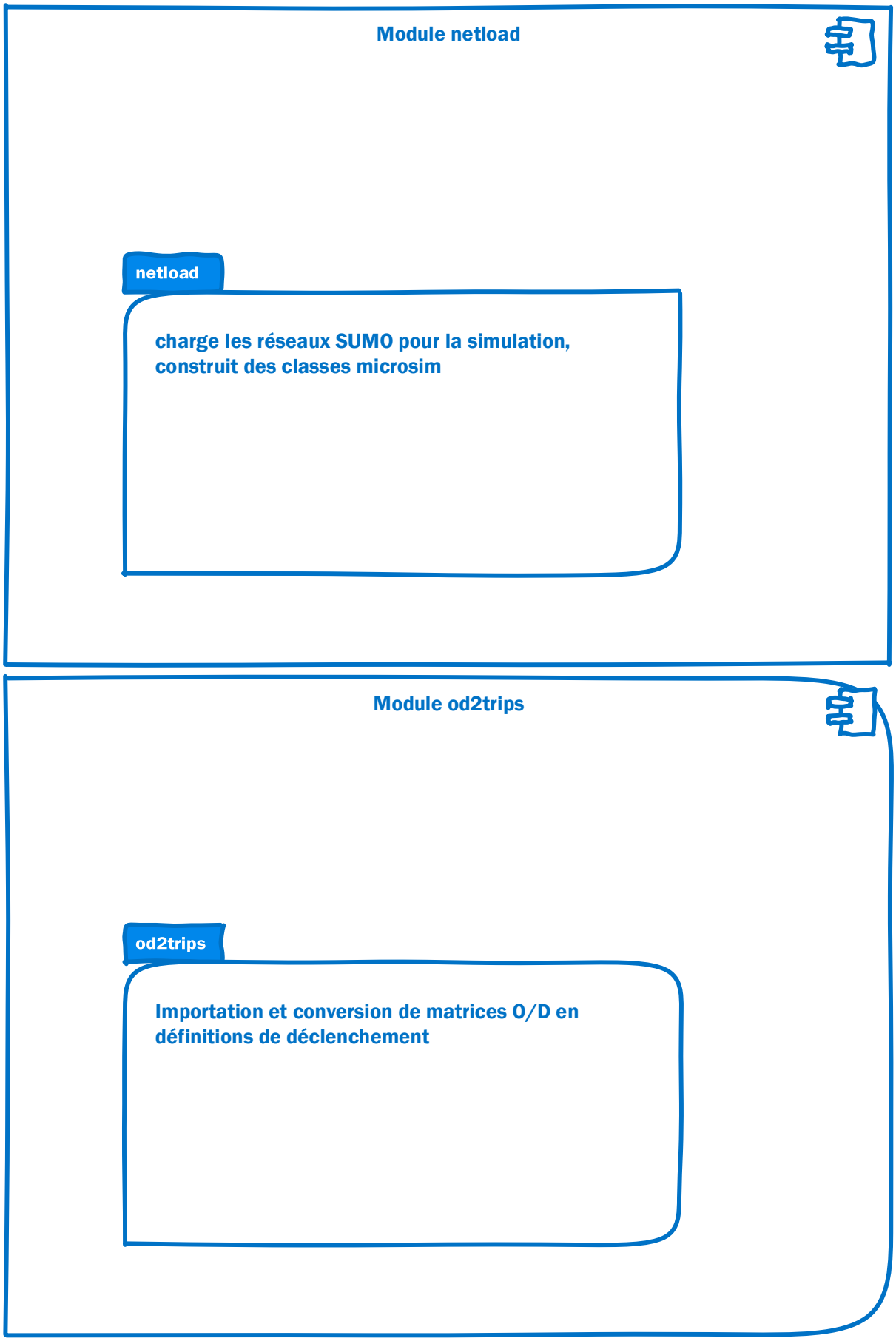

Module étranger
mersenne
générateur de nombres aléatoires indépendant du système
étranger
certains modules importés
fontstash
dessine du texte en openGL
rtree
implémentation de rtree
tcpip
implémentation de rtree

