An aerial, black and white photograph of a city street intersection. A large, dark building with a grid of windows is the central focus. The street features a prominent zebra crosswalk in the foreground and another one further back. Road markings include white arrows and a square symbol. A street lamp stands near the building. The overall scene is captured from a high angle, showing the layout of the road and the building's footprint.

Shortest path search for *real* road networks

Anton Patrushev
Georepublic

What is *pgRouting*?



Shortest path



TSP and DD



VRP (DARP)

Real road networks

How do they look like?

Like *this*...





...or like *this*...

...or sometimes like *this*.



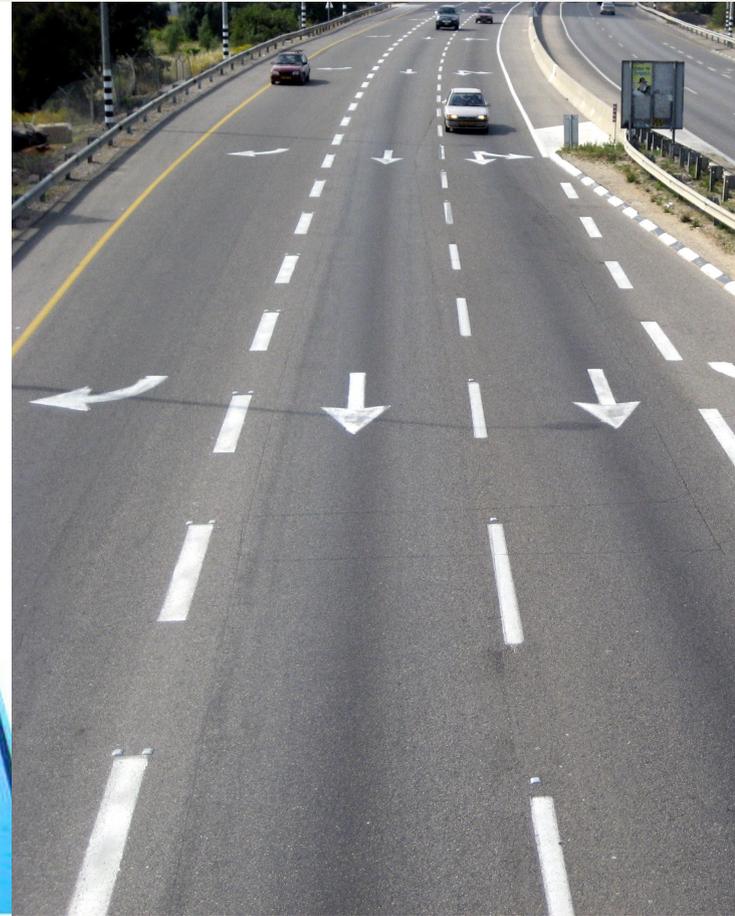
What makes them *real*?



traffic lights



signs



road marking

How *pgRouting* can help here?



