UNIVERSIDAD POLITECNICA SALESIANA

Prueba IA

Narcisa Araujo

Objetivo:

• Consolidar los conocimientos adquiridos en clase para los métodos de búsqueda.
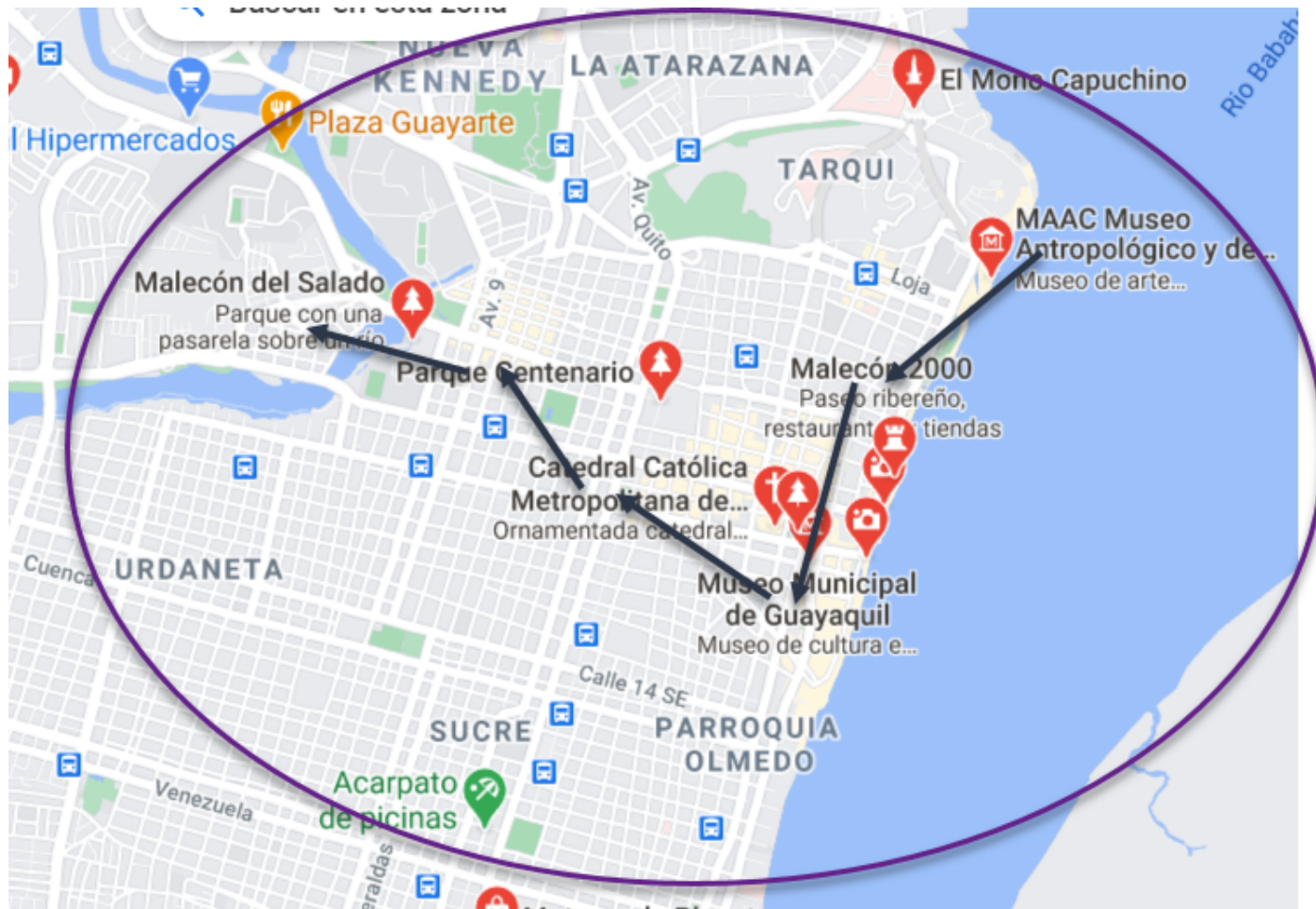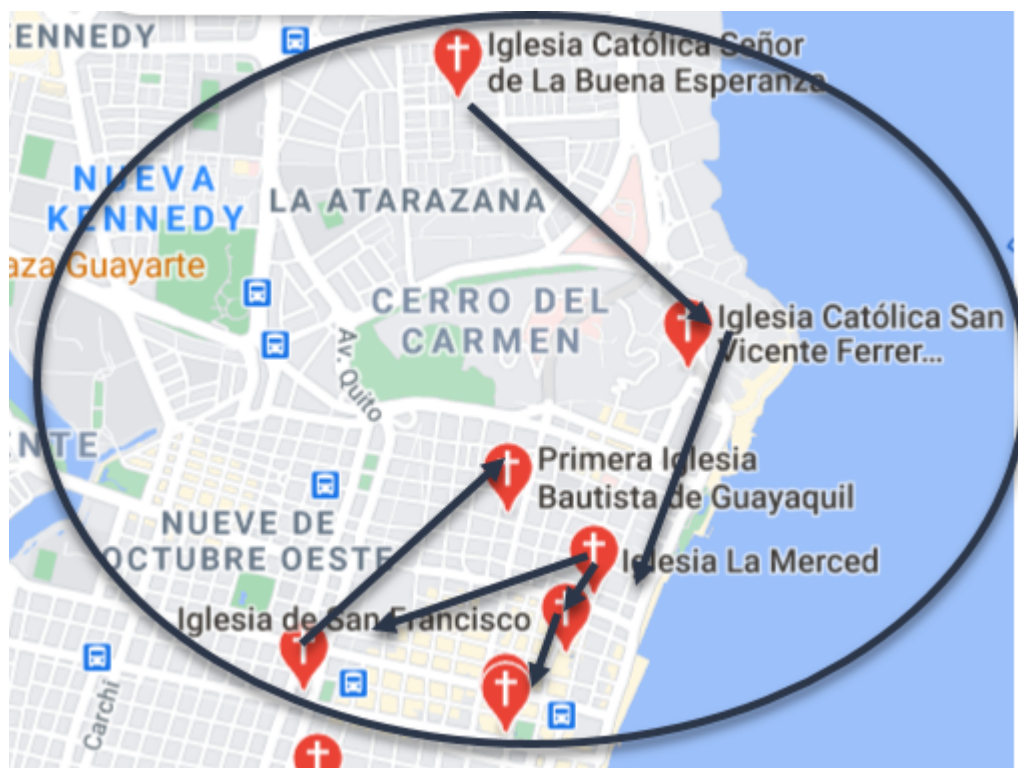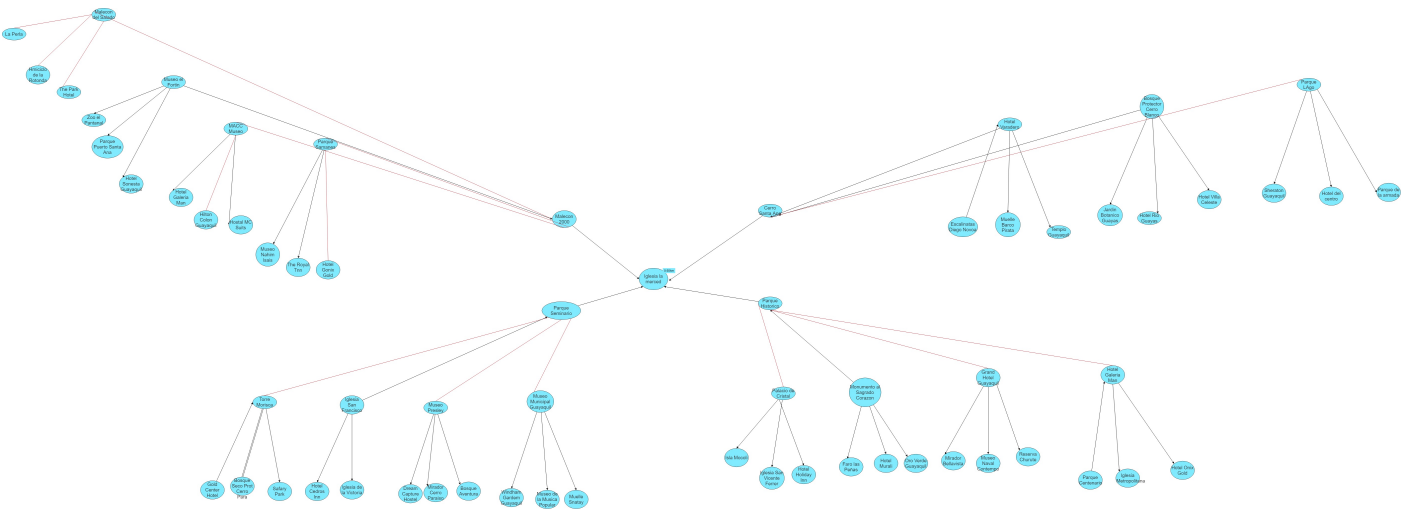
Guayaquil - Guayas