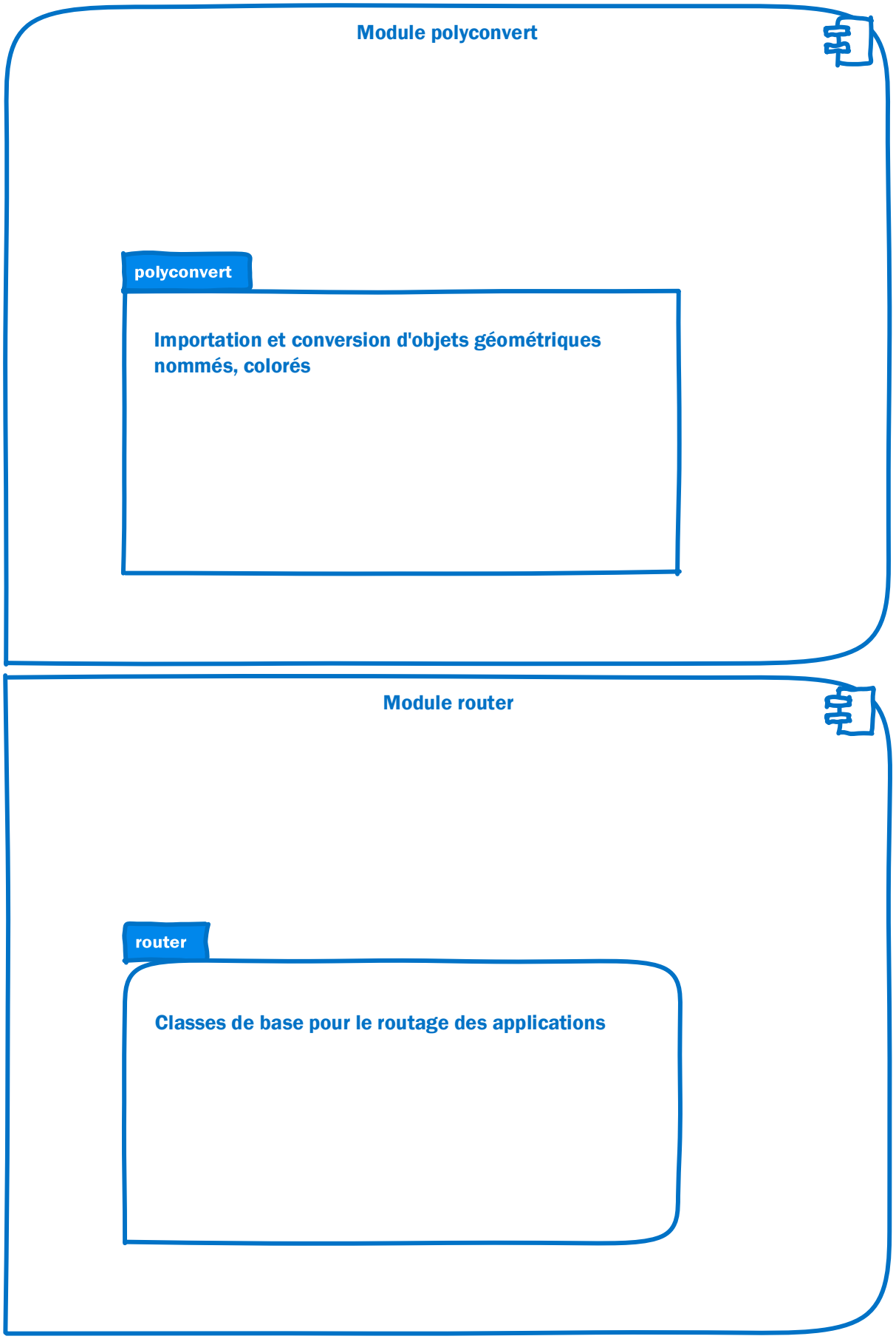

Module gui
gui
Fenêtres et threads spécifiques à SUMO-GUI
Module guinetload
guinetload
dérivées de netload, ces classes construisent des classes guisim au lieu de classes microsim

