FFS

Fault Finding System

Jose Leitao & Daniel Rodriguez | NIE | Dublin

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facebook scale

as of June 2018

1.47 billion daily
active users

2.23 billion monthly
active users

DC network

Host1
rsw26
sw01
sw02
sw03
sw04
ssw01
ssw02
ssw03
ssw04
ssw05
ssw06
idc01
idc02
idc03
idc04
idc05
idc06
idc07
idc08
ssw01
ssw02
ssw03
ssw04
ssw05
ssw06
sw01
sw02
sw03
sw04
rsw45
Host2

Fault Finding System for the netw😎rk

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FFS:
why?

🤔

Find the needle in the CLOS 🤔

Host1
rsw26
sw01
sw02
sw03
sw04
ssw01
ssw02
ssw03
ssw04
ssw05
ssw06
idc01
idc02
idc03
idc04
idc05
idc06
idc07
idc08
ssw01
ssw02
ssw03
ssw04
ssw05
ssw06
sw01
sw02
sw03
sw04
rsw45
Host2

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Find the needle in the CLOS

idc01
ssw01
ssw01
sw01
sw02
sw03
sw04
sw01
sw02
sw03
sw04
Host1
rsw26
rsw45
Host2
ssw06
06
idc08

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LIAR!
idc01
idc02
idc03
idc04
idc05
idc06
idc07
idc08
ssw01
ssw02
ssw03
ssw04
ssw05
ssw06
ssw02
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sw01
sw02
sw03
sw04
sw01
sw02
sw03
sw04
Host1
rsw26
rsw45
Host2

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Our needs

🙃

Traffic similar to Production

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ECMP-Ready

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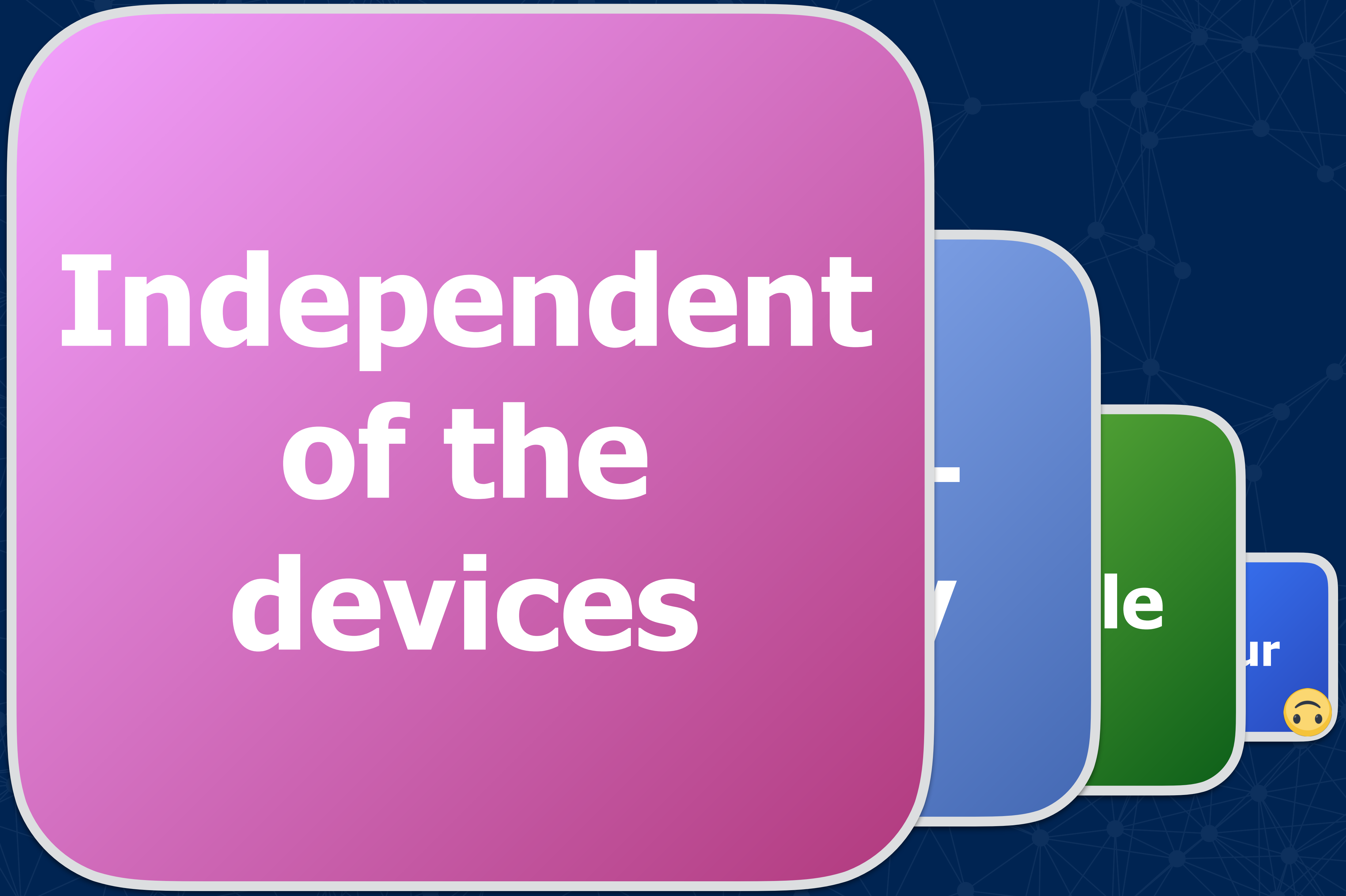