source

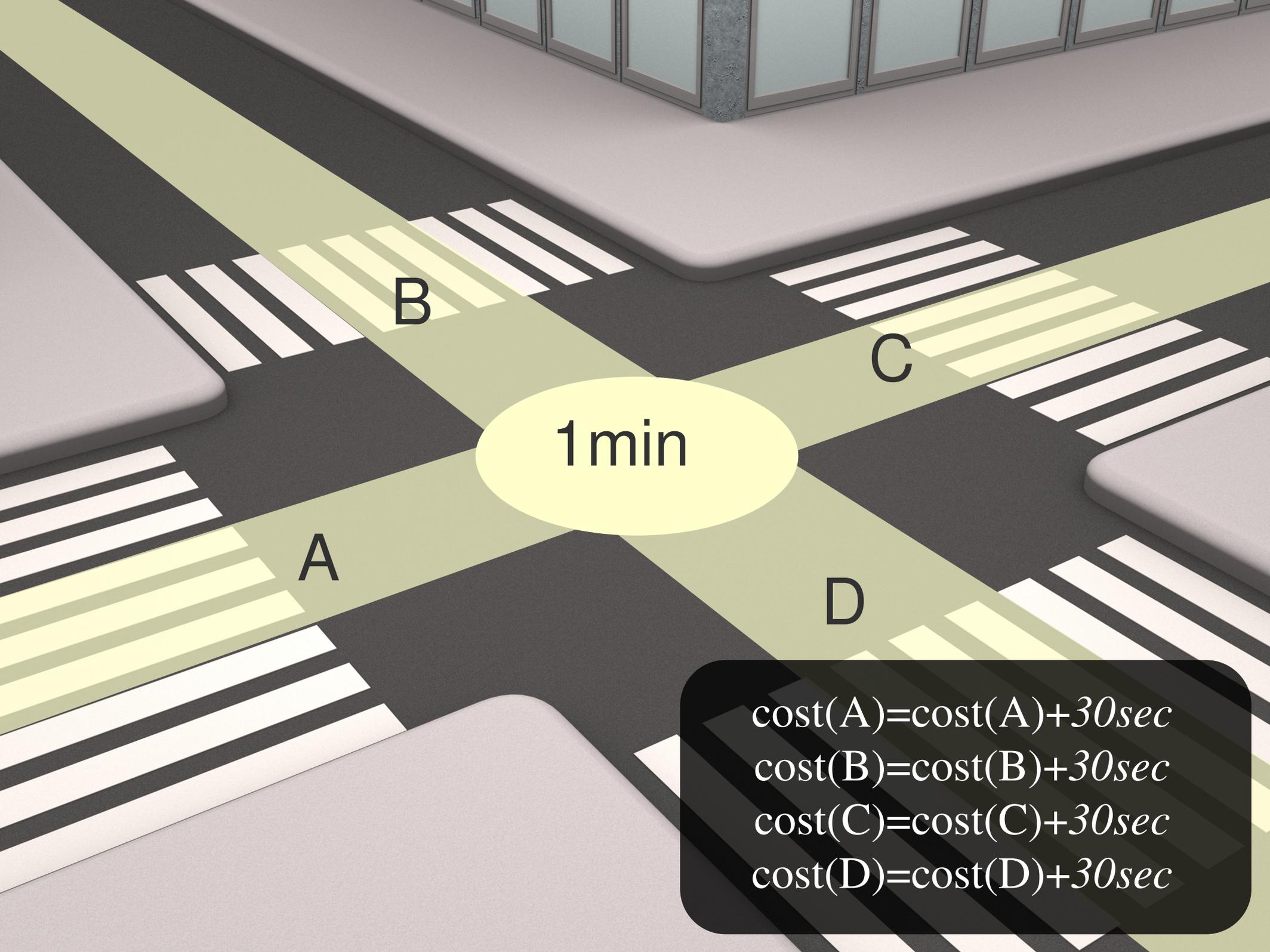
target

gid,
source,
target,
cost,
reverse_cost,
x1, y1,
x2, y2,
rule,
to_cost

Traffic lights make you slower.



It means we should *increase costs*.



1 min

A

B

C

D

$\text{cost}(A) = \text{cost}(A) + 30\text{sec}$

$\text{cost}(B) = \text{cost}(B) + 30\text{sec}$

$\text{cost}(C) = \text{cost}(C) + 30\text{sec}$

$\text{cost}(D) = \text{cost}(D) + 30\text{sec}$



Signs tell you about
restrictions and road types.