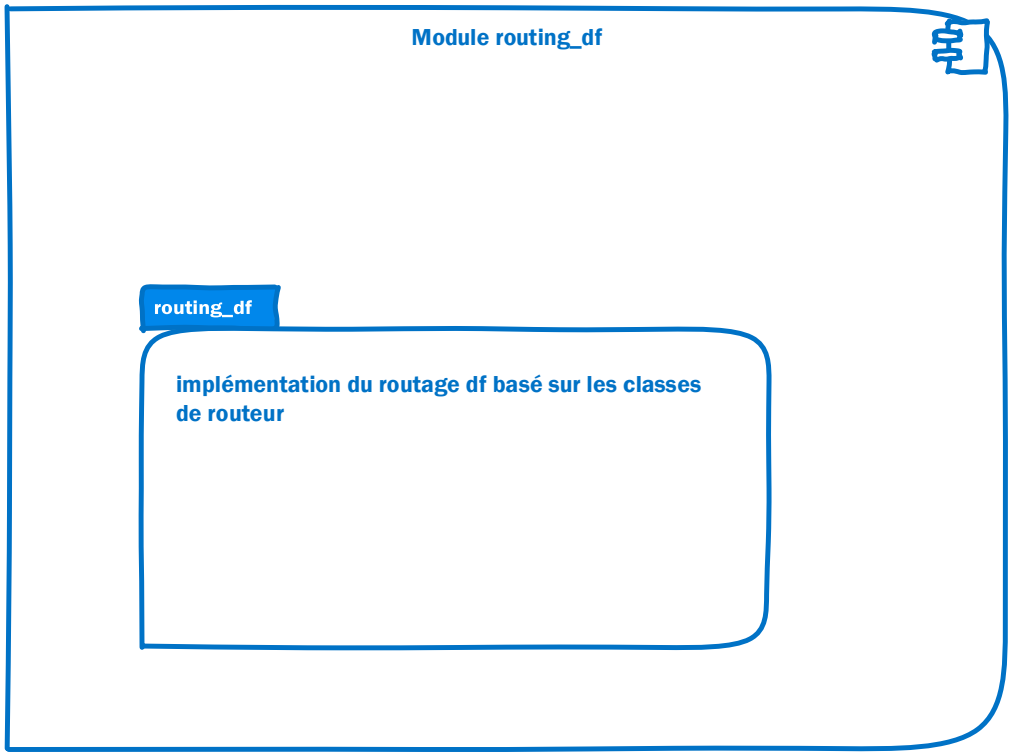

Module guisim
guisim
classes dérivées de microsim, étendues par des méthodes de visualisation et d'interaction
Module Icônes
Icônes
icônes d'application (MS Windows)