Independent of the devices

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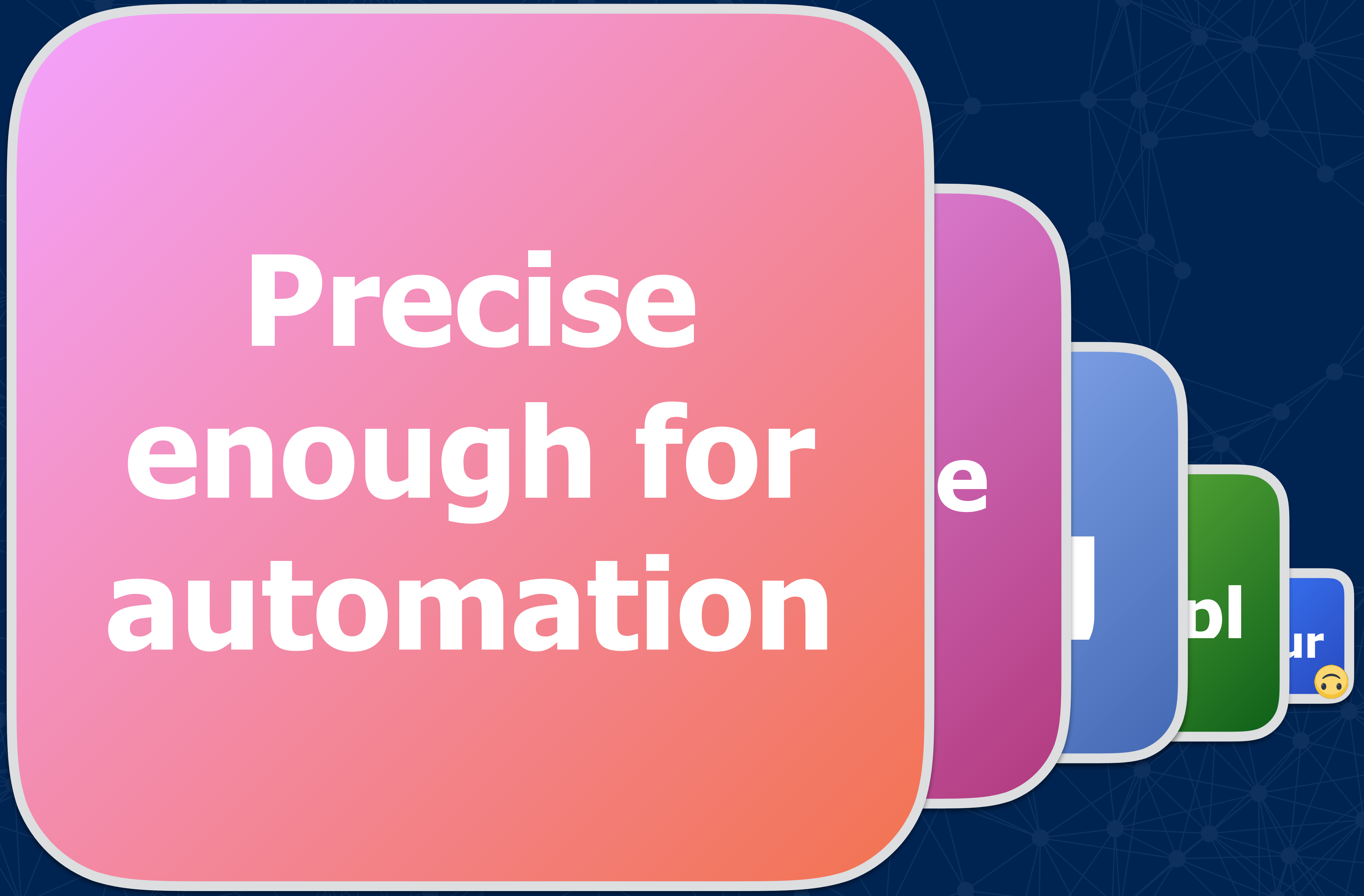