ONE WAY



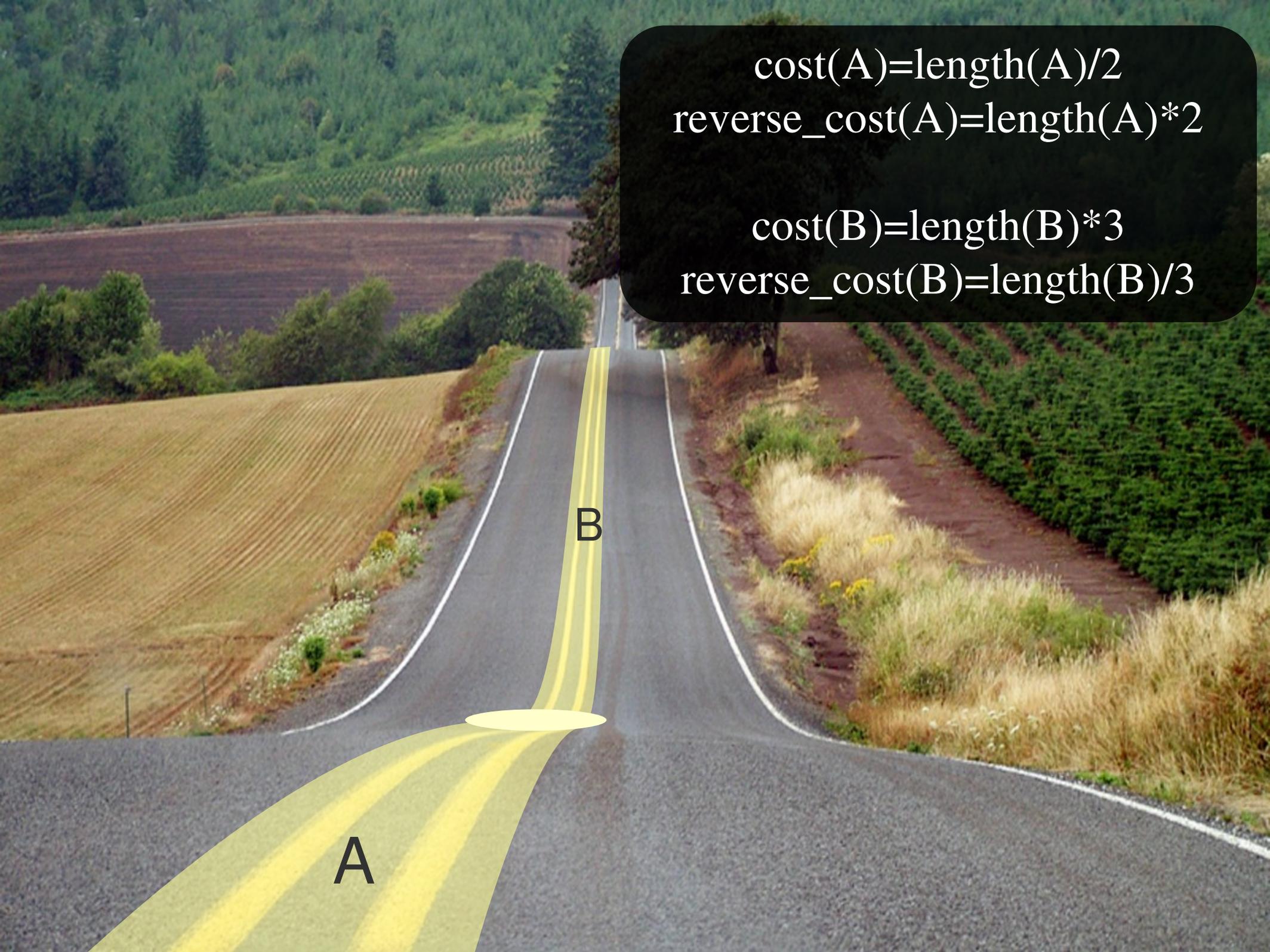
$\text{cost}(A) = \text{length}(A)$
 $\text{reverse_cost}(A) = \infty$

A photograph of a narrow city street with a yellow path labeled 'A'. The path starts on the sidewalk on the left, crosses the street, and continues on the sidewalk on the right. The street is lined with multi-story buildings, and a street lamp is visible on the right side. The path is highlighted in yellow and labeled with the letter 'A' at the bottom.

