# NEEN OFEC

#### Jose Leitao & Daniel Rodriguez | NIE | Dublin







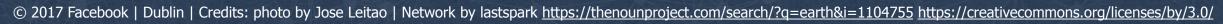
٠

X



.

.





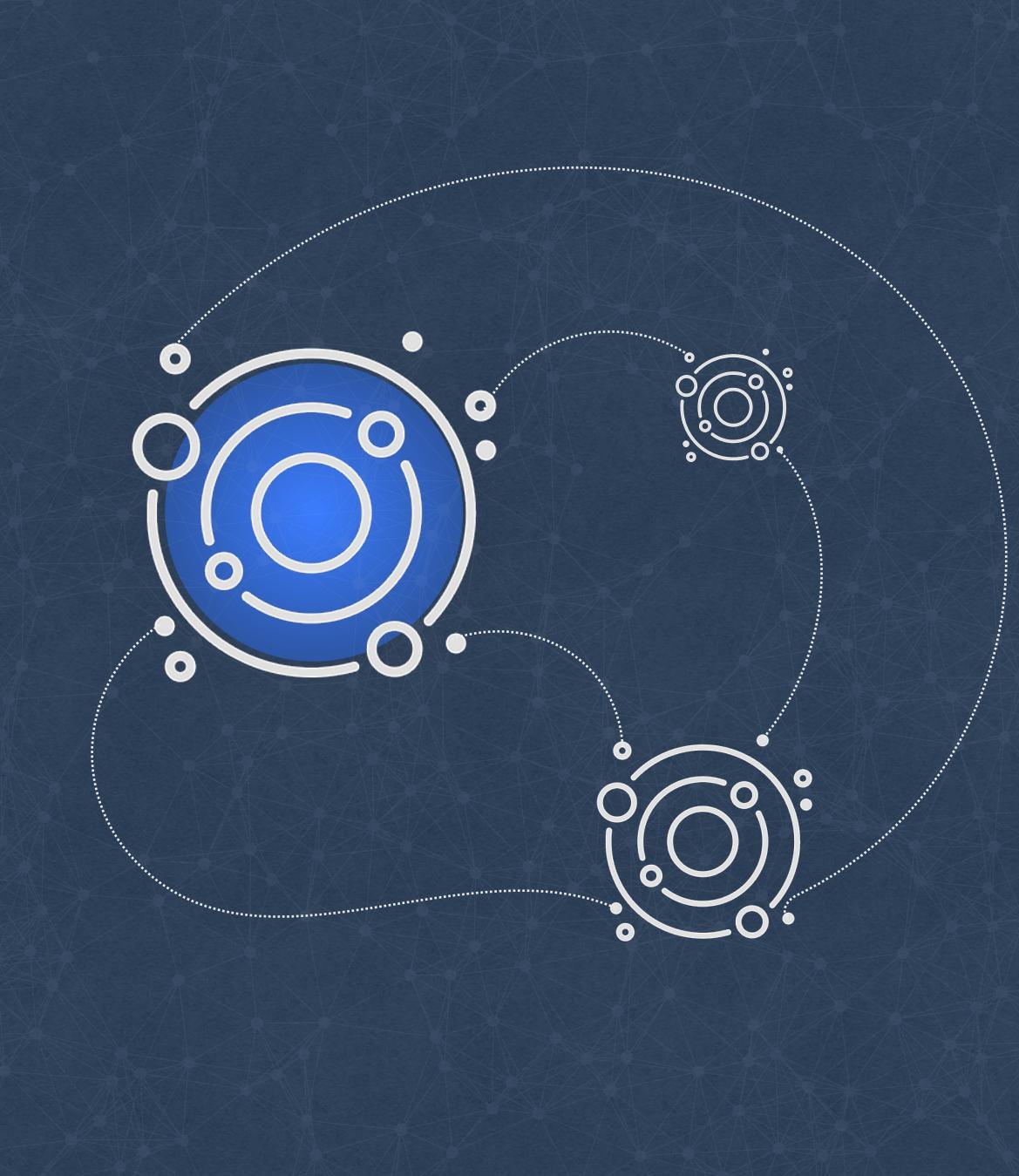
#### focebook scale as of March 2018

#### **1.45 billion daily** active users

#### 2.20 billion monthly active users

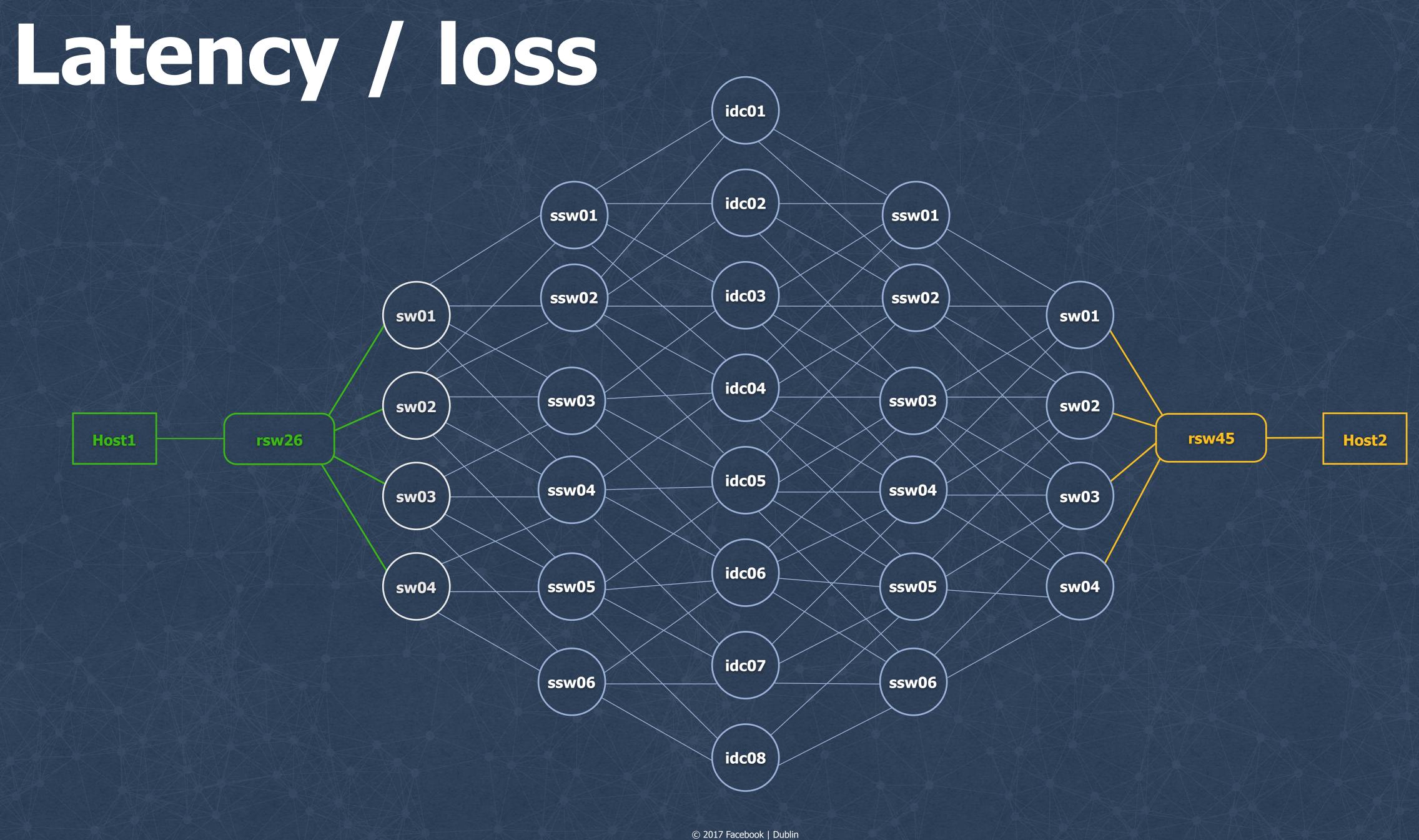


# Problem?



© 2017 Facebook | Dublin | Credits: solar system by Sergey Demushkin https://thenounproject.com/mockturtle/collection/out-of-space/?i=189333 https://creativecommons.org/licenses/by/3.0/











### Ping all the things!

Run pingers on some machines

Run responders on all machines Collect and analyze data



#### Evolution

Run /bin/ping from a python agent

#### Raw Sockets, **Fast TCP Probes**

#### Raw Sockets, **Fast ICMP Probes**

#### **UDP** Probes and Responder

**UDP** Probes and **Responder + Fast ICMP** Probes



### Pinger and responder

Send UDP probes to target list

**Timestamp & Log results** 

High ping-rate (up to 1Mpps)

Pingers

Set DSCP marking

-----

#### github.com/facebook/UdpPinger

#### **Receive/Reply to probe**

Timestamp

. . . . . . . . . . . . . . . .