Hoteles

Lugares Turisticos

Iglesias

Ahora armamos el arbol de nodos para una mejor comprension.

Sacamos el H(n), G(n), latitud y longitud de todos los nodos

	Lugar	H(n)	G(n)	Latitud-Longitud
A	**1.Iglesia la Merced**	0.60km		-2.1901128968068893, -79.88085320014666
C	1.1Parque Seminario	0.1km	1.2km	-2.19482476958220 34, -79.88313801543005
B	1.2Malecon 2000	0.5km	0.3km	-2.1936158601968545, -79.87985420404793
D	1.3Parque historico	5.72km	8.5km	-2.145045304444773, -79.87011826416469
E	1.4Cerro Santa Ana	1.68km	2km	-2.1795810991596642, -79.88115570232887
J	1.1.1Torre morisca	0.3km	0.5km	-2.1956965548554983, -79.88044760018025
K	1.1.2Iglesia San Francisco	0.3km	0.6km	-2.1920508553681795, -79.8817802727392
L	1.1.3Museo Presley	1.58km	2km	-2.1875341337223135, -79.89527490019256
M	1.1.4Museo Municipal Guayaquil	0.1km	0.7km	-2.1959100548742865, -79.88263012905243
F	1.2.1Malecon del salado	2.16km	5km	-2.187271617827687, -79.89808877125547
G	1.2.2Museo el fortin	1.46km	0.75km	-2.181199817911005, -79.8756172290063
H	1.2.3MACC Museo	1.09km	0.008	-2.184792633665745, -79.87554680019261
I	1.2.4Parque samanes	10.13km	10.5km	-2.103611840185342, -79.89642372898678
N	1.3.1Palacio de Cristal	6.49km	9.5km	-2.202044454937904, -79.8827954001764
O	1.3.2Monumento al sagrado corazon	4.18km	7.9km	-2.1802048179040128, -79.88370000012713
P	1.3.3Grand Hotel Guayaquil	5.74km	7.8km	-2.1946613968000994, -79.88472010014999
Q	1.3.4Hotel Galeria Man	5.35km	7.8km	-2.1883348968097507, -79.89135830014496
R	1.4.1Hotel Varadero	1.21km	2.7km	-2.1848942757499628, -79.89068927128959
S	1.4.2Bosque Protector Cerro Blanco	15km	19.9km	-2.183610812866751, -80.01641354637617
T	1.4.3Parque Lago	24.46km	31.4km	-2.2241726136781743, -80.09667277133362

Gg	1.1.1.1 Gold Center Hotel	6.68km	8.3km	-2.1384791327376553, -79.89883127131773
Hh	1.1.1.2 Bosque Seco Prot Cerro Para	5.63km	6.9km	-2.1710105756882503, -79.92474450015737
Ii	1.1.1.3 Safary Park	0.7km	0.7km	-2.1897671178226, -79.87848260012551
Jj	1.1.2.1 Hotel Cedros Inn	3.34km	5.6km	-2.174654675707976, -79.90622380016192
Kk	1.1.2.2 Iglesia de la Victoria	1km	1.8km	-2.1932925758457897, -79.89078865791112
Ll	1.1.3.1 DreamKapture Hostel	5.85km	7.8km	-2.136250618277581, -79.90673050013388
Mm	1.1.3.2 Mirador Cerro Paraiso	3.77km	4.9km	-2.168818896822859, -79.92345707127183
Nn	1.1.3.3 Bosque Aventura	29.31m	32.7km	-2.2584457967244114, -80.1493389290187
Oo	1.1.4.1 Windham Gardem Guayaquil	4.41km	5.5km	-2.157521818082387, -79.89262277125641
Pp	1.1.4.2 Museo de la Música popular	1.85km	2.7km	-2.1816312757474035, -79.87415390016523
Qq	1.1.4.3 Muelle Snatay	3.77km	4.2km	-2.22781773453463, -79.87112850019264
U	1.2.1.1 La perla	2.42km	3.4km	-2.1861365972914286, -79.87636284323703