A



Sometimes the
costs have
different
meaning.



$\text{cost}(A) = \text{length}(A) / 2$
 $\text{reverse_cost}(A) = \text{length}(A) * 2$

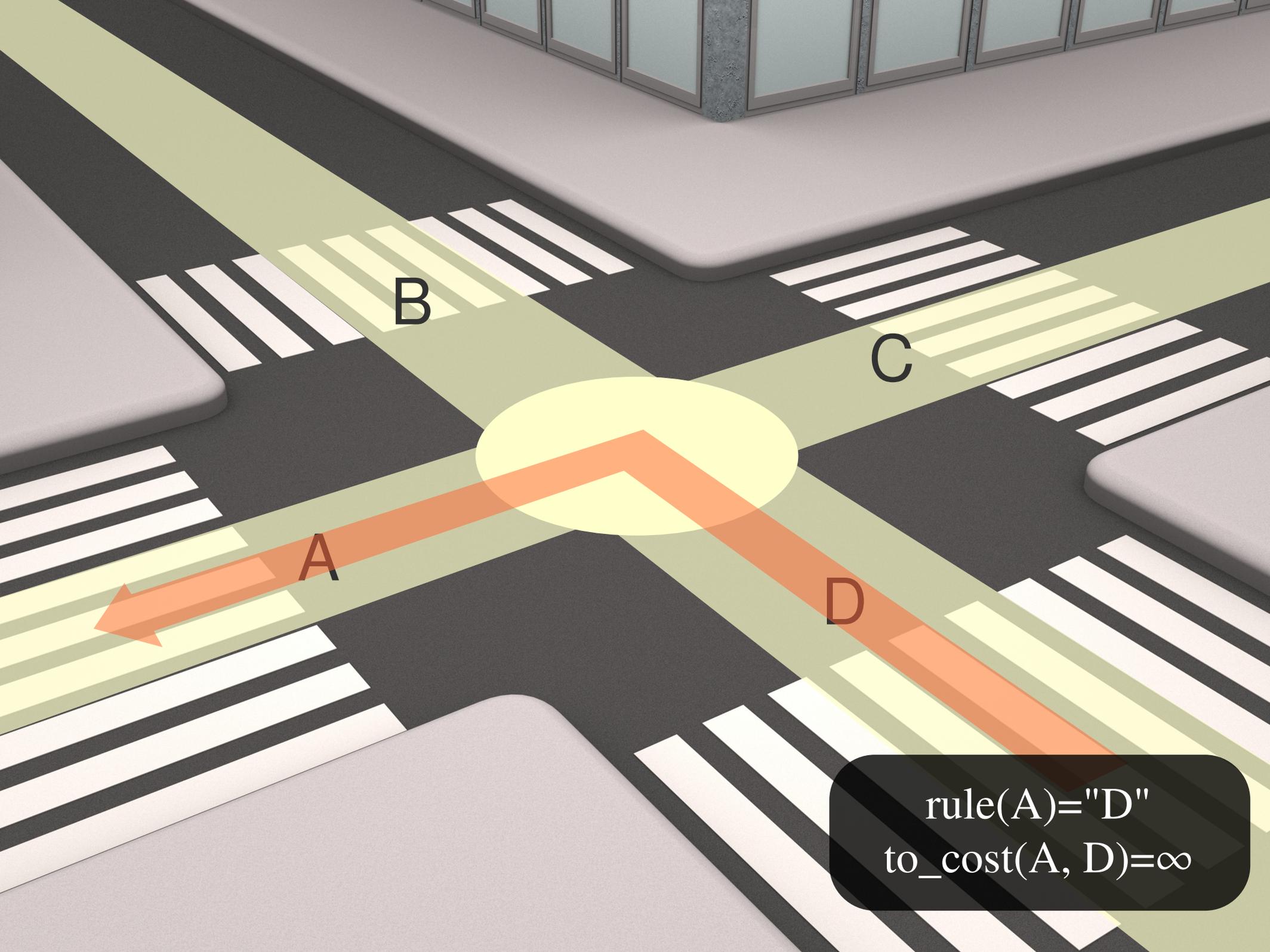
$\text{cost}(B) = \text{length}(B) * 3$
 $\text{reverse_cost}(B) = \text{length}(B) / 3$

B

A

Turn restrictions
obviously restrict
turns.