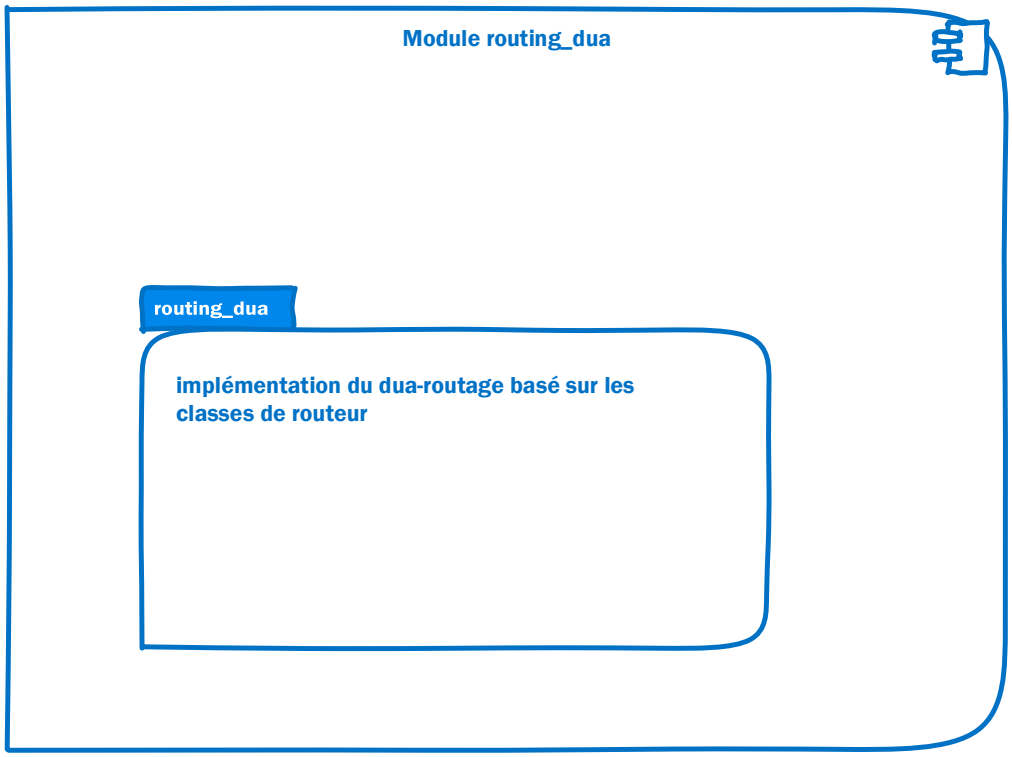

Module microsim
Actions
sortie couplée à tls
dispositifs
dispositifs embarqués (c2c, gsm)
microsim
mise en place de la micro simulation
enregistrement
classes de transfert de valeur
production
génération de sortie microsim
feux de circulation
différents algorithmes de feux de circulation et changement de programme
déclencheur
classes changeant l'état des microsim-structures