V	1.2.1.2 Hemiciclo de la rotonda	2.20km	3.1km	-2.1925842178279744, -79.8793491578781
W	1.2.1.3 The park Hotel	1.86km	2.3km	-2.194185717784017, -79.88281100012793
X	1.2.2.1 Zoo el pantanal	22km	27.5km	-2.003650852529363, -79.96487575792258
Y	1.2.2.2 Parque puerto santa ana	0.3km	0.8km	-2.1789072757472683, -79.8755920290323
Z	1.2.2.3 Hotel sonesta guayaquil	3.29km	5.3km	-2.1554972366108314, -79.89035753636877
Aa	1.2.3.1 Hotel galería Man	1.80km	2.8km	-2.1882812916879097, -79.89135830021971
Bb	1.2.3.2 Hilton colon guayaquil	3.80km	5.3km	-2.1591508756210294, -79.89807900015988
Cc	1.2.3.3 Hostal MC Suits	3.55km	5.1km	-2.1629550787553704, -79.8989594426194
Dd	1.2.4.1 The Royalty Inn	5.42km	6.2km	-2.1510648755752615, -79.88731800016177
Ee	1.2.4.2 Museo Nahim Isais	10.24km	13.1km	-2.194527417781686, -79.88122030012761
Ff	1.2.4.3 Hostal perla real	5.14km	5.8km	-2.1497219542692845, -79.89244300017656
Rr	1.3.1.1 Isla mocoli	11.14km	15.7km	-2.10398526586693126, -79.86053283036168
Ss	1.3.1.2 Iglesia San Vicente Ferrer	2.27km	2.6km	-2.182247433631794, -79.87758992906537
Tt	1.3.1.3 Hotel Holiday Inn	6.33km	8.6km	-2.145169196856886, -79.88362377127424
Uu	1.3.2.1 Faro las peñas	908.68m	2.4km	-2.18091754264871, -79.87554446131837
Vv	1.3.2.2 Hotel Murali	4.21km	6.7km	-2.1424554280177683, -79.8860205306919
Ww	1.3.2.3 Oro Verde Guayaquil	1.31km	2.7km	-2.189017013147905, -79.89153266526655
Xx	1.3.3.1 Mirador Bellavista	3.75km	5.3km	-2.1783904863479853, -79.91423569818106
Yy	1.3.3.2 Museo Naval Contemporáneo	2.25km	2.9km	-2.214799275985195, -79.88650198678256
Zz	1.3.3.3 Reserva Churute	35.68km	61.4km	-2.424553254602044, -79.66091204183267

Aaa	1.3.4.1 Parque Centenario	0.4km	1.8km	-2.189666817821865, -79.8883865001275
Bbb	**1.3.4.2.Catedral metropolitana**	1.19km	2.3km	-2.1945666758210525, -79.88392260016576
Ccc	1.3.4.3 Hotel Onix Gold	0.2km	0.7km	-2.186575649540506, -79.89006567138273
Ddd	1.4.1.1 Escalinatas diego novoa	1.63km	2.1km	-2.1835105546676354, -79.87605844242533
Eee	1.4.1.2 Muelle Barco Pirada	1.76km	2.6km	-2.196785675850094, -79.88027612903466
Fff	1.4.1.3 Templo guayaquil	3.58km	6.9km	-2.156167296856242, -79.90530820014631
Ggg	1.4.2.1 jardin botánico guayas	16.58km	30.5km	-2.0799490298877785, -79.90889410001913
Hhh	1.4.2.2 Hotel rio guayas	14.81km	22.8km	-2.2042999549668645, -79.88459010017687
Iii	1.4.2.3 Hotel Villa Celeste	13.80km	26.6km	-2.2161926551382263, -79.89648152905042
Jjj	1.4.3.1 Sheraton Guayaquil	24km	30.5km	-2.1564677543859503, -79.89155765792269
Kkk	1.4.3.2 Hotel del centro	24.23km	29.4km	-2.189557175808241, -79.88134232903504
Lll	1.4.3.3 Parque de la armada	23.28km	33.9km	-2.21547414678827, -79.88730001543941