B

C

A

D

$\text{rule}(A) = \text{"D"}$
 $\text{to_cost}(A, D) = \infty$

Road type signs
can be used for
cost calculation.



Not only *types*, but
also *conditions*.



A high-angle, nighttime photograph of a multi-lane highway. Several cars are visible, their headlights and taillights blurred due to motion. The road surface is marked with white lines, including dashed lane dividers and solid edge lines. Large white arrows are painted on the road, pointing in the direction of traffic flow. The scene is illuminated by streetlights, creating a warm, orange glow. In the upper right corner, there is a black rounded rectangle containing white text.

What about *road marking*?

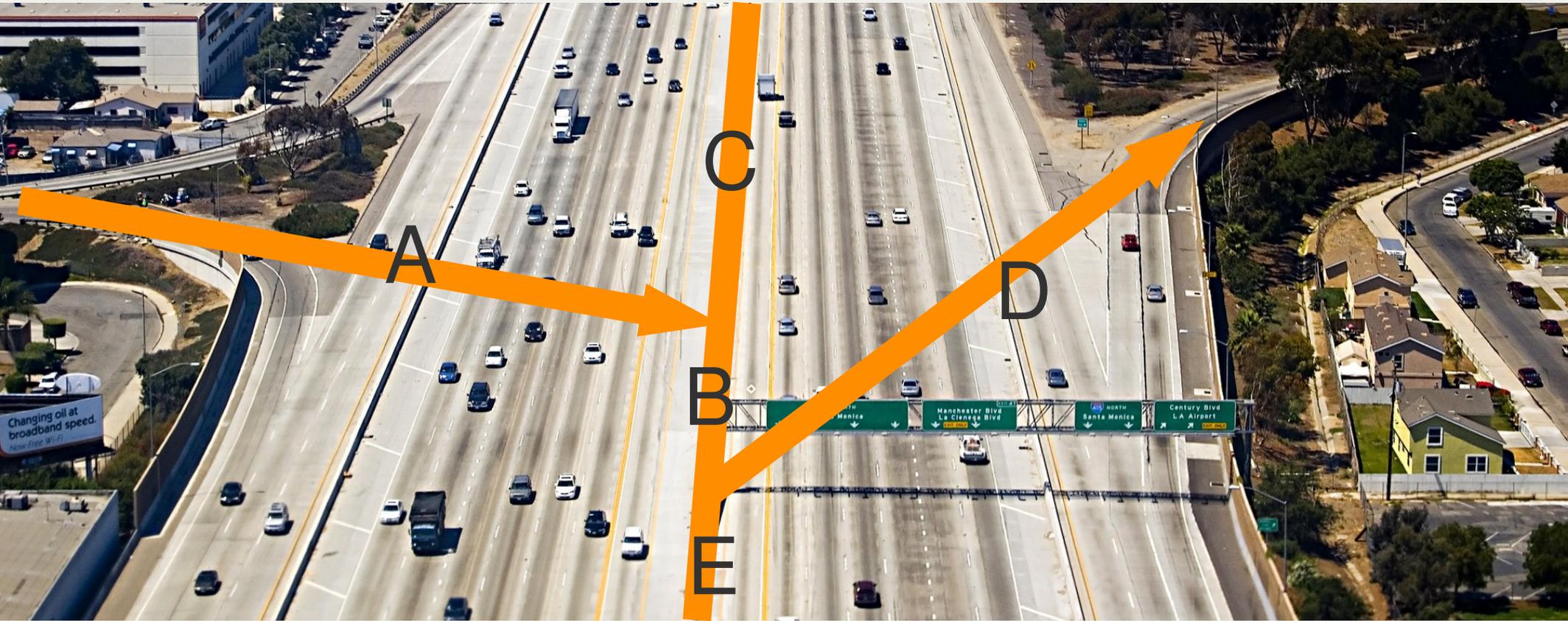
It separates
lanes, ...