------

Responders

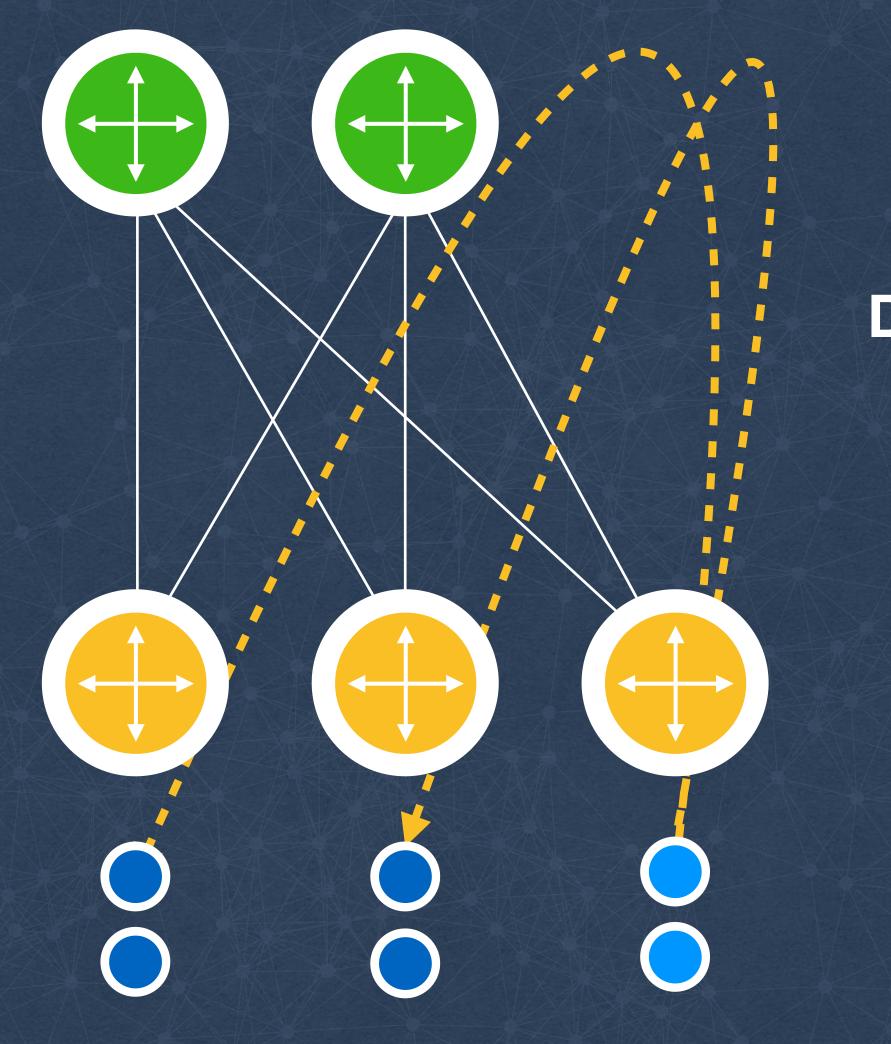
Low load: thousands of pps

-- Reflect DSCP value back

© 2017 Facebook | Dublin



### **UoL Racks - Pinging inside clusters**



**Detect issues** with rack switches

**Dedicated** pingers per cluster

**Probe ALL** machines in cluster

Store timeseries per host/rack





**Detect issues** with rack switches

#### Dedicated pingers per cluster

**Probe ALL** machines in cluster

Store timeseries per host/rack



**Detect issues** with rack switches

/ 1

Dedicated pingers per cluster

#### **Probe ALL** machines in cluster

Store timeseries per host/rack



**Detect issues** with rack switches

Dedicated pingers per cluster

**Probe ALL** machines in cluster

Store timeseries per host/rack

Lags realtime by 2 minutes



© 2017 Facebook | Dublin | Credits: pointing up by Till Teenck https://thenounproject.com/tillt/collection/hands/?oq=hand%20pointing%20up&cidx=3&i=60413 https://creativecommons.org/licenses/by/3.0/