Precise enough for automation

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Building blocks of a PoC

Building blocks

Network Tracer

Maps the paths of the network

Building blocks

Network Tracer

Maps the paths of the network

Traffic Generator

Generate prod-like traffic at scale

Building blocks

Network Tracer

Maps the paths of the network

Traffic Generator

Generate prod-like traffic at scale

Master / Backend

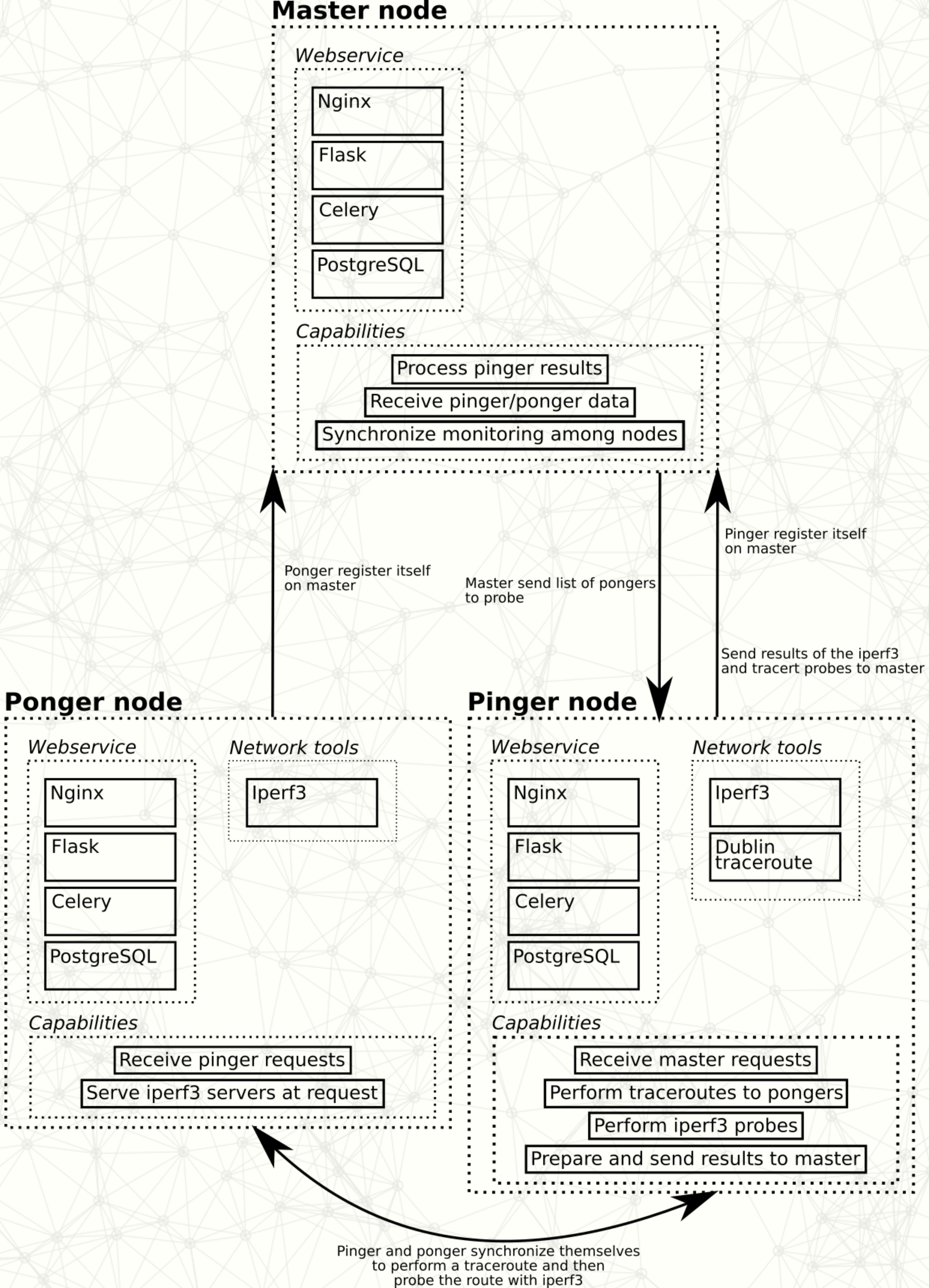
Receiver of inputs. Coordinator of pingers

FFS: Network Fault Finding System

https://github.com/facebookexperimental/ffs

FFS Architecture

FFS Architecture



Master node

Webservice

Nginx

Flask

Celery

PostgreSQL

Capabilities

Process pinger results

Receive pinger/ponger data

Synchronize monitoring among nodes

Ponger register itself on master

Master send list of pongers to probe

Pinger register itself on master

Send results of the iperf3 and tracert probes to master

Ponger node

Webservice

Nginx

Flask

Celery

PostgreSQL

Network tools

Iperf3

Capabilities

Receive pinger requests

Serve iperf3 servers at request

Pinger node

Webservice

Nginx

Flask

Celery

PostgreSQL

Network tools

Iperf3

Dublin traceroute

Capabilities

Receive master requests

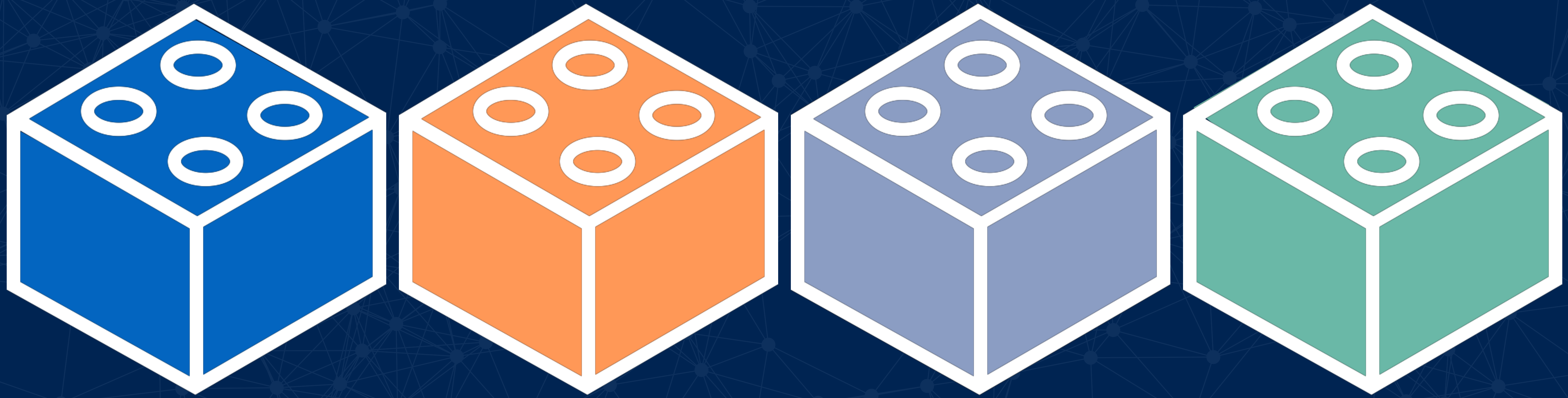
Perform traceroutes to pongers

Perform iperf3 probes

Prepare and send results to master

Pinger and ponger synchronize themselves to perform a traceroute and then probe the route with iperf3

