Internet Yellow Pages

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RIPE86. May 25th, 2023

Knowledge seekers

- What is this AS?
- Who announces this prefix?
- How it propagates in BGP?
- Is it in RPKI? Seen at an IXP route server?

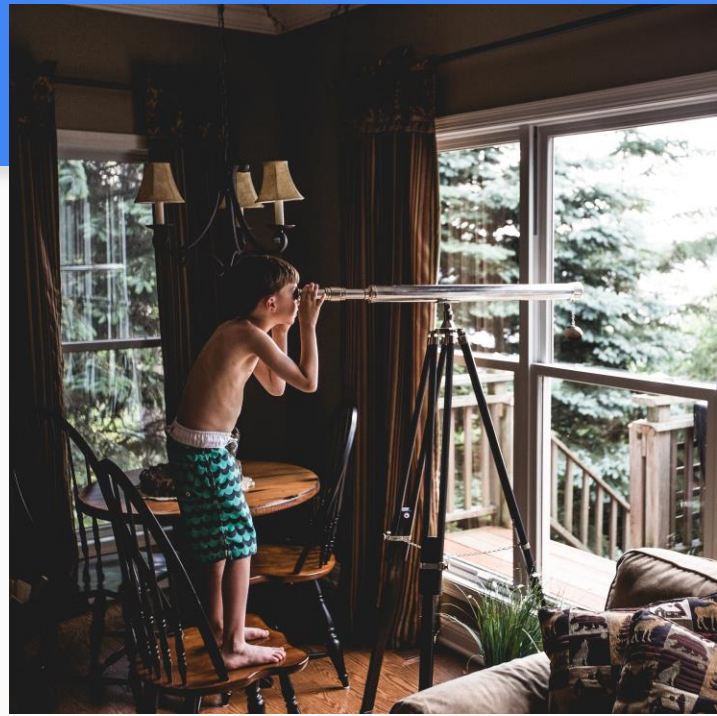
Going to RIPEstat, bgp.he.net, PeeringDB, CAIDA, whois, etc…

These provide complementary views, sometimes with different semantics.

Striving for better data

Our Goal:

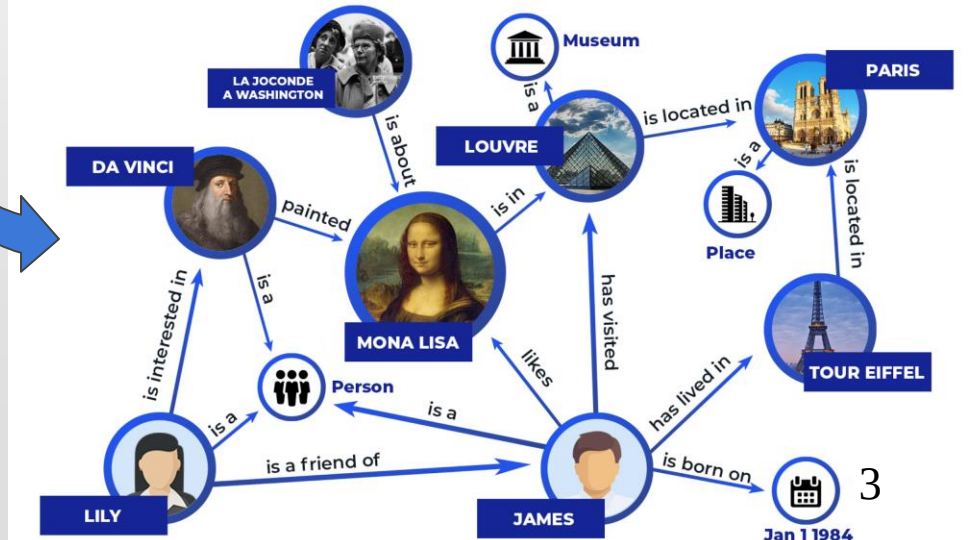
- One place, all datasets
- **Open** to anyone: Users and contributors
- **Structured**: not a repo with tons of data dumps
- **Extensible**: no fixed database schema