**Detect issues** with rack switches

Dedicated pingers per cluster

**Probe ALL** machines in cluster

Store timeseries per host/rack





**Detect issues** with rack switches

Dedicated pingers per cluster

**Probe ALL** machines in cluster

Store timeseries per host/rack

Lags realtime by 2 minutes



© 2017 Facebook | Dublin | Credits: thumbs up by Till Teenck https://thenounproject.com/tillt/collection/hands/?oq=hand%20pointing%20up&cidx=3&i=61039 https://creativecommons.org/licenses/by/3.0/



## Pinging the clusters

Cluster

 $\bigcirc$ 

**Data Center** 

Pinger A: same DC

Cluster

Target Cluster

Region

**Data Center** 

0

Cluster

**Data Center** 

Region



### Pinging the clusters

Pinger B: same region

Cluster

\_\_\_\_\_

**Data Center** 



**Data Center** 

Region

Pinger A: same DC 0

Cluster

**Data Center** 

Region



### Pinging the clusters

**Pinger B:** same region

Cluster

**Data Center** 



**Data Center** 

Region

Pinger C: **Outside region** 

**Pinger A:** same DC

Cluster **Data Center** 

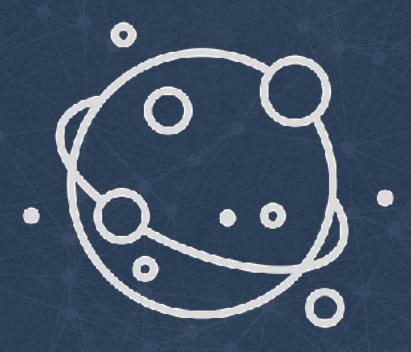
Region

-----



# Building an Open Source









#### github.com/facebook/UdpPinger

Pingers

#### Responders

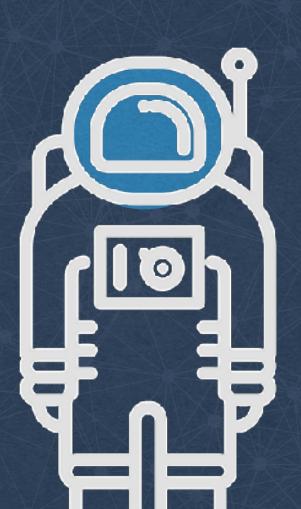
© 2017 Facebook | Dublin





Host (cron)









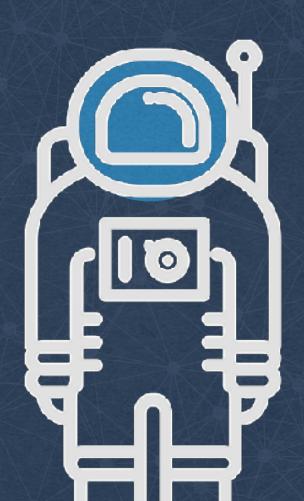
Host (cron w ID)

#### Host (cron w ID)

\_\_\_\_\_



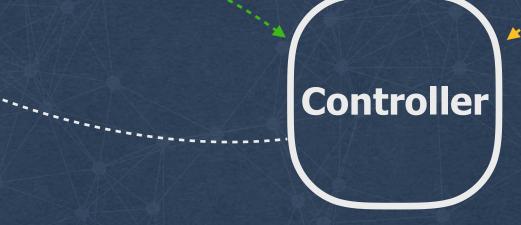




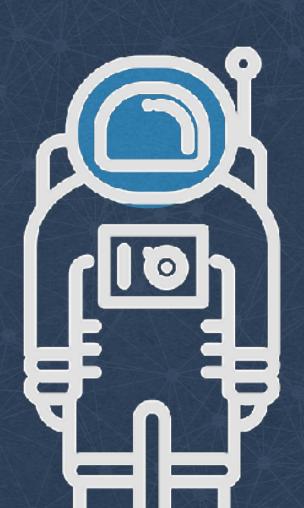




Host (cron)