Workflow



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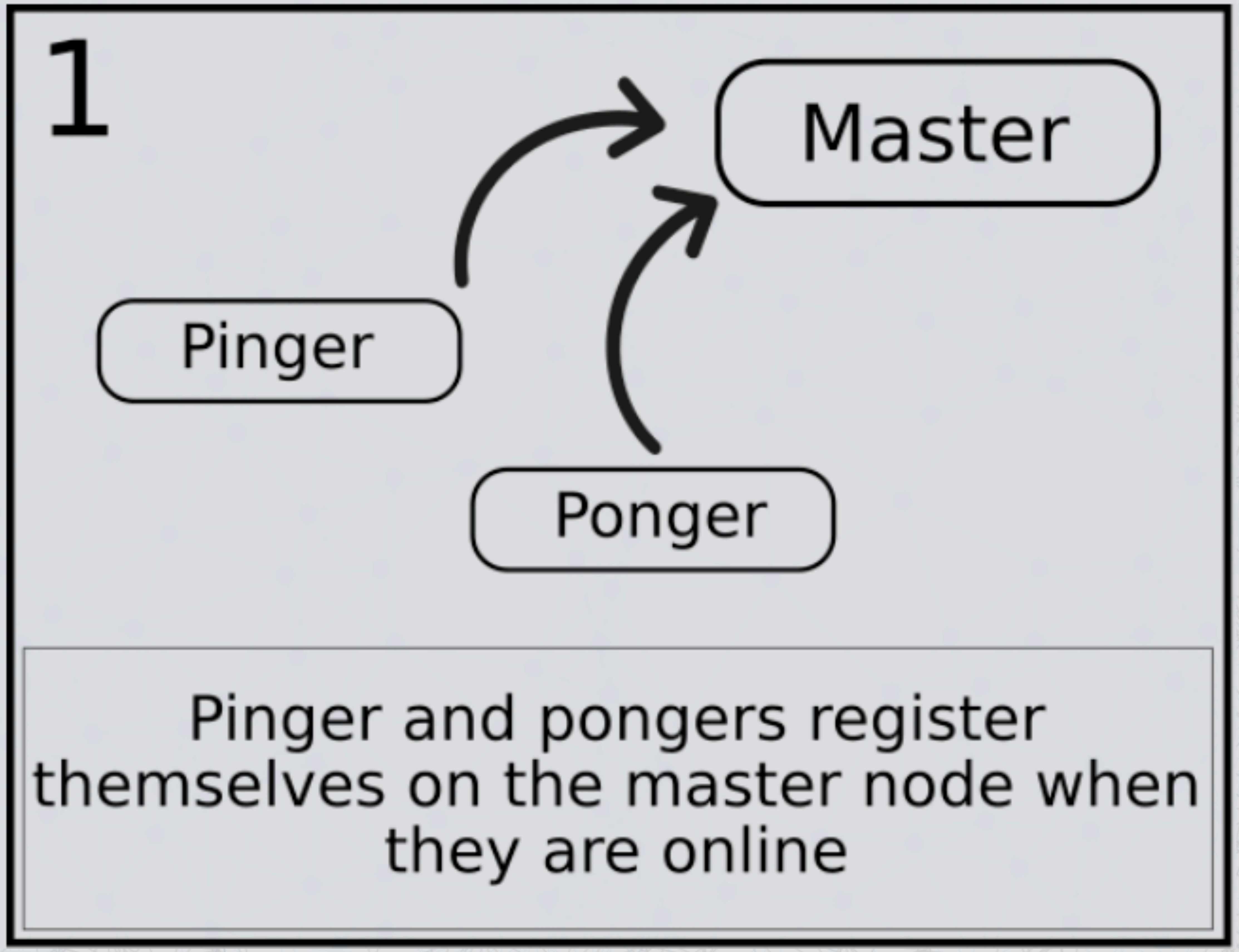
Workflow