Knowledge graph

Structure data in a graph

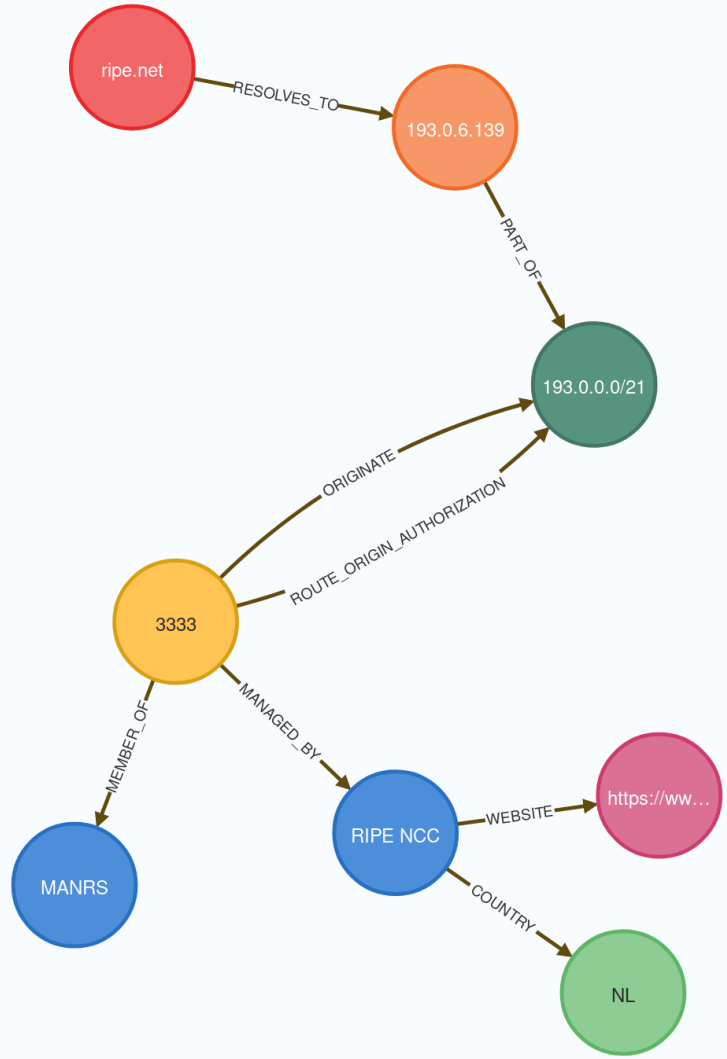
Inspired from wikidata.org, Google/Facebook knowledge graph, world factbook



Ontology

"Things, not strings"

- 19 node types
  (AS, Prefix, IP, IXP, Facility, Domain Name,...)
- 22 link types
  (Originate, Peer with, Resolve to, ...)