...specifies *road*
types, ...



... and *restrictions*.



rule(D)="A, B"
to_cost(D)= ∞

And you know what's *cool* about
pgRouting?

All costs are *dynamic*.

Which is opposite to *pre-calculated*.

If the road is *closed*, ...

**ROAD
AHEAD
CLOSED**



... there is an *accident*, ...



... a sign with
restrictions *limited*
in time, ...





... bad weather conditions, ...

... or an *obstacle*, ...





You don't need to
rebuild and reload
your network...



... and wait forever.

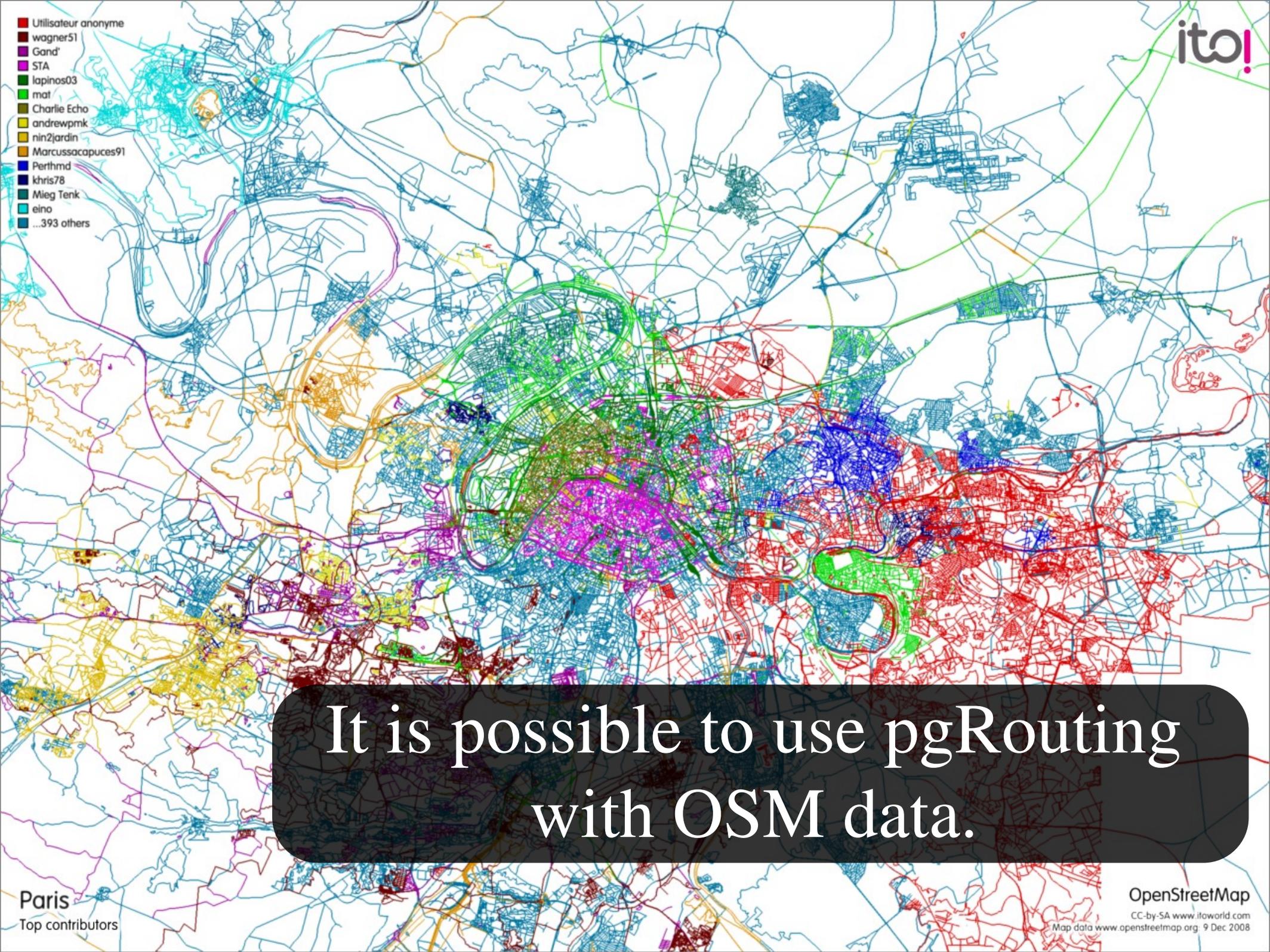
You only need to *adjust the cost* for
this particular road.