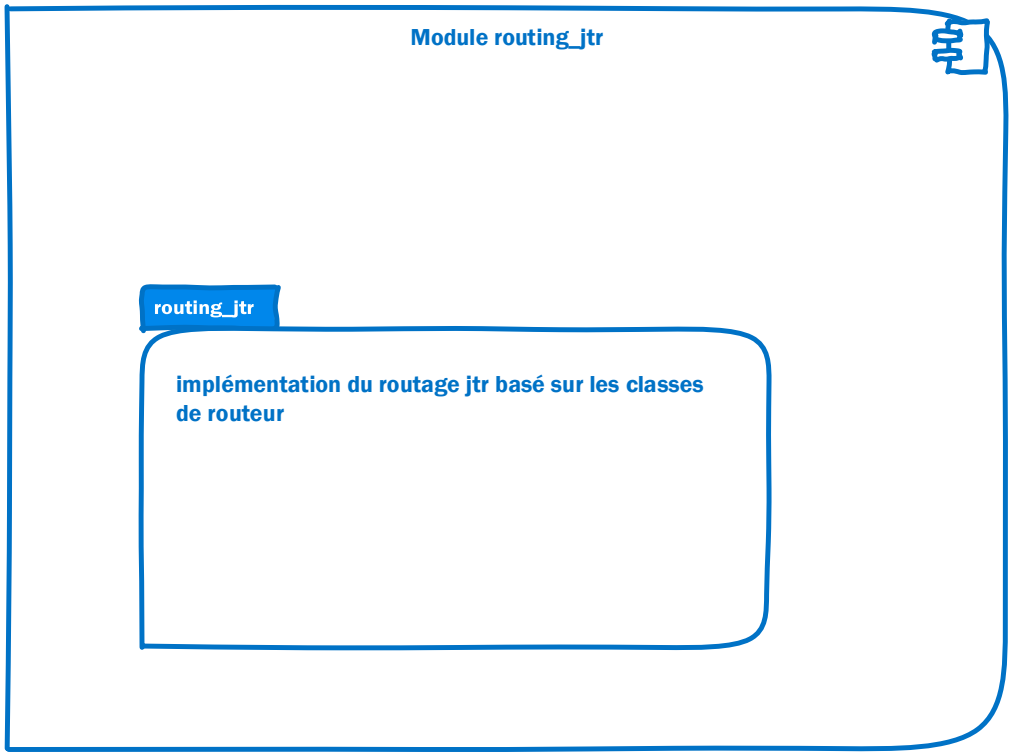

Module netbuild
netbuild
construction / préparation de réseaux SUMO

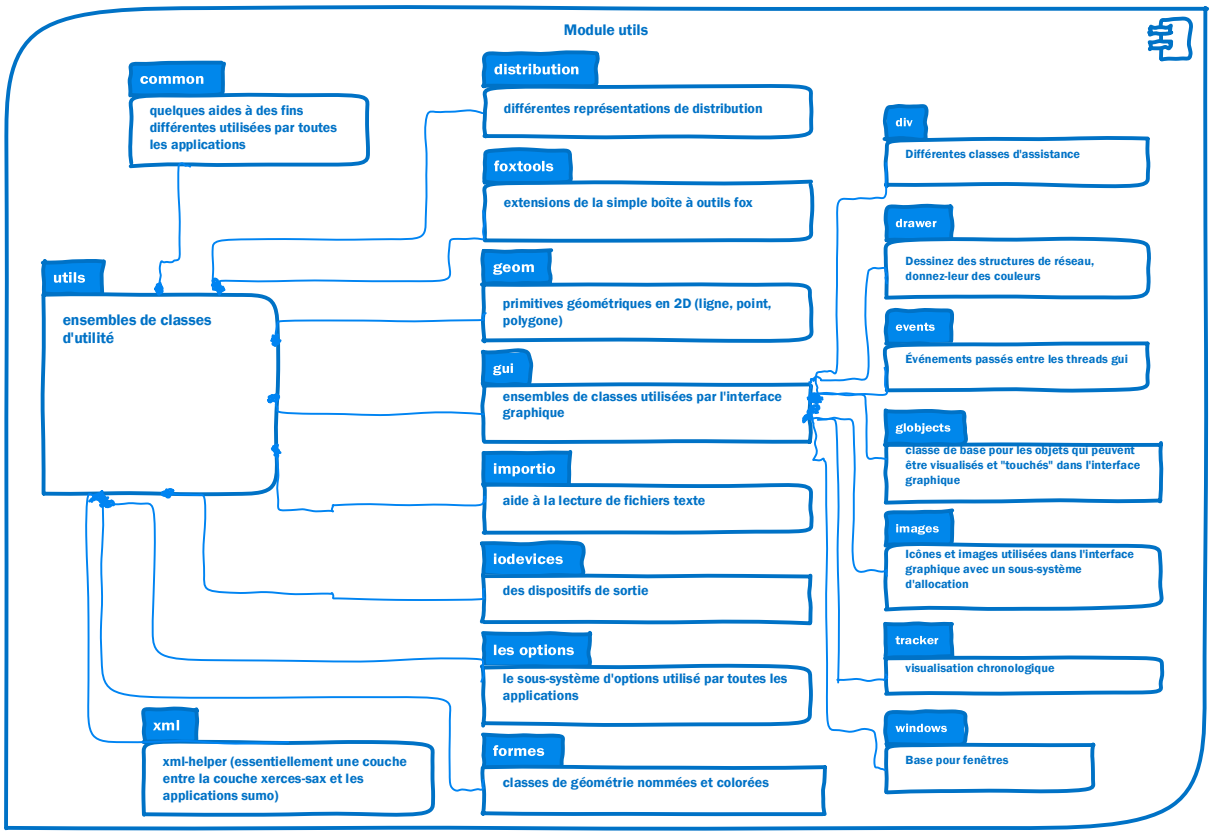

Module netload
netload
charge les réseaux SUMO pour la simulation, construit des classes microsim
Module od2trips
od2trips
Importation et conversion de matrices O/D en définitions de déclenchement


Module polyconvert
polyconvert
Importation et conversion d'objets géométriques nommés, colorés
Module router
router
Classes de base pour le routage des applications


Module routing_df
routing_df
implémentation du routage df basé sur les classes de routeur


Module routing_dua
routing_dua
implémentation du dua-routage basé sur les classes de routeur


Module routing_jtr
routing_jtr
implémentation du routage jtr basé sur les classes de routeur



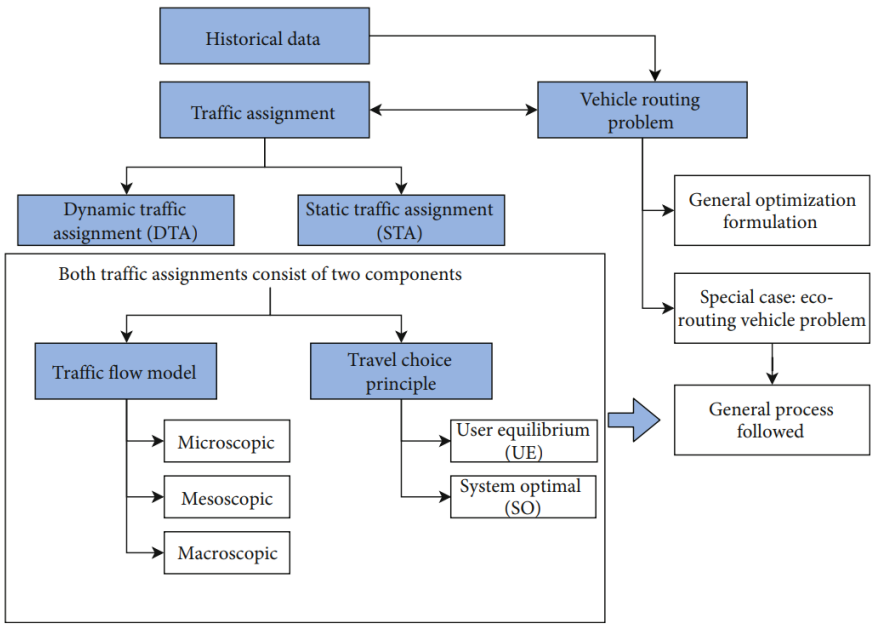


FIGURE 1: Traffic assignment classification, components, and traffic assignment relationship with routing.