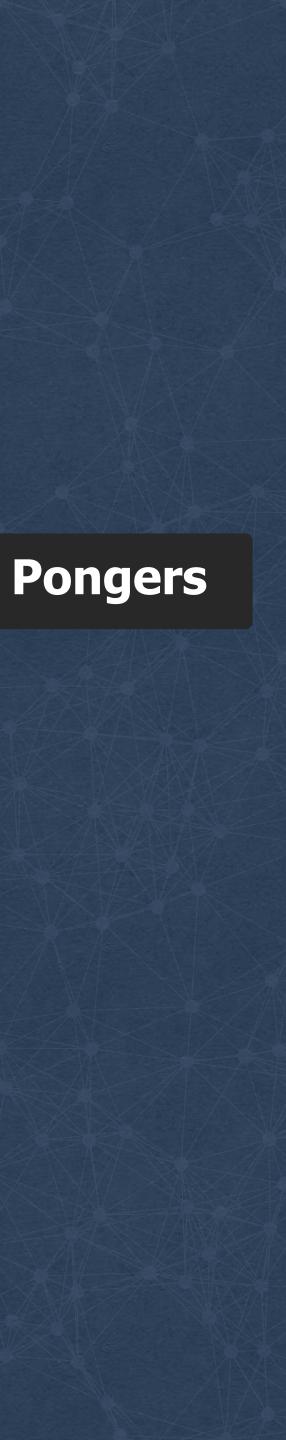
Flask + DB



Host

(cron)

\_\_\_\_\_

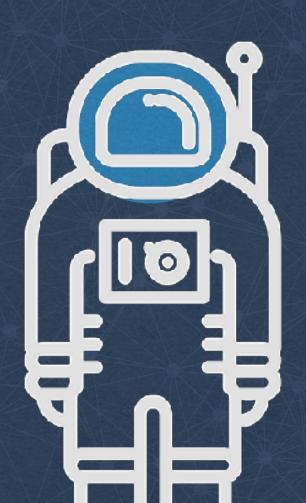




Host (cron)

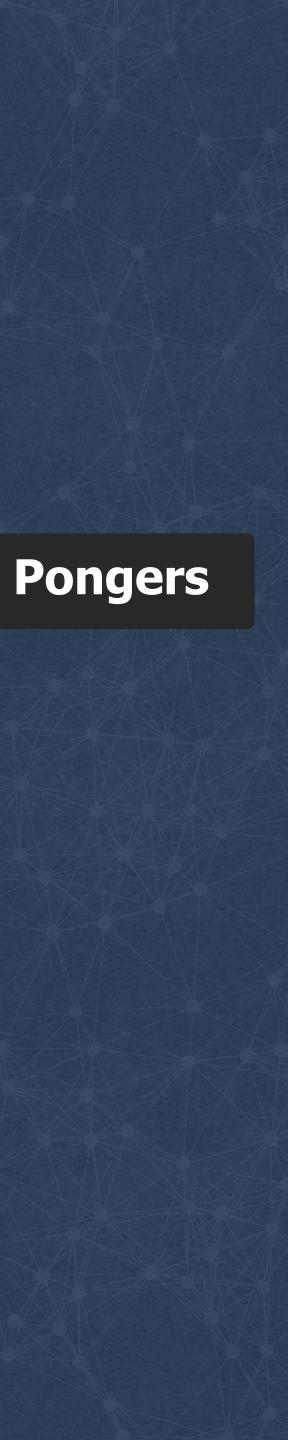


Flask + DB



Host

(cron)



Host

(cron)