Pinger and pongers register themselves on the master node when they are online

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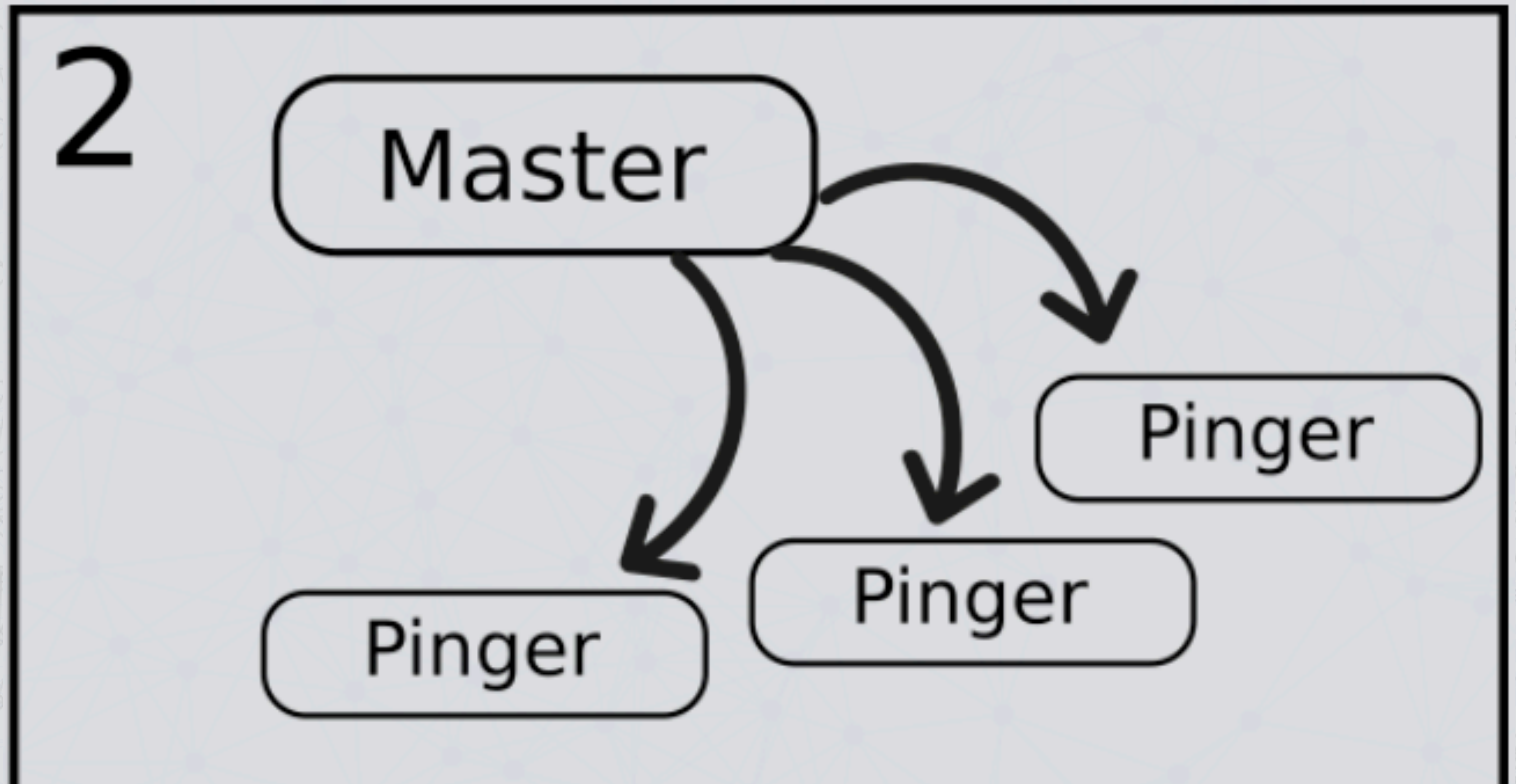
Workflow



Master sends to every registered pinger a list of ponger to monitor at time intervals (30 min for example)

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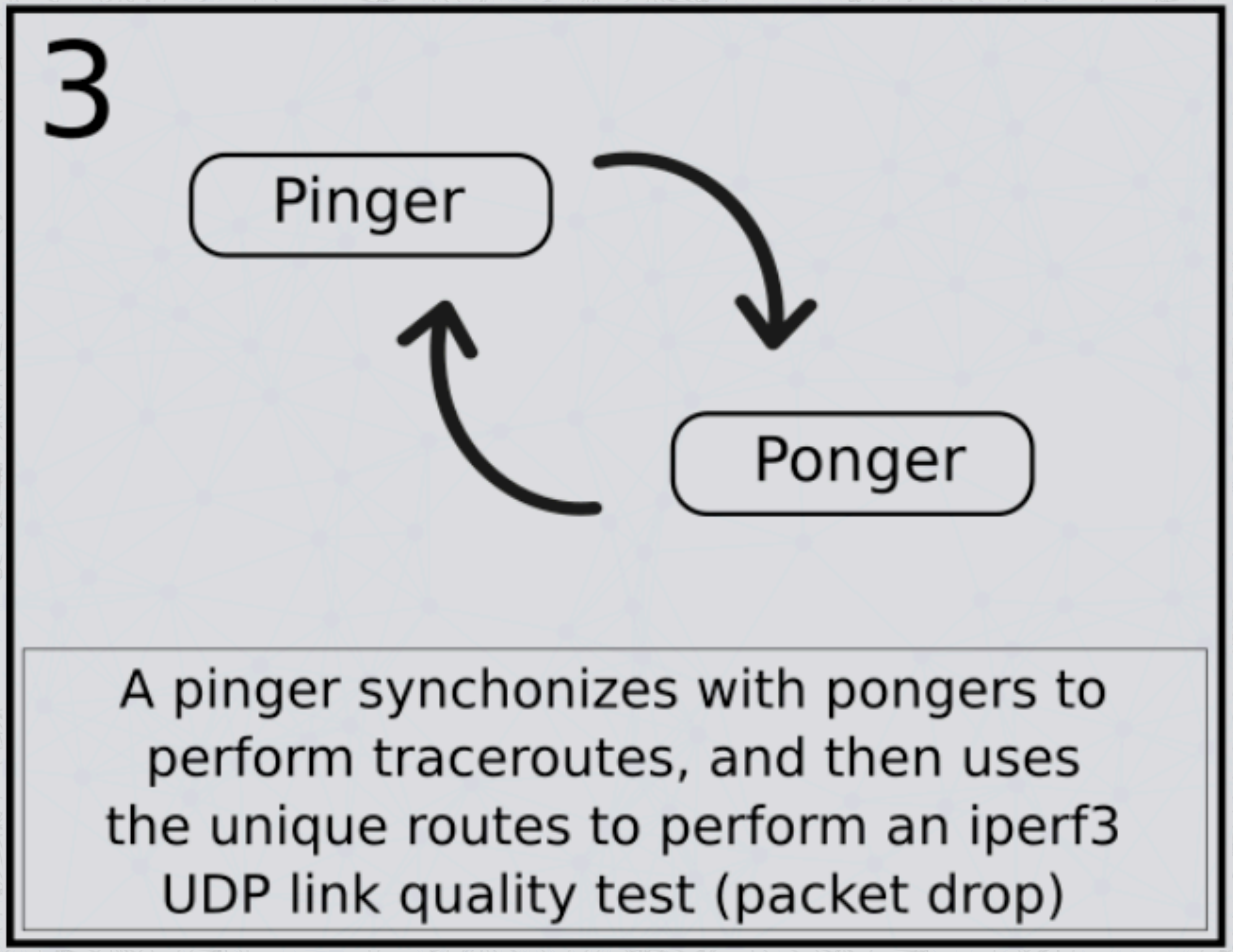
Workflow