Algoritmos en Neo4j

Busqueda A*

Creacion Nodos Neo4j

```
In [ ]:   CREATE (a:Station {name: 'Iglesia la Merced', latitude: -2.1901128968068893, l
          ongitude: -79.88085320014666}),
          (b:Station {name: 'Malecon 2000', latitude: -2.1936158601968545, longitude: -7
          9.87985420404793}),
          (c:Station {name: 'Parque Seminario', latitude: -2.1948247695822034, longitude
          : -79.88313801543005}),
          (d:Station {name: 'Parque Historico', latitude: -2.145045304444773, longitude:
          -79.87011826416469}),
          (e:Station {name: 'Cerro Santa Ana', latitude: -2.1795810991596642, longitude:
          -79.88115570232887}),

          (f:Station {name: 'Malecon del Salado', latitude: -2.187271617827687, longitud
          e: -79.89808877125547}),
          (g:Station {name: 'Museo del Fortin', latitude: -2.181199817911005, longitude:
          -79.8756172290063}),
          (h:Station {name: 'MACC Museo', latitude: -2.184792633665745, longitude: -79.8
          7554680019261}),
          (i:Station {name: 'Parque Samanes', latitude: -2.103611840185342, longitude: -
          79.89642372898678}),

          (j:Station {name: 'Torre Morisca', latitude: -2.1956965548554983, longitude: -
          79.88044760018025}),
          (k:Station {name: 'Iglesia San Francisco', latitude: -2.1920508553681795, long
          itude: -79.8817802727392}),
          (l:Station {name: 'Museo Presley', latitude: -2.193211, longitude: 79.890767
          }),
          (m:Station {name: 'Museo Municipal Guayaquil', latitude: -2.181941, longitude:
          -79.878106}),

          (n:Station {name: 'Palacio de Cristal', latitude: -2.202044454937904, longitud
          e: -79.8827954001764}),
          (o:Station {name: 'Monumento al Sagrado Corazon', latitude: -2.180204817904012
          8, longitude: -79.88370000012713}),
          (p:Station {name: 'Grand Hotel Guayaquil', latitude: -2.1946613968000994, long
          itude: -79.88472010014999}),
          (q:Station {name: 'Hotel Galeria Man', latitude: -2.1883348968097507, longitud
          e: -79.89135830014496}),

          (r:Station {name: 'Hotel Varadero', latitude: -2.1848942757499628, longitude:
          -79.89068927128959}),
          (s:Station {name: 'Bosque Protector Cerro Blanco', latitude: -2.18361081286675
          1, longitude: -80.01641354637617}),
          (t:Station {name: 'Parque Lago', latitude: -2.2241726136781743, longitude: -8
          0.09667277133362}),

          (u:Station {name: 'Gold Center Hotel', latitude: -2.1384791327376553, longitud
          e: -79.89883127131773}),
          (v:Station {name: 'Bosque Seco Prot', latitude: -2.1710105756882503, longitude
          : -79.92474450015737}),
          (w:Station {name: 'Safary Park', latitude: -2.1897671178226, longitude: -79.87
          848260012551}),

          (x:Station {name: 'Hotel Cedros Inn', latitude: -2.174654675707976, longitude:
          -79.90622380016192}),
          (y:Station {name: 'Iglesia de la Victoria', latitude: -2.1932925758457897, lon
          gitude: -79.89078865791112}),
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```
(z:Station {name: 'Dreamkapture Hostel', latitude: -2.136250618277581, longitu
de: -79.90673050013388}),
(aa:Station {name: 'Mirador Cerro Paraiso', latitude: -2.168818896822859, long
itude: -79.92345707127183}),
(bb:Station {name: 'Bosque Aventura', latitude: -2.2584457967244114, longitude
: -80.1493389290187}),

(cc:Station {name: 'Windham Garden Guayaquil', latitude: -2.157521818082387, l
ongitude: -79.89262277125641}),
(dd:Station {name: 'Museo de la musica popular', latitude: -2.1816312757474035
, longitude: -79.87415390016523}),
(ee:Station {name: 'Muelle Santay', latitude: -2.22781773453463, longitude: -7
9.87112850019264}),

(ff:Station {name: 'La Perla', latitude: -2.1861365972914286, longitude: -79.8
7636284323703}),
(gg:Station {name: 'Hemiciclo de la Rotonda', latitude: -2.1925842178279744, l
ongitude: -79.8793491578781}),
(hh:Station {name: 'The Park Hotel', latitude: -2.194185717784017, longitude:
-79.88281100012793}),

(ii:Station {name: 'Zoo el Pantanal', latitude: -2.003650852529363, longitude:
-79.96487575792258}),
(jj:Station {name: 'Parque Puerto Santa Ana', latitude: -2.1789072757472683, l
ongitude: -79.8755920290323}),
(kk:Station {name: 'Hotel Sonesta Guayaquil', latitude: -2.1554972366108314, l
ongitude: -79.89035753636877}),

(ll:Station {name: 'Hotel Galeria Man', latitude: -2.1882812916879097, longitu
de: -79.89135830021971}),
(mm:Station {name: 'Hilton Colon Guayaquil', latitude: -2.1591508756210294, lo
ngitude: -79.89807900015988}),
(nn:Station {name: 'Hostal MC Suits', latitude: -2.1629550787553704, longitude
: -79.8989594426194}),

(oo:Station {name: 'The Royalty Inn', latitude: -2.1510648755752615, longitude
: -79.88731800016177}),