\*\*\*\*\*\*\*\*\*

Pingers

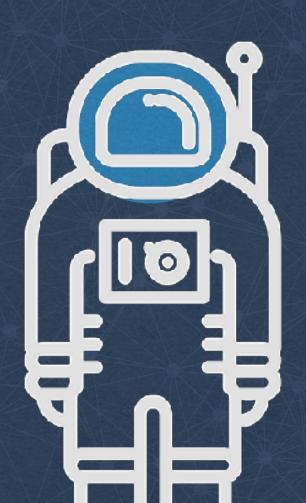
InfluxDB





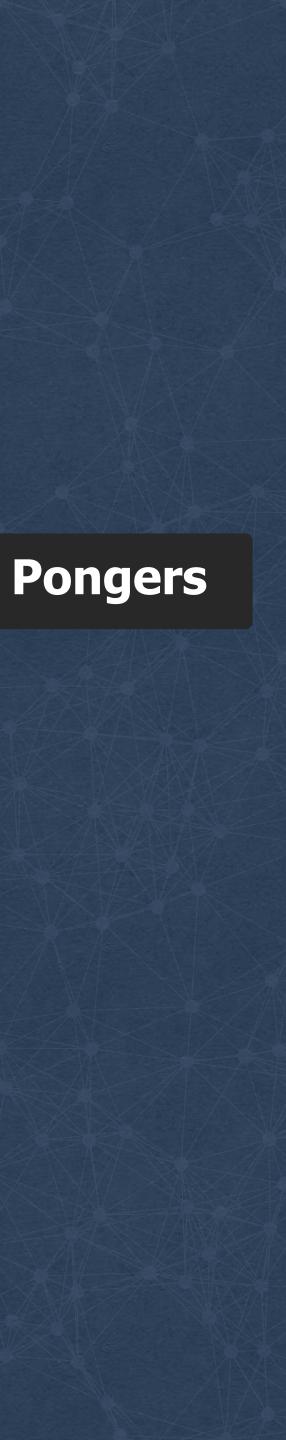
-----

Flask + DB



Host

(cron)





#### github.com/fbsamples/OpenNetNorad



© 2017 Facebook | Dublin | Credits: Radar by Kenneth Chua https://thenounproject.com/inkentation/collection/radar/?oq=radar&cidx=0&i=467351 https://creativecommons.org/licenses/by/3.0/



#### fbsamples / OpenNetNorad



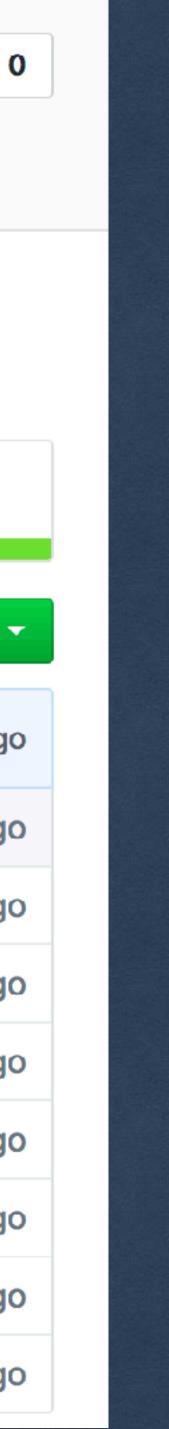
Sample system to manage Uping and Upong (UdpPinger) instances, used to measure / graph network latency and loss on Linux

2 commits	ဖို <b> 1 branc</b> h
Branch: master - New pull request	
j-leitao committed on GitHub Update READM	E.md
<b>chronograf</b>	first
🖿 debian	first
pong_logger	first
scripts	first
CONTRIBUTING.md	first
LICENSE.md	first
PATENTS.md	first
README.md	Upd

