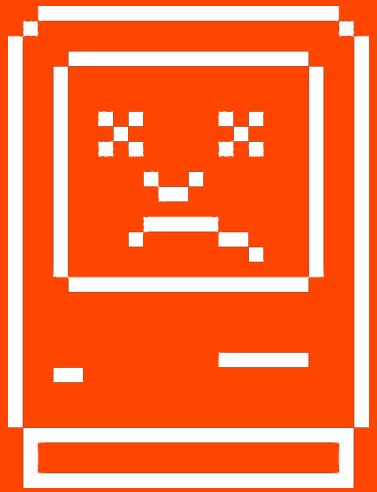
reddit

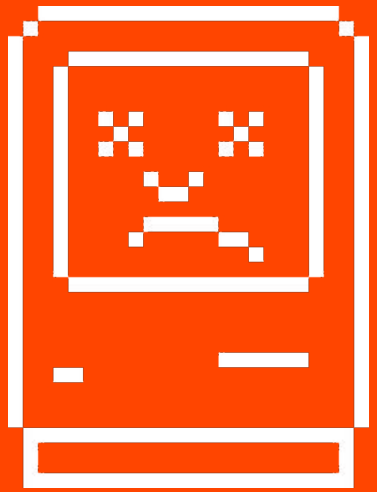
Noisy Neighbors



through networking

reddit

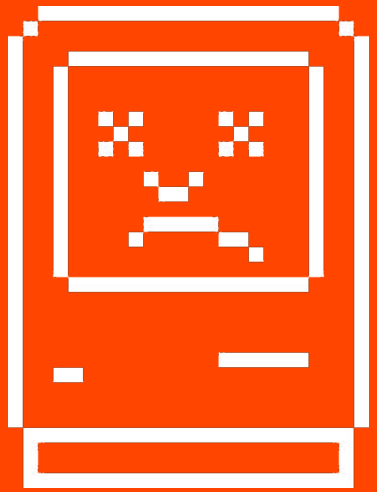
Noisy Neighbors



René Treffer
(he/him)

reddit

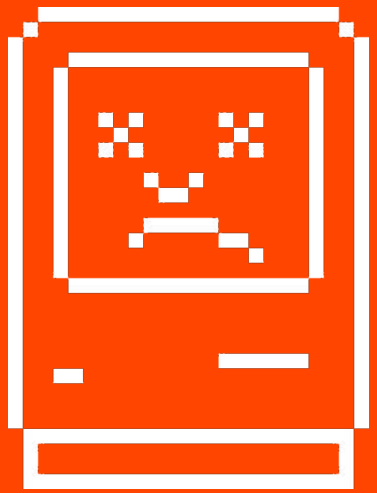
Noisy Neighbors



Ben Kochie (he/him)

Incidents

5

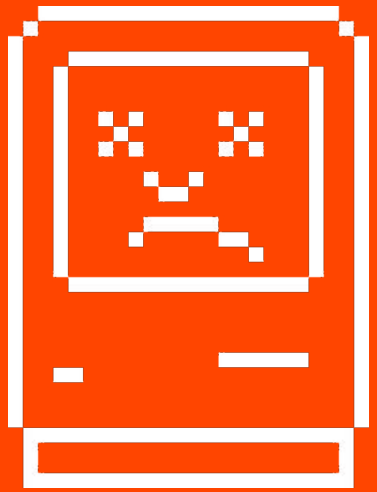


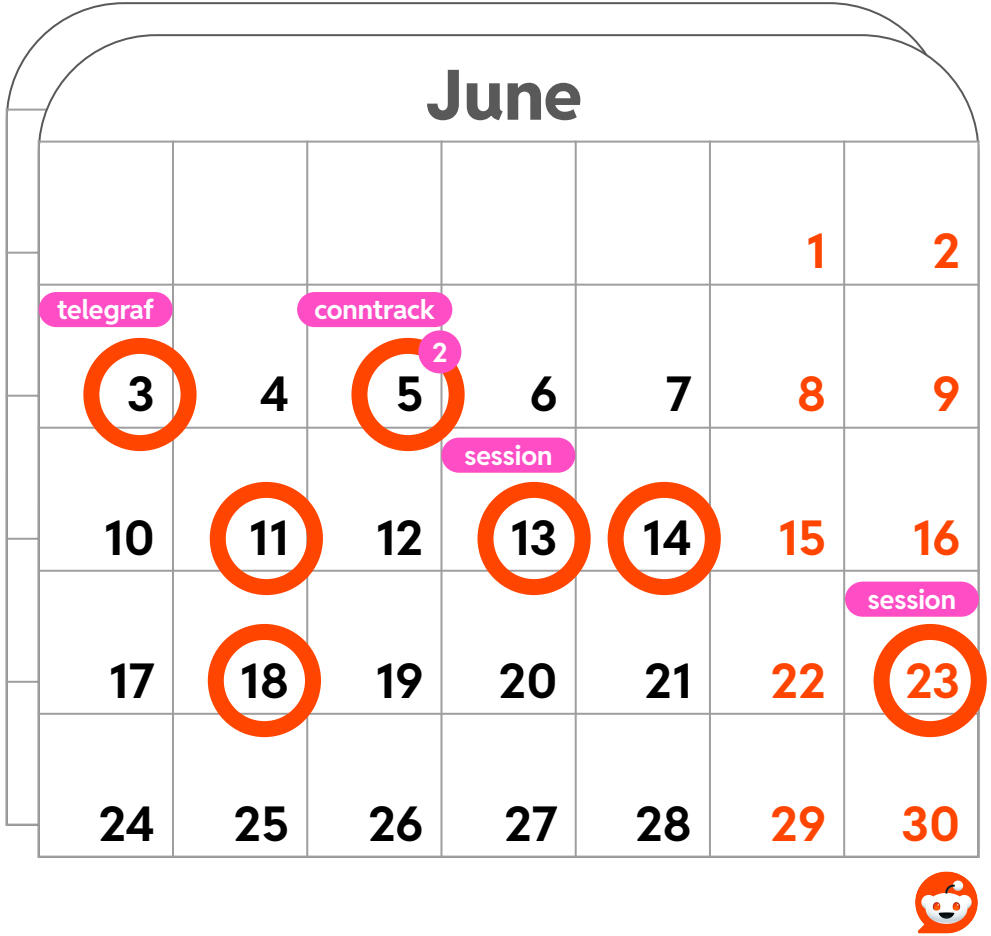
May

		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17 (2)	18	19
20	21	22	23	24	25	26
27	28	29	30 (k8s)	31		

Incidents

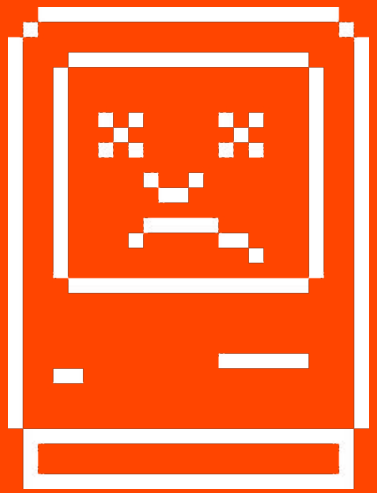
5 + 7 = 12