(pp:Station {name: 'Museo Nahim Isais', latitude: -2.194527417781686, longitud
e: -79.88122030012761}),
(qq:Station {name: 'Hostal Perla Real', latitude: -2.1497219542692845, longitu
de: -79.89244300017656}),

(rr:Station {name: 'Isla Mocoli', latitude: -2.1039852658693126, longitude: -7
9.86053283036168}),
(ss:Station {name: 'Iglesia San Vicente Ferrer', latitude: -2.182247433631794,
longitude: -79.87758992906537}),
(tt:Station {name: 'Hotel Holiday Inn', latitude: -2.145169196856886, longitud
e: -79.88362377127424}),

(uu:Station {name: 'Faro las peñas', latitude: -2.18091754264871, longitude: -
79.87554446131837}),
(vv:Station {name: 'Hotel Murali', latitude: -2.1424554280177683, longitude: -
79.8860205306919}),
(ww:Station {name: 'Oro Verde Guayaquil', latitude: -2.189017013147905, longit
ude: -79.89153266526655}),
```

```
(xx:Station {name: 'Mirador Bellavista', latitude: -2.1783904863479853, longit
ude: -79.91423569818106}),
(yy:Station {name: 'Museo Naval Contemporaneo', latitude: -2.214799275985195,
longitude: -79.88650198678256}),
(zz:Station {name: 'Reserva Churute', latitude: -2.424553254602044, longitude:
-79.66091204183267}),

(aaa:Station {name: 'Parque Centenario', latitude: -2.189666817821865, longitu
de: -79.89006567138273}),
(bbb:Station {name: 'Catedral Metropolitana', latitude: -2.1945666758210525, l
ongitude: -79.88392260016576}),
(ccc:Station {name: 'Hotel Onix Gold', latitude: -2.186575649540506, longitude
: -79.89006567138273}),

(ddd:Station {name: 'Escalinatas Diego Novoa', latitude: -2.1835105546676354,
longitude: -79.87605844242533}),
(eee:Station {name: 'Muelle Barco Pirata', latitude: -2.196785675850094, longi
tude: -79.88027612903466}),
(fff:Station {name: 'Templo Guayaquil', latitude: -2.156167296856242, longitud
e: -79.90530820014631}),

(ggg:Station {name: 'Jardin Botanico Guayas', latitude: -2.0799490298877785, l
ongitude: -79.90889410001913}),
(hhh:Station {name: 'Hotel Rio Guayas', latitude: -2.2042999549668645, longitu
de: -79.88459010017687}),
(iii:Station {name: 'Hotel Villa Celeste', latitude: -2.2161926551382263, long
itude: -79.89648152905042}),

(jjj:Station {name: 'Sheraton Guayaquil', latitude: -2.1564677543859503, longi
tude: -79.89155765792269}),
(kkk:Station {name: 'Hotel del Centro', latitude: -2.189557175808241, longitud
e: -79.88134232903504}),
(lll:Station {name: 'Parque de la Armada', latitude: -2.21547414678827, longit
ude: -79.88730001543941}),



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(a)-[:CONNECTION {time: 1.2}]->(c),
(a)-[:CONNECTION {time: 8.5}]->(d),
(a)-[:CONNECTION {time: 2}]->(e),
(b)-[:CONNECTION {time: 5}]->(f),
(b)-[:CONNECTION {time: 0.75}]->(g),
(b)-[:CONNECTION {time: 0.008}]->(h),
(b)-[:CONNECTION {time: 10.5}]->(i),
(c)-[:CONNECTION {time: 0.5}]->(j),
(c)-[:CONNECTION {time: 0.6}]->(k),
(c)-[:CONNECTION {time: 2}]->(l),
(c)-[:CONNECTION {time: 0.7}]->(m),
(d)-[:CONNECTION {time: 9.5}]->(n),
(d)-[:CONNECTION {time: 7.9}]->(o),
(d)-[:CONNECTION {time: 7.8}]->(p),
(d)-[:CONNECTION {time: 7.8}]->(q),
(e)-[:CONNECTION {time: 2.7}]->(r),
(e)-[:CONNECTION {time: 19.9}]->(s),
(e)-[:CONNECTION {time: 31.4}]->(t),
(f)-[:CONNECTION {time: 3.4}]->(u),
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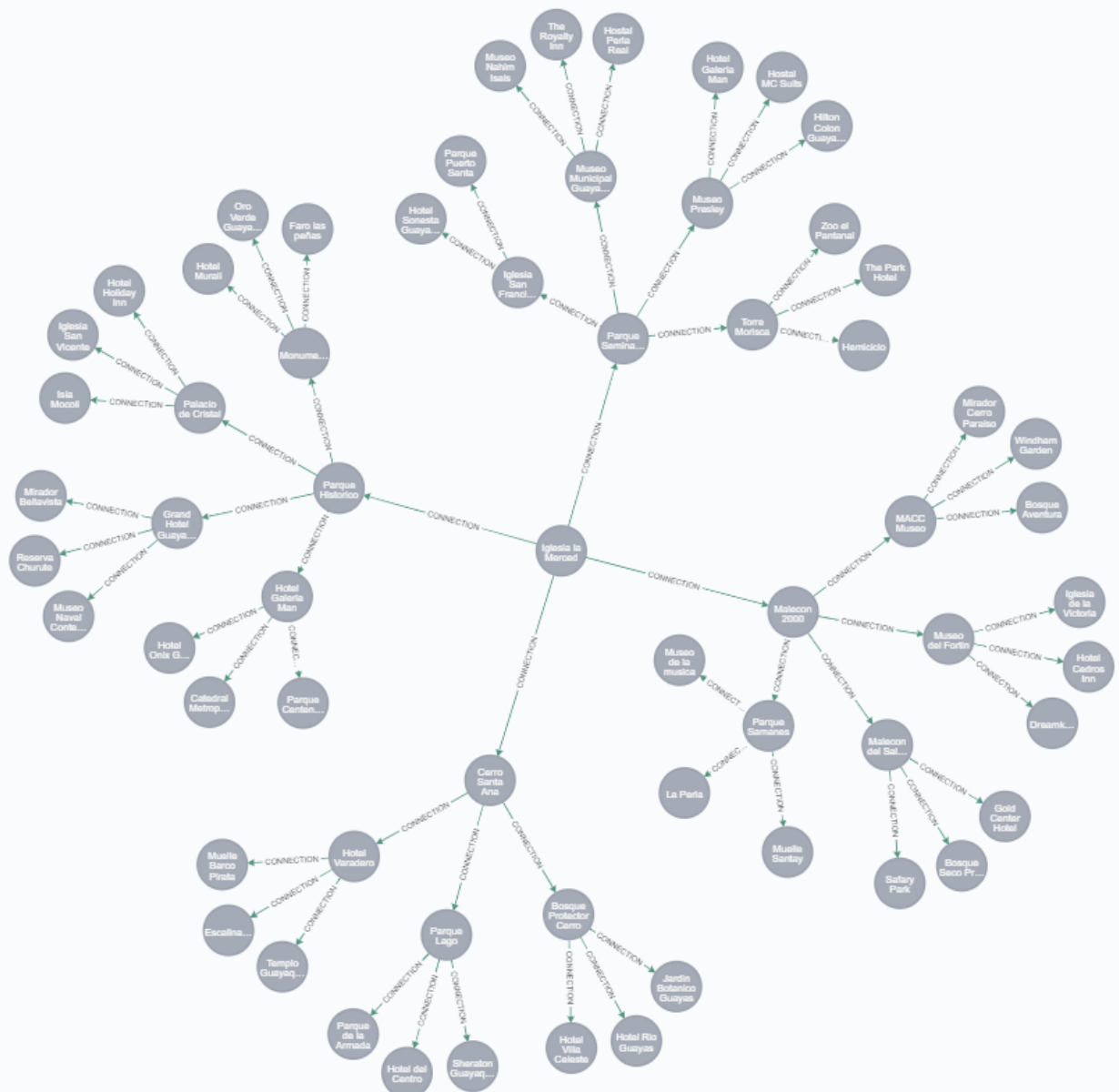
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(f)-[:CONNECTION {time: 3.1}]->(v),
(f)-[:CONNECTION {time: 2.3}]->(w),
(g)-[:CONNECTION {time: 27.5}]->(x),
(g)-[:CONNECTION {time: 0.8}]->(y),
(g)-[:CONNECTION {time: 5.3}]->(z),
(h)-[:CONNECTION {time: 2.8}]->(aa),
(h)-[:CONNECTION {time: 5.3}]->(bb),
(h)-[:CONNECTION {time: 5.1}]->(cc),
(i)-[:CONNECTION {time: 6.2}]->(dd),
(i)-[:CONNECTION {time: 13.1}]->(ee),
(i)-[:CONNECTION {time: 5.8}]->(ff),
(j)-[:CONNECTION {time: 8.3}]->(gg),
(j)-[:CONNECTION {time: 6.9}]->(hh),
(j)-[:CONNECTION {time: 0.7}]->(ii),
(k)-[:CONNECTION {time: 5.6}]->(jj),
(k)-[:CONNECTION {time: 1.8}]->(kk),
(l)-[:CONNECTION {time: 7.8}]->(ll),
(l)-[:CONNECTION {time: 4.9}]->(mm),
(l)-[:CONNECTION {time: 32.7}]->(nn),
(m)-[:CONNECTION {time: 5.5}]->(oo),
(m)-[:CONNECTION {time: 2.7}]->(pp),
(m)-[:CONNECTION {time: 4.2}]->(qq),
(n)-[:CONNECTION {time: 15.7}]->(rr),
(n)-[:CONNECTION {time: 2.6}]->(ss),
(n)-[:CONNECTION {time: 8.6}]->(tt),
(o)-[:CONNECTION {time: 2.4}]->(uu),
(o)-[:CONNECTION {time: 6.7}]->(vv),
(o)-[:CONNECTION {time: 2.7}]->(ww),
(p)-[:CONNECTION {time: 5.3}]->(xx),
(p)-[:CONNECTION {time: 2.9}]->(yy),
(p)-[:CONNECTION {time: 61.4}]->(zz),
(q)-[:CONNECTION {time: 1.8}]->(aaa),
(q)-[:CONNECTION {time: 2.3}]->(bbb),
(q)-[:CONNECTION {time: 0.7}]->(ccc),
(r)-[:CONNECTION {time: 2.1}]->(ddd),
(r)-[:CONNECTION {time: 2.6}]->(eee),
(r)-[:CONNECTION {time: 6.9}]->(fff),
(s)-[:CONNECTION {time: 30.5}]->(ggg),
(s)-[:CONNECTION {time: 22.8}]->(hhh),
(s)-[:CONNECTION {time: 26.6}]->(iii),
(t)-[:CONNECTION {time: 30.5}]->(jjj),
(t)-[:CONNECTION {time: 29.4}]->(kkk),
(t)-[:CONNECTION {time: 33.9}]->(lll)
```