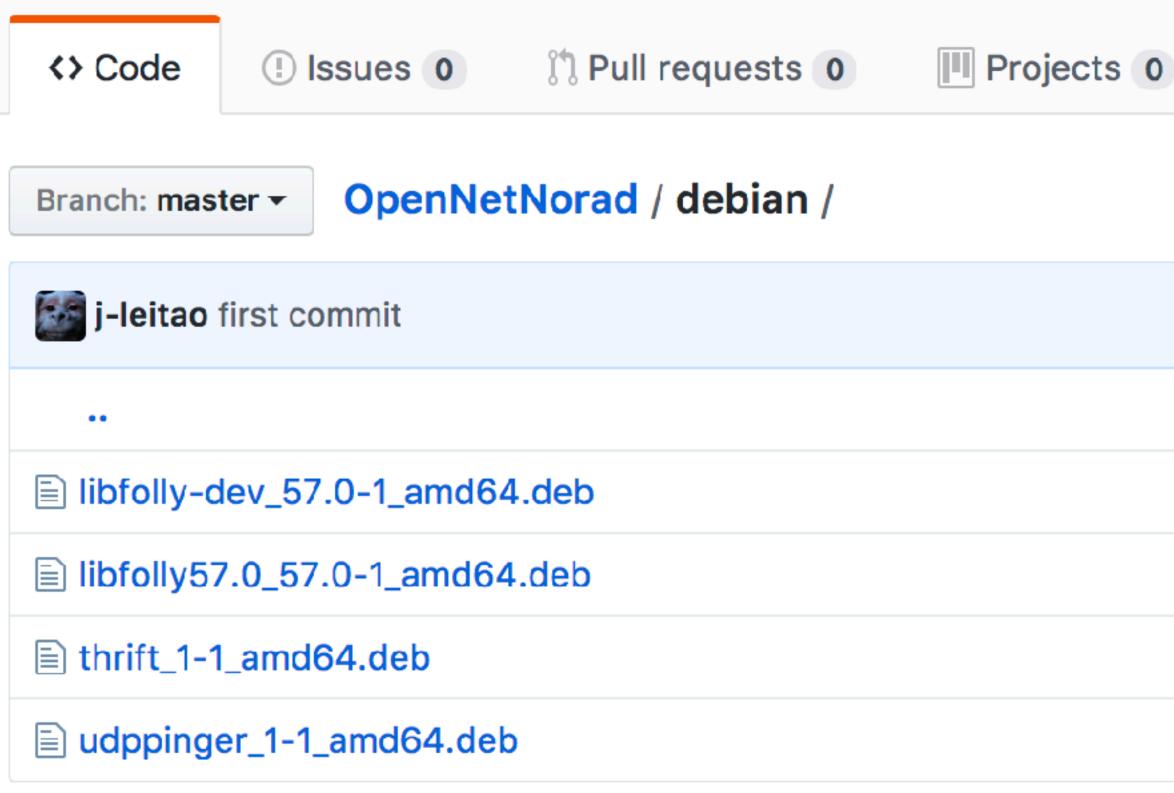
• Watch	4	★ Star	0	<b>%</b> Fork	0

#### Insights -

$\bigcirc$	0 releases	11	Le 1 contributor		
		Find file	Clone or download -		
		Latest com	mit dd2a32e 15 days ago		
t commit			15 days ago		
t commit			15 days ago		
t commit			15 days ago		
t commit			15 days ago		
t commit			15 days ago		
t commit			15 days ago		
t commit			15 days ago		
date README.md			15 days ago		

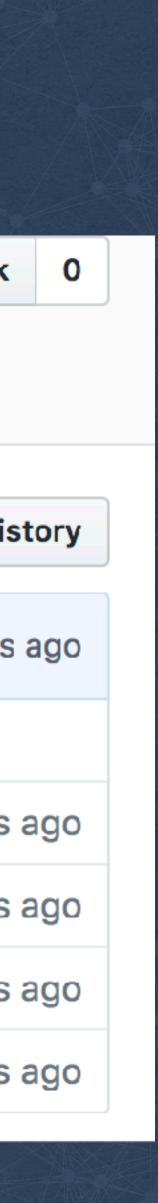


#### fbsamples / OpenNetNorad



			<b>⊙</b> Watch	5	★ Star	1	ୢୄ୰୲	Fork
)	Insights -							
				Creat	te new file	Find	file	His
				Late	est commit	54306f	Fe 17 (	days
		first commit					17 d	lays
		first commit					17 d	lays
		first commit					17 d	lays
		first commit					17 d	lays

© 2017 Facebook | Dublin | Credits: Radar by Kenneth Chua https://thenounproject.com/inkentation/collection/radar/?oq=radar&cidx=0&i=467351 https://creativecommons.org/licenses/by/3.0/





•

۲

+

•

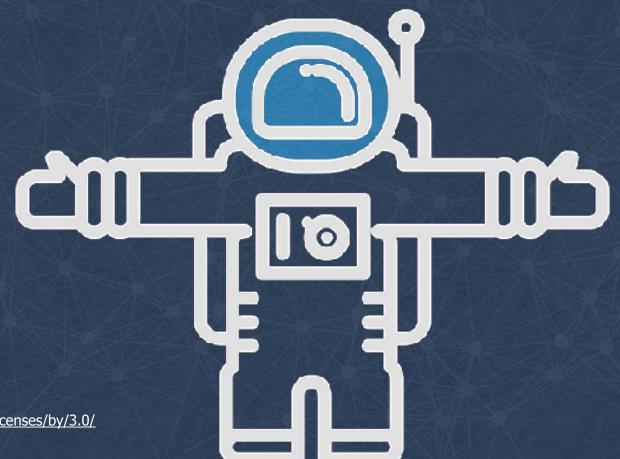
٠

۲

۲



×





# 

Loss within the same cluster