And next search will go another way.



Cost can be virtually
anything.

- Utilisateur anonyme
- wagner51
- Gand'
- STA
- lapinos03
- mat
- Charlie Echo
- andrewpmk
- nin2jardin
- Marcussacapuces91
- Perthmd
- khris78
- Mieg Tenk
- eino
- ...393 others



It is possible to use pgRouting with OSM data.

pgRouting can be used for *different*
kinds of networks.

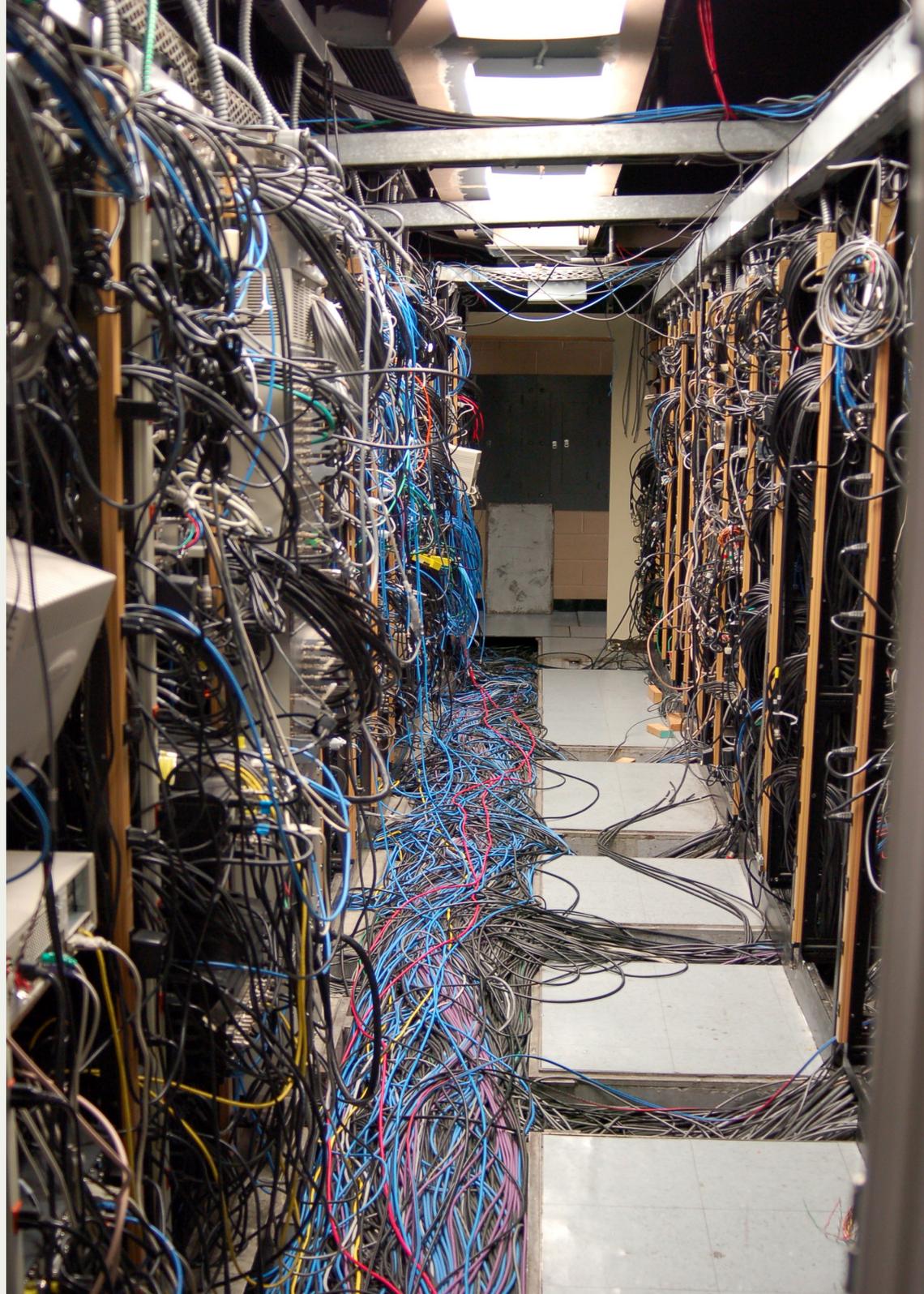
Canals and rivers, ...