A pinger synchonizes with pongers to perform traceroutes, and then uses the unique routes to perform an iperf3 UDP link quality test (packet drop)

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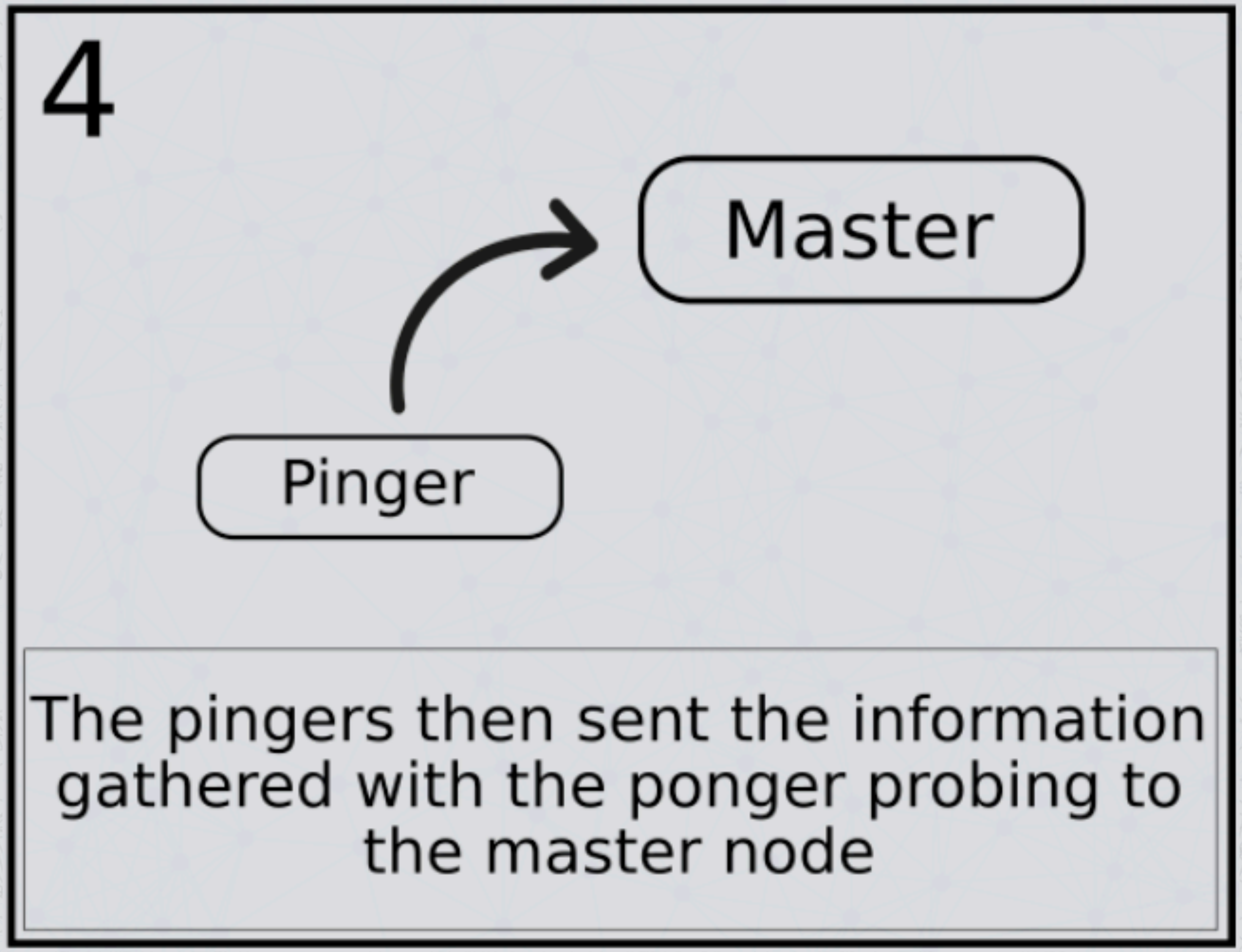
Workflow



The pingers then sent the information gathered with the ponger probing to the master node