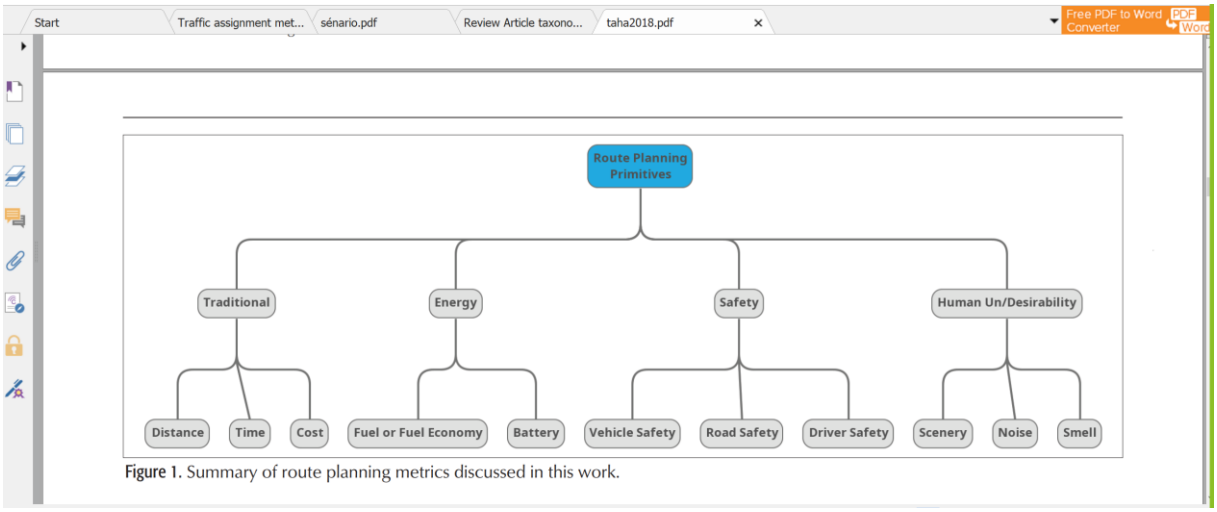


Figure 1. Summary of route planning metrics discussed in this work.

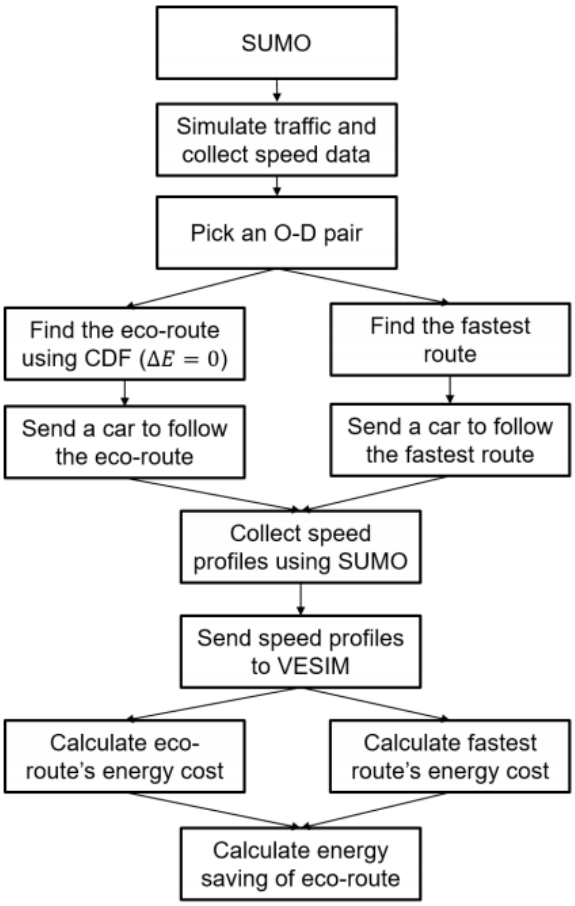


Fig. 18: Procedure for calculating energy costs using SUMO and VESIM