Arbol de Nodos

Algoritmo A*

```
In [ ]:  MATCH (start:Station {name: "Iglesia la Merced"}), (end:Station {name: "Catedr
         al Metropolitana"})
         CALL gds.alpha.shortestPath.astar.stream({
         nodeQuery: 'MATCH (p:Station) RETURN id(p) AS id',
         relationshipQuery: 'MATCH (p1:Station)-[r:CONNECTION]->(p2:Station) RETURN id
         (p1) AS source, id(p2) AS target, r.time AS weight',
         startNode: start,
         endNode: end,
         relationshipWeightProperty: 'weight',
         propertyKeyLat: 'latitude',
         propertyKeyLat: 'longitude'
         })
         YIELD nodeId, cost
         RETURN gds.util.asNode(nodeId).name AS station, cost
```

station	cost
1 "Iglesia la Merced"	0.0
2 "Parque Historico"	8.5
3 "Hotel Galeria Man"	16.3
4 "Catedral Metropolitana"	18.6

Algoritmo Costo Menor

```
CREATE (a:Loc {name: 'Iglesia la Merced'}),
(b:Loc {name: 'Malecon 2000'}),
(c:Loc {name: 'Parque Seminario'}),
(d:Loc {name: 'Parque Historico'}),
(e:Loc {name: 'Cerro Santa Ana'}),

(f:Loc {name: 'Malecon del Salado'}),
(g:Loc {name: 'Museo del Fortin'}),
(h:Loc {name: 'MACC Museo'}),
(i:Loc {name: 'Parque Samanes'}),
(j:Loc {name: 'Torre Morisca'}),
(k:Loc {name: 'Iglesia San Francisco'}),
(l:Loc {name: 'Museo Presley'}),
(m:Loc {name: 'Museo Municipal Guayaquil'}),
(n:Loc {name: 'Palacio de Cristal'}),
(o:Loc {name: 'Monumento al Sagrado Corazon'}),
(p:Loc {name: 'Grand Hotel Guayaquil'}),
(q:Loc {name: 'Hotel Galeria Man'}),
(r:Loc {name: 'Hotel Varadero'}),
(s:Loc {name: 'Bosque Protector Cerro Blanco'}),
(t:Loc {name: 'Parque Lago'}),
(u:Loc {name: 'Gold Center Hotel'}),
(v:Loc {name: 'Bosque Seco Prot'}),
(w:Loc {name: 'Safary Park'}),
(x:Loc {name: 'Hotel Cedros Inn'}),
(y:Loc {name: 'Iglesia de la Victoria'}),
(z:Loc {name: 'Dreamkapture Hostel'}),
(aa:Loc {name: 'Mirador Cerro Paraiso'}),
(bb:Loc {name: 'Bosque Aventura'}),
(cc:Loc {name: 'Windham Garden Guayaquil'}),
(dd:Loc {name: 'Museo de la musica popular'}),
(ee:Loc {name: 'Muelle Santay'}),
(ff:Loc {name: 'La Perla'}),
(gg:Loc {name: 'Hemiciclo de la Rotonda'}),
(hh:Loc {name: 'The Park Hotel'}),
(ii:Loc {name: 'Zoo el Pantanal'}),
(jj:Loc {name: 'Parque Puerto Santa Ana'}),
(kk:Loc {name: 'Hotel Sonesta Guayaquil'}),
(ll:Loc {name: 'Hotel Galeria Man'}),
(mm:Loc {name: 'Hilton Colon Guayaquil'}),
(nn:Loc {name: 'Hostal MC Suits'}),
(oo:Loc {name: 'The Royalty Inn'}),
(pp:Loc {name: 'Museo Nahim Isais'}),
(qq:Loc {name: 'Hostal Perla Real'}),
(rr:Loc {name: 'Isla Mocoli'}),
(ss:Loc {name: 'Iglesia San Vicente Ferrer'}),
(tt:Loc {name: 'Hotel Holiday Inn'}),
(uu:Loc {name: 'Faro las peñas'}),
(vv:Loc {name: 'Hotel Murali'}),
(ww:Loc {name: 'Oro Verde Guayaquil'}),
(xx:Loc {name: 'Mirador Bellavista'}),
(yy:Loc {name: 'Museo Naval Contemporaneo'}),
(zz:Loc {name: 'Reserva Churute'}),
(aaa:Loc {name: 'Parque Centenario'}),
(bbb:Loc {name: 'Catedral Metropolitana'}),
(ccc:Loc {name: 'Hotel Onix Gold'}),
```
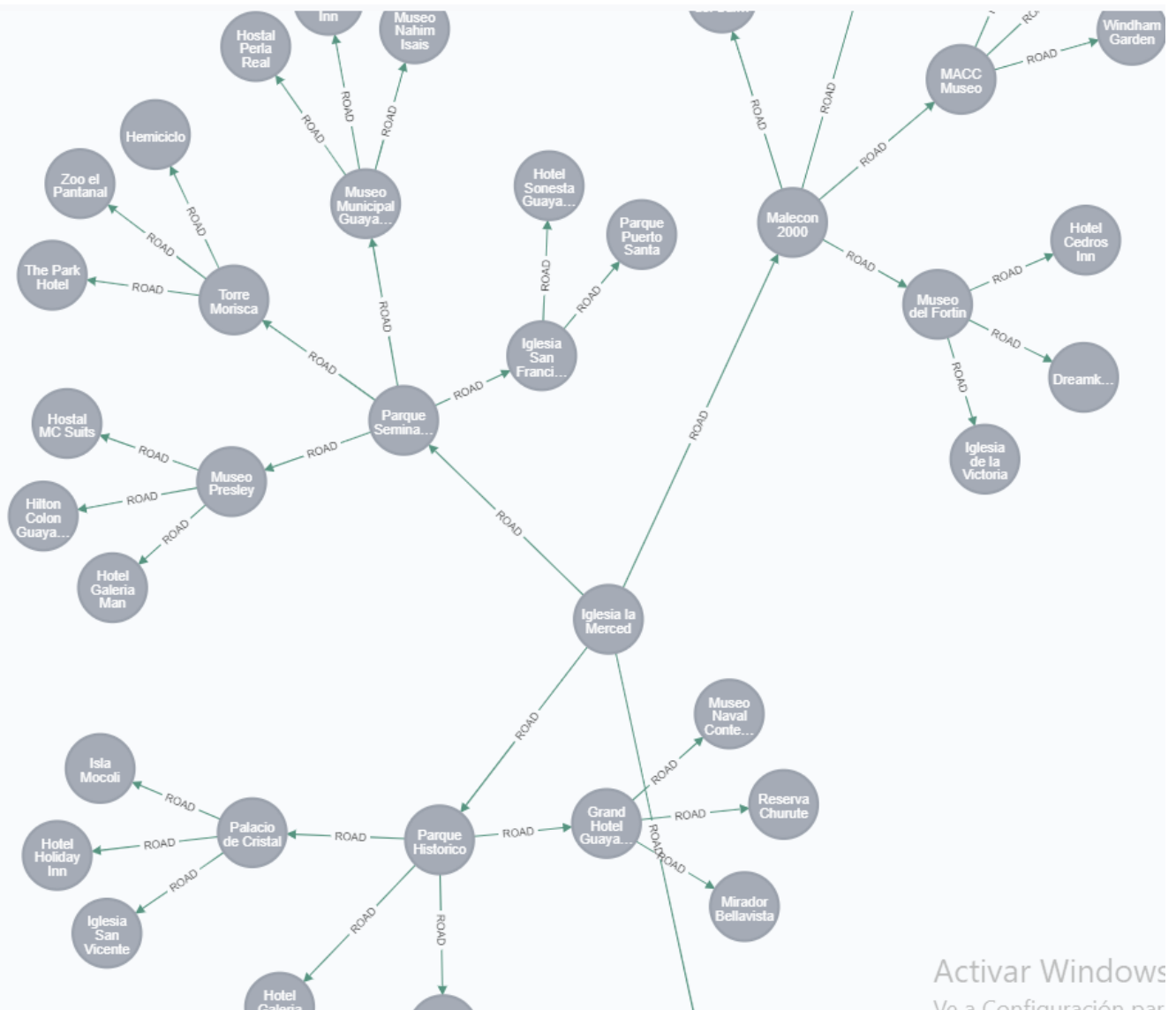
```
(ddd:Loc {name: 'Escalinatas Diego Novoa'}),
(eee:Loc {name: 'Muelle Barco Pirata'}),
(fff:Loc {name: 'Templo Guayaquil'}),
(ggg:Loc {name: 'Jardin Botanico Guayas'}),
(hhh:Loc {name: 'Hotel Rio Guayas'}),
(iii:Loc {name: 'Hotel Villa Celeste'}),
(jjj:Loc {name: 'Sheraton Guayaquil'}),
(kkk:Loc {name: 'Hotel del Centro'}),
(lll:Loc {name: 'Parque de la Armada'}),


(a)-[:ROAD {cost: 0.3}]->(b),
(a)-[:ROAD {cost: 1.2}]->(c),
(a)-[:ROAD {cost: 8.5}]->(d),
(a)-[:ROAD {cost: 2}]->(e),
(b)-[:ROAD {cost: 5}]->(f),
(b)-[:ROAD {cost: 0.75}]->(g),
(b)-[:ROAD {cost: 0.008}]->(h),
(b)-[:ROAD {cost: 10.5}]->(i),
(c)-[:ROAD {cost: 0.5}]->(j),
(c)-[:ROAD {cost: 0.6}]->(k),
(c)-[:ROAD {cost: 2}]->(l),
(c)-[:ROAD {cost: 0.7}]->(m),
(d)-[:ROAD {cost: 9.5}]->(n),
(d)-[:ROAD {cost: 7.9}]->(o),
(d)-[:ROAD {cost: 7.8}]->(p),
(d)-[:ROAD {cost: 7.8}]->(q),
(e)-[:ROAD {cost: 2.7}]->(r),
(e)-[:ROAD {cost: 19.9}]->(s),
(e)-[:ROAD {cost: 31.4}]->(t),
(f)-[:ROAD {cost: 3.4}]->(u),
(f)-[:ROAD {cost: 3.1}]->(v),
(f)-[:ROAD {cost: 2.3}]->(w),
(g)-[:ROAD {cost: 27.5}]->(x),
(g)-[:ROAD {cost: 0.8}]->(y),
(g)-[:ROAD {cost: 5.3}]->(z),
(h)-[:ROAD {cost: 2.8}]->(aa),
(h)-[:ROAD {cost: 5.3}]->(bb),
(h)-[:ROAD {cost: 5.1}]->(cc),
(i)-[:ROAD {cost: 6.2}]->(dd),
(i)-[:ROAD {cost: 13.1}]->(ee),
(i)-[:ROAD {cost: 5.8}]->(ff),
(j)-[:ROAD {cost: 8.3}]->(gg),
(j)-[:ROAD {cost: 6.9}]->(hh),
(j)-[:ROAD {cost: 0.7}]->(ii),
(k)-[:ROAD {cost: 5.6}]->(jj),
(k)-[:ROAD {cost: 1.8}]->(kk),
(l)-[:ROAD {cost: 7.8}]->(ll),
(l)-[:ROAD {cost: 4.9}]->(mm),
(l)-[:ROAD {cost: 32.7}]->(nn),
(m)-[:ROAD {cost: 5.5}]->(oo),
(m)-[:ROAD {cost: 2.7}]->(pp),
(m)-[:ROAD {cost: 4.2}]->(qq),
(n)-[:ROAD {cost: 15.7}]->(rr),
(n)-[:ROAD {cost: 2.6}]->(ss),
(n)-[:ROAD {cost: 8.6}]->(tt),
```

```
(o)-[:ROAD {cost: 2.4}]->(uu),
(o)-[:ROAD {cost: 6.7}]->(vv),
(o)-[:ROAD {cost: 2.7}]->(ww),
(p)-[:ROAD {cost: 5.3}]->(xx),
(p)-[:ROAD {cost: 2.9}]->(yy),
(p)-[:ROAD {cost: 61.4}]->(zz),
(q)-[:ROAD {cost: 1.8}]->(aaa),
(q)-[:ROAD {cost: 2.3}]->(bbb),
(q)-[:ROAD {cost: 0.7}]->(ccc),
(r)-[:ROAD {cost: 2.1}]->(ddd),
(r)-[:ROAD {cost: 2.6}]->(eee),
(r)-[:ROAD {cost: 6.9}]->(fff),
(s)-[:ROAD {cost: 30.5}]->(ggg),
(s)-[:ROAD {cost: 22.8}]->(hhh),
(s)-[:ROAD {cost: 26.6}]->(iii),
(t)-[:ROAD {cost: 30.5}]->(jjj),
(t)-[:ROAD {cost: 29.4}]->(kkk),
(t)-[:ROAD {cost: 33.9}]->(lll)
```

```
In [ ]:  MATCH (start:Loc {name: 'Iglesia la Merced'}), (end:Loc {name: 'Catedral Metro
         politana'})
         CALL gds.alpha.shortestPath.stream({
         nodeQuery:'MATCH(n:Loc) RETURN id(n) AS id',
         relationshipQuery:'MATCH(n:Loc)-[r:ROAD]->(m:Loc) RETURN id(n) AS source, id
         (m) AS target,
         r.cost AS weight',
         startNode: start,
         relationshipWeightProperty: 'weight',
         endNode: end
         })
         YIELD nodeId, cost
         RETURN gds.util.asNode(nodeId).name AS name, cost
```

$ MATCH (start:Loc {name: 'Iglesia la Merced'}), (end:Loc {name: 'Catedral Metropolitana'}) CALL gds.alpha.shortest…

name	cost
1 "Iglesia la Merced"	0.0
2 "Parque Historico"	8.5
3 "Hotel Galeria Man"	16.3
4 "Catedral Metropolitana"	18.6

Algoritmo Amplitud

```
In [ ]:   CREATE
            (a:Node {tag: 'Iglesia la Merced'}),
            (b:Node {tag: 'Malecon 2000'}),
            (c:Node {tag: 'Parque Seminario'}),
            (d:Node {tag: 'Parque Historico'}),
            (e:Node {tag: 'Cerro Santa Ana'}),
            (f:Node {tag: 'Malecon del Salado'}),
            (g:Node {tag: 'Museo del Fortin'}),
            (h:Node {tag: 'MACC Museo'}),
            (i:Node {tag: 'Parque Samanes'}),
            (j:Node {tag: 'Torre Morisca'}),
            (k:Node {tag: 'Iglesia San Francisco'}),
            (l:Node {tag: 'Museo Presley'}),
            (m:Node {tag: 'Museo Municipal Guayaquil'}),
            (n:Node {tag: 'Palacio de Cristal'}),
            (o:Node {tag: 'Monumento al Sagrado Corazon'}),
            (p:Node {tag: 'Grand Hotel Guayaquil'}),
            (q:Node {tag: 'Hotel Galeria Man'}),
            (r:Node {tag: 'Hotel Varadero'}),
            (s:Node {tag: 'Bosque Protector Cerro Blanco'}),
            (t:Node {tag: 'Parque Lago'}),
            (u:Node {tag: 'Gold Center Hotel'}),
            (v:Node {tag: 'Bosque Seco Prot'}),

            (w:Node {tag: 'Safary Park'}),
            (x:Node {tag: 'Hotel Cedros Inn'}),
            (y:Node {tag: 'Iglesia de la Victoria'}),
            (z:Node {tag: 'Dreamkapture Hostel'}),
            (aa:Node {tag: 'Mirador Cerro Paraiso'}),
            (bb:Node {tag: 'Bosque Aventura'}),
            (cc:Node {tag: 'Windham Garden Guayaquil'}),
            (dd:Node {tag: 'Museo de la musica popular'}),
            (ee:Node {tag: 'Muelle Santay'}),
            (ff:Node {tag: 'La Perla'}),
            (gg:Node {tag: 'Hemiciclo de la Rotonda'}),
            (hh:Node {tag: 'The Park Hotel'}),
            (ii:Node {tag: 'Zoo el Pantanal'}),
            (jj:Node {tag: 'Parque Puerto Santa Ana'}),
            (kk:Node {tag: 'Hotel Sonesta Guayaquil'}),
            (ll:Node {tag: 'Hotel Galeria Man'}),
            (mm:Node {tag: 'Hilton Colon Guayaquil'}),
            (nn:Node {tag: 'Hostal MC Suits'}),
            (oo:Node {tag: 'The Royalty Inn'}),
            (pp:Node {tag: 'Museo Nahim Isais'}),
            (qq:Node {tag: 'Hostal Perla Real'}),
            (rr:Node {tag: 'Isla Mocoli'}),
            (ss:Node {tag: 'Iglesia San Vicente Ferrer'}),
            (tt:Node {tag: 'Hotel Holiday Inn'}),
            (uu:Node {tag: 'Faro las peñas'}),
            (vv:Node {tag: 'Hotel Murali'}),
            (ww:Node {tag: 'Oro Verde Guayaquil'}),
            (xx:Node {tag: 'Mirador Bellavista'}),
            (yy:Node {tag: 'Museo Naval Contemporaneo'}),
            (zz:Node {tag: 'Reserva Churute'}),
            (aaa:Node {tag: 'Parque Centenario'}),
            (bbb:Node {tag: 'Catedral Metropolitana'}),
```

```
        (ccc:Node {tag: 'Hotel Onix Gold'}),
        (ddd:Node {tag: 'Escalinatas Diego Novoa'}),
        (eee:Node {tag: 'Muelle Barco Pirata'}),
        (fff:Node {tag: 'Templo Guayaquil'}),
        (ggg:Node {tag: 'Jardin Botanico Guayas'}),
        (hhh:Node {tag: 'Hotel Rio Guayas'}),
        (iii:Node {tag: 'Hotel Villa Celeste'}),
        (jjj:Node {tag: 'Sheraton Guayaquil'}),
        (kkk:Node {tag: 'Hotel del Centro'}),
        (lll:Node {tag: 'Parque de la Armada'}),

(a)-[:REL {cost: 0.3}]->(b),
(a)-[:REL {cost: 1.2}]->(c),
(a)-[:REL {cost: 8.5}]->(d),
(a)-[:REL {cost: 2}]->(e),
(b)-[:REL {cost: 5}]->(f),
(b)-[:REL {cost: 0.75}]->(g),
(b)-[:REL {cost: 0.008}]->(h),
(b)-[:REL {cost: 10.5}]->(i),
(c)-[:REL {cost: 0.5}]->(j),
(c)-[:REL {cost: 0.6}]->(k),
(c)-[:REL {cost: 2}]->(l),
(c)-[:REL {cost: 0.7}]->(m),
(d)-[:REL {cost: 9.5}]->(n),
(d)-[:REL {cost: 7.9}]->(o),
(d)-[:REL {cost: 7.8}]->(p),
(d)-[:REL {cost: 7.8}]->(q),
(e)-[:REL {cost: 2.7}]->(r),
(e)-[:REL {cost: 19.9}]->(s),
(e)-[:REL {cost: 31.4}]->(t),
(f)-[:REL {cost: 3.4}]->(u),
(f)-[:REL {cost: 3.1}]->(v),
(f)-[:REL {cost: 2.3}]->(w),
(g)-[:REL {cost: 27.5}]->(x),
(g)-[:REL {cost: 0.8}]->(y),
(g)-[:REL {cost: 5.3}]->(z),
(h)-[:REL {cost: 2.8}]->(aa),
(h)-[:REL {cost: 5.3}]->(bb),
(h)-[:REL {cost: 5.1}]->(cc),
(i)-[:REL {cost: 6.2}]->(dd),
(i)-[:REL {cost: 13.1}]->(ee),
(i)-[:REL {cost: 5.8}]->(ff),
(j)-[:REL {cost: 8.3}]->(gg),
(j)-[:REL {cost: 6.9}]->(hh),
(j)-[:REL {cost: 0.7}]->(ii),
(k)-[:REL {cost: 5.6}]->(jj),
(k)-[:REL {cost: 1.8}]->(kk),
(l)-[:REL {cost: 7.8}]->(ll),
(l)-[:REL {cost: 4.9}]->(mm),
(l)-[:REL {cost: 32.7}]->(nn),
(m)-[:REL {cost: 5.5}]->(oo),
(m)-[:REL {cost: 2.7}]->(pp),
(m)-[:REL {cost: 4.2}]->(qq),
(n)-[:REL {cost: 15.7}]->(rr),
(n)-[:REL {cost: 2.6}]->(ss),
(n)-[:REL {cost: 8.6}]->(tt),
(o)-[:REL {cost: 2.4}]->(uu),
```

```
(o)-[:REL {cost: 6.7}]->(vv),
(o)-[:REL {cost: 2.7}]->(ww),
(p)-[:REL {cost: 5.3}]->(xx),
(p)-[:REL {cost: 2.9}]->(yy),
(p)-[:REL {cost: 61.4}]->(zz),
(q)-[:REL {cost: 1.8}]->(aaa),
(q)-[:REL {cost: 2.3}]->(bbb),
(q)-[:REL {cost: 0.7}]->(ccc),
(r)-[:REL {cost: 2.1}]->(ddd),
(r)-[:REL {cost: 2.6}]->(eee),
(r)-[:REL {cost: 6.9}]->(fff),
(s)-[:REL {cost: 30.5}]->(ggg),
(s)-[:REL {cost: 22.8}]->(hhh),
(s)-[:REL {cost: 26.6}]->(iii),
(t)-[:REL {cost: 30.5}]->(jjj),
(t)-[:REL {cost: 29.4}]->(kkk),
(t)-[:REL {cost: 33.9}]->(lll)
```

In [ ]:
```
CALL gds.graph.create('myGraph', 'Node', 'REL', { relationshipProperties: 'cost' })
```

In [ ]:
```
MATCH (a:Node{tag:'Iglesia la Merced'})
WITH id(a) AS startNode
CALL gds.alpha.bfs.stream('myGraph', {startNode: startNode})
YIELD path
UNWIND [ n in nodes(path) | n.tag ] AS tags
RETURN tags
ORDER BY tags
```

In [ ]:
```
MATCH (a:Node{tag:'Iglesia la Merced'})
WITH id(a) AS startNode
CALL gds.alpha.bfs.stream('myGraph', {startNode: startNode, maxDepth: 1})
YIELD path
UNWIND [ n in nodes(path) | n.tag ] AS tags
RETURN tags
ORDER BY tags
```