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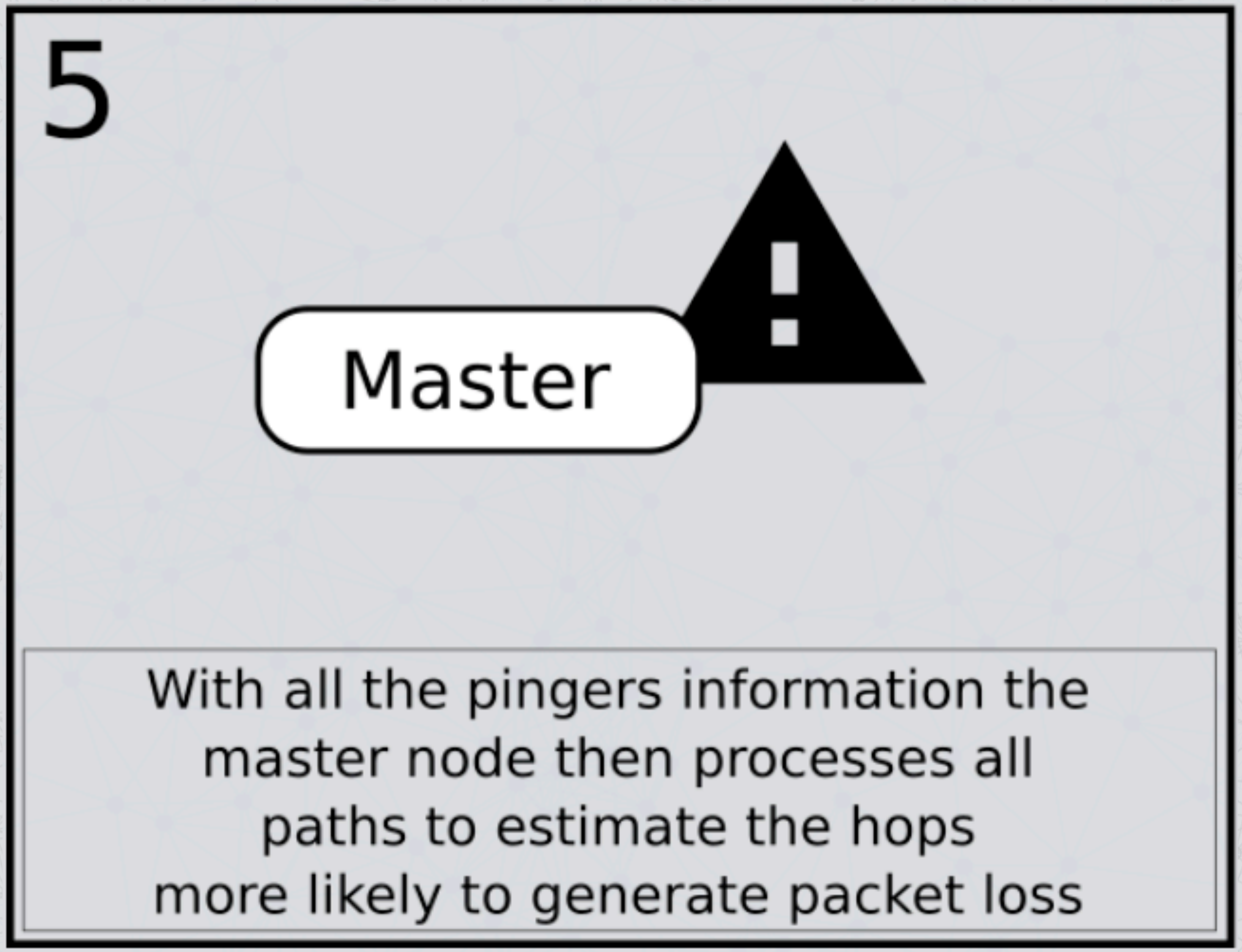
Workflow



With all the pingers information the master node then processes all paths to estimate the hops more likely to generate packet loss

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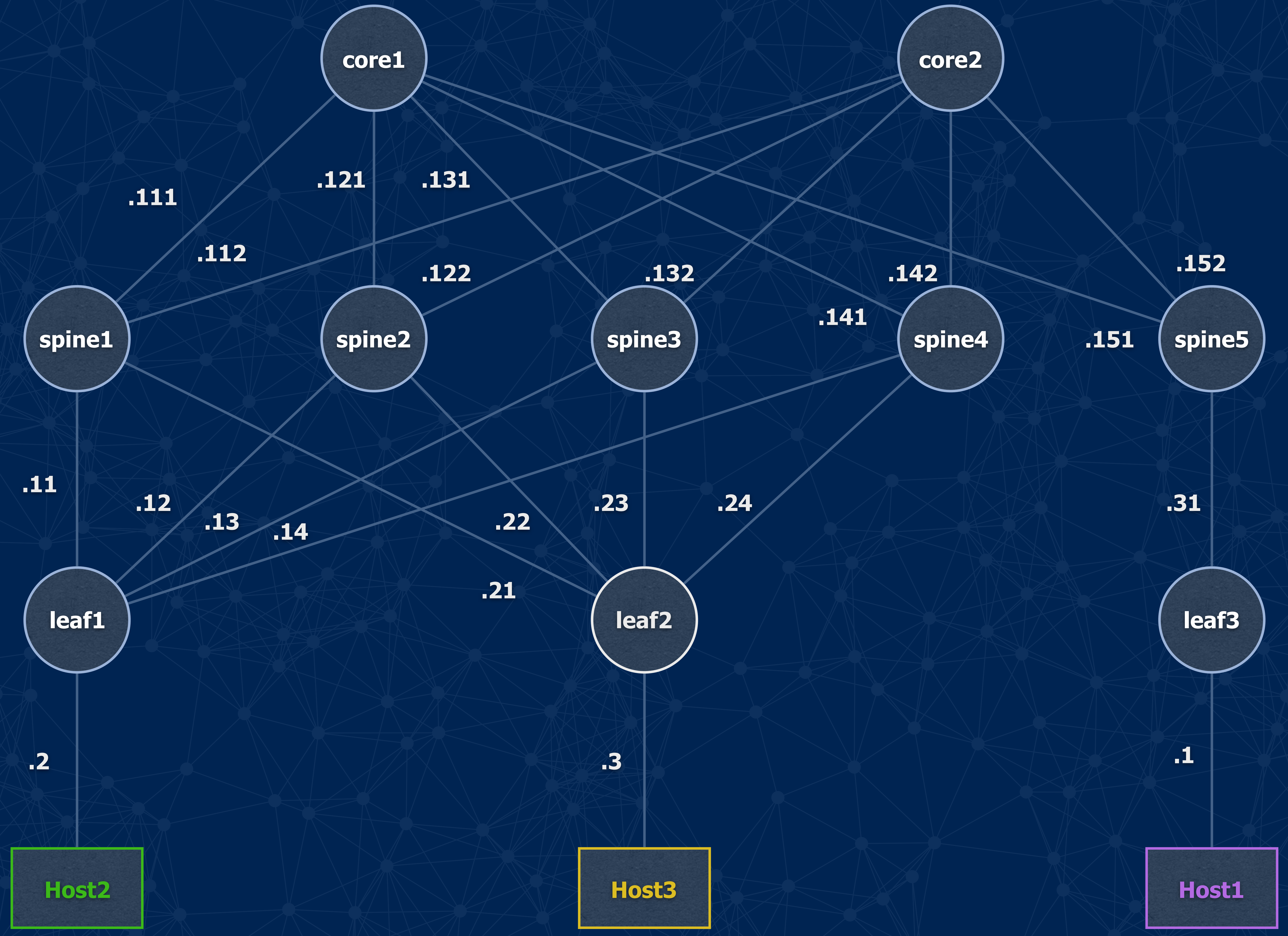
Demo

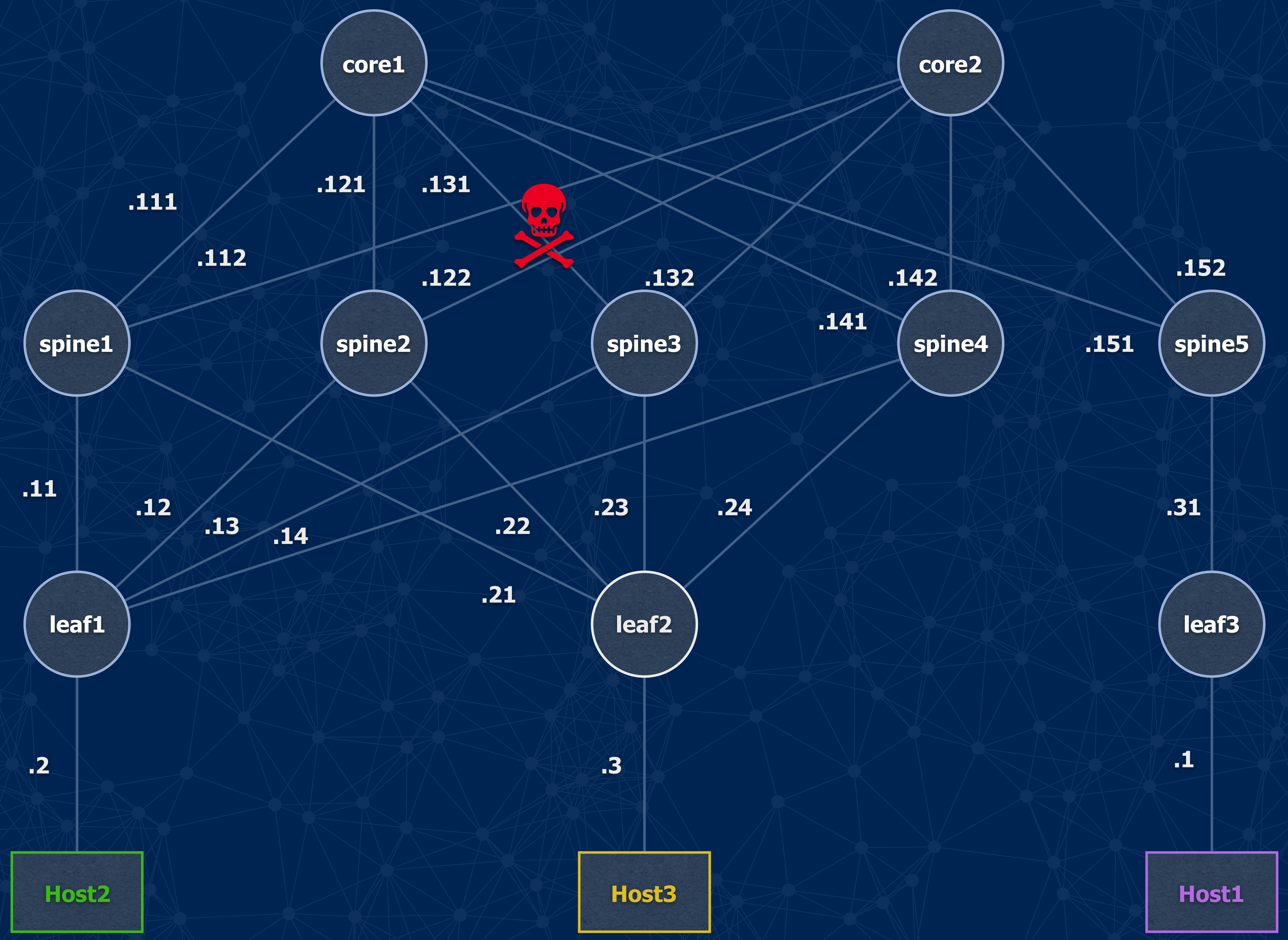
Demo ☠

DEMO ☠



Base net 10.0.x.0/24

DEMO



Base net 10.0.x.0/24

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Q&A