... hiking trails, ...



... or *any other*
kind of network.



Now it's *showtime!*

Thanks to *sxc.hu* for being the best free
photo stock.

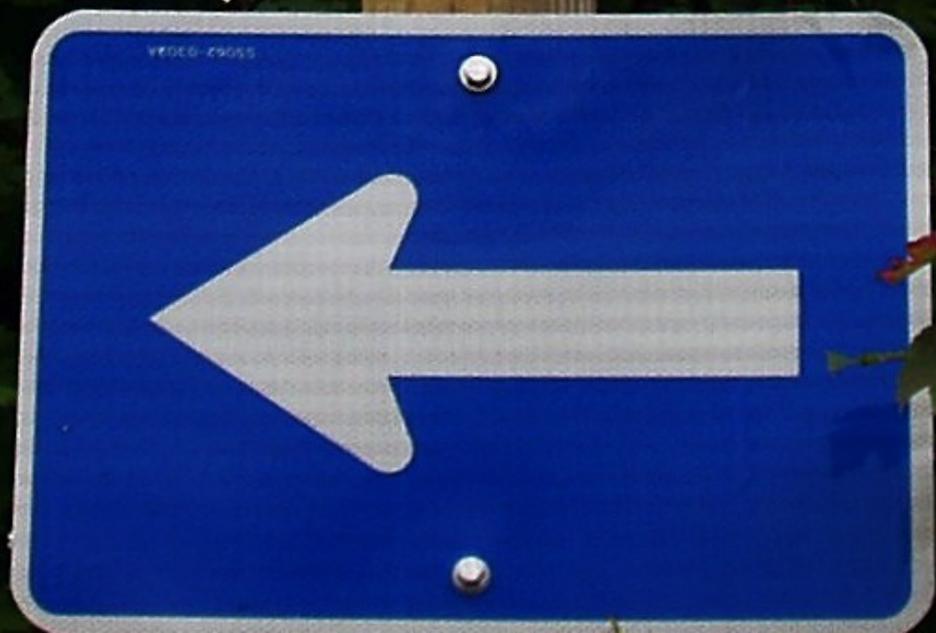
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Just want you to remember

pgrouting.org
georepublic.de
openvrp.com



Georepublic



THANK YOU