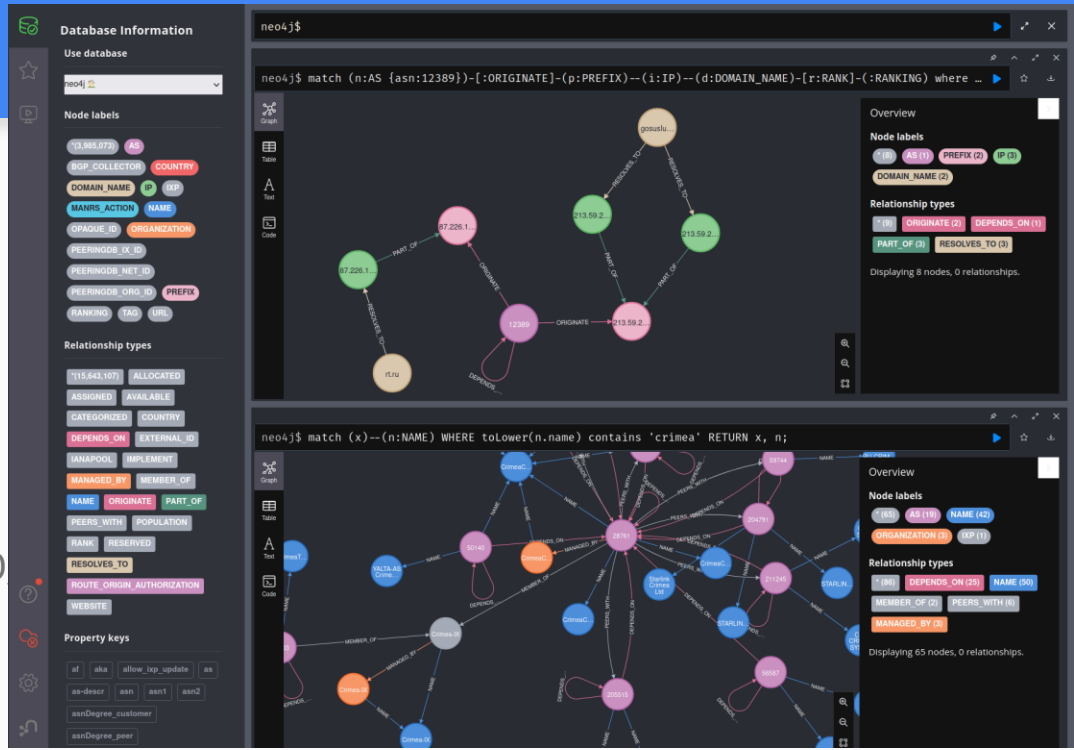


Internet Yellow Pages: Current status

http://iyp.iijlab.net

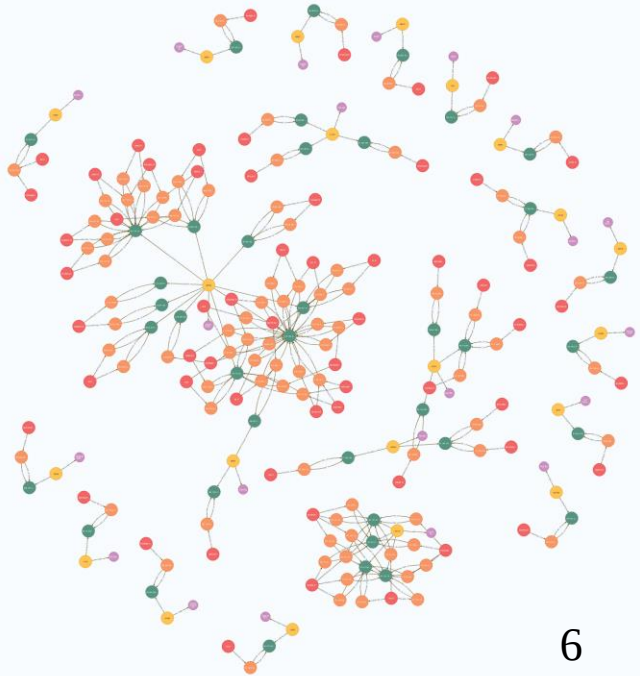
- Base on Neo4j (cypher / bolt)
- About 4M nodes, 20M links
- 16 data sources:

APNIC, BGPKIT, Bgp.tools, CAIDA, Citizen Lab, Cloudflare, IHR, InetIntel, MANRS, NRO, OpenINTEL, PCH, PeeringDB, RIPE NCC, Stanford, Tranco

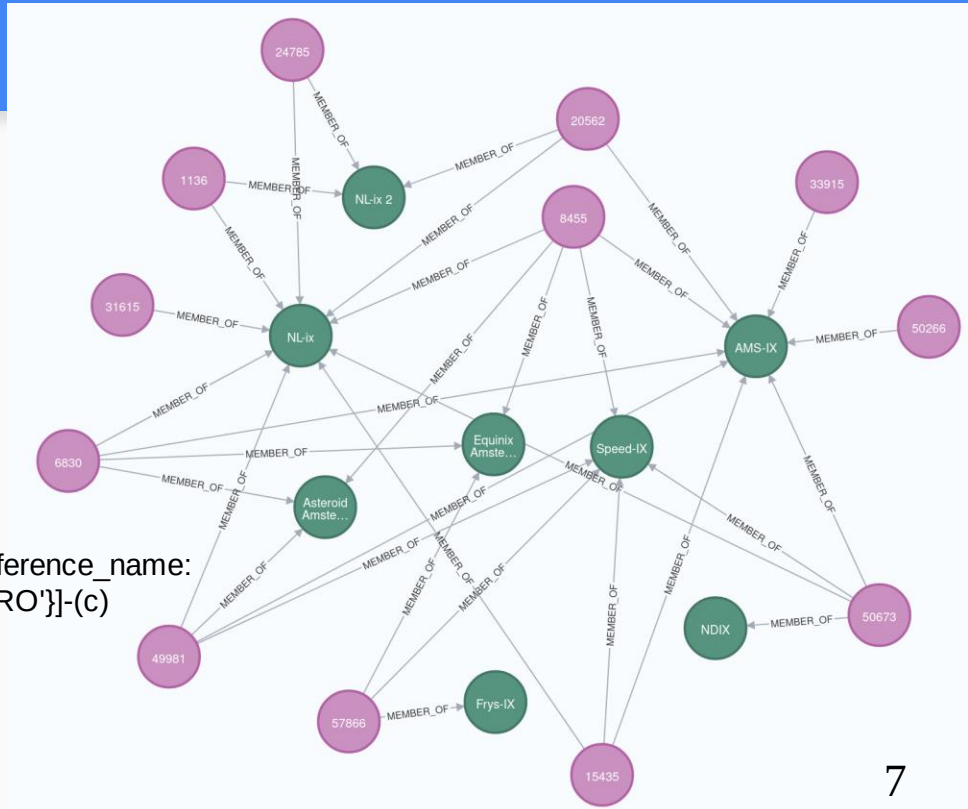


Popular domain names (not in RPKI)

```
MATCH (:Ranking {name:"Tranco top 1M"})-[r:RANK]-(dn:DomainName)-
[dnip:RESOLVES_TO]-(ip:IP)-[ippfx:PART_OF]-(pfx:Prefix)-[o:ORIGINATE]-(net:AS),
(net)-[nn:NAME {reference_org:'PeeringDB'}]-(name:Name),
(pfx)-[:CATEGORIZED]-(:Tag {label:'RPKI NotFound'})
WHERE r.rank<100000 and dn.name ends with '.nl'
RETURN dn, ip, pfx, net, dnip, ippfx, o, nn, name
```

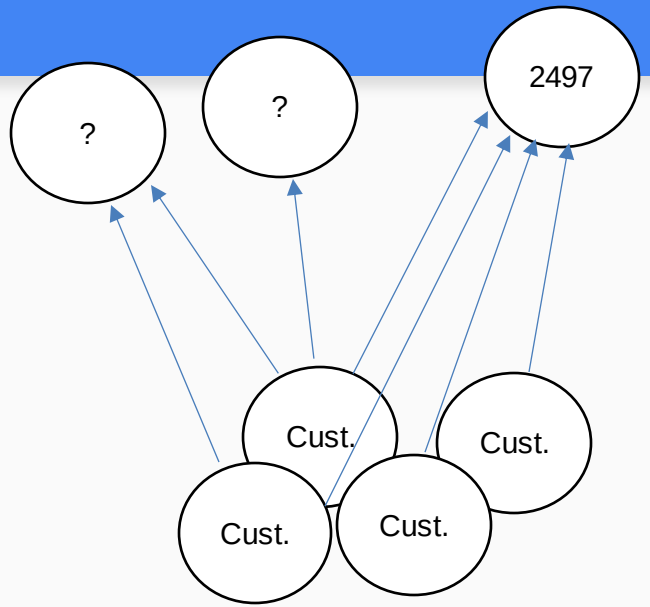


IXPs in NL?




```
MATCH (c:Country {country_code:'NL'})--(r:Ranking)-[rnet:RANK {reference_name:
"ihr.country_dependency"} ]-(net:AS)-[:COUNTRY {reference_org:'NRO'}]-(c)
WHERE rnet.hege>0.02
OPTIONAL MATCH (net)-[netix:MEMBER_OF]-(ix:IXP)--(c)
RETURN net, netix, ix
```

Upstream competitors




```
MATCH (comp:AS)-[:PEERS_WITH {rel:1}]->(customer:AS)<-[:PEERS_WITH {rel:1}]-(iij:AS {asn:2497})
WITH comp, customer OPTIONAL MATCH (comp)-[:NAME {reference_org:'RIPE NCC'}]-(comp_name:Name)
RETURN comp, comp_name, count(DISTINCT customer) AS nb_customer ORDER BY nb_customer DESC
```

Summary

- IYP is a knowledge graph for networking resources: http://iyp.iijlab.net
  - Weekly database dump
- Deploy your own instance and contribute to IYP
  - https://github.com/InternetHealthReport/internet-yellow-pages
- Let us know:
  - What dataset you use?
  - What you'd like to do with IYP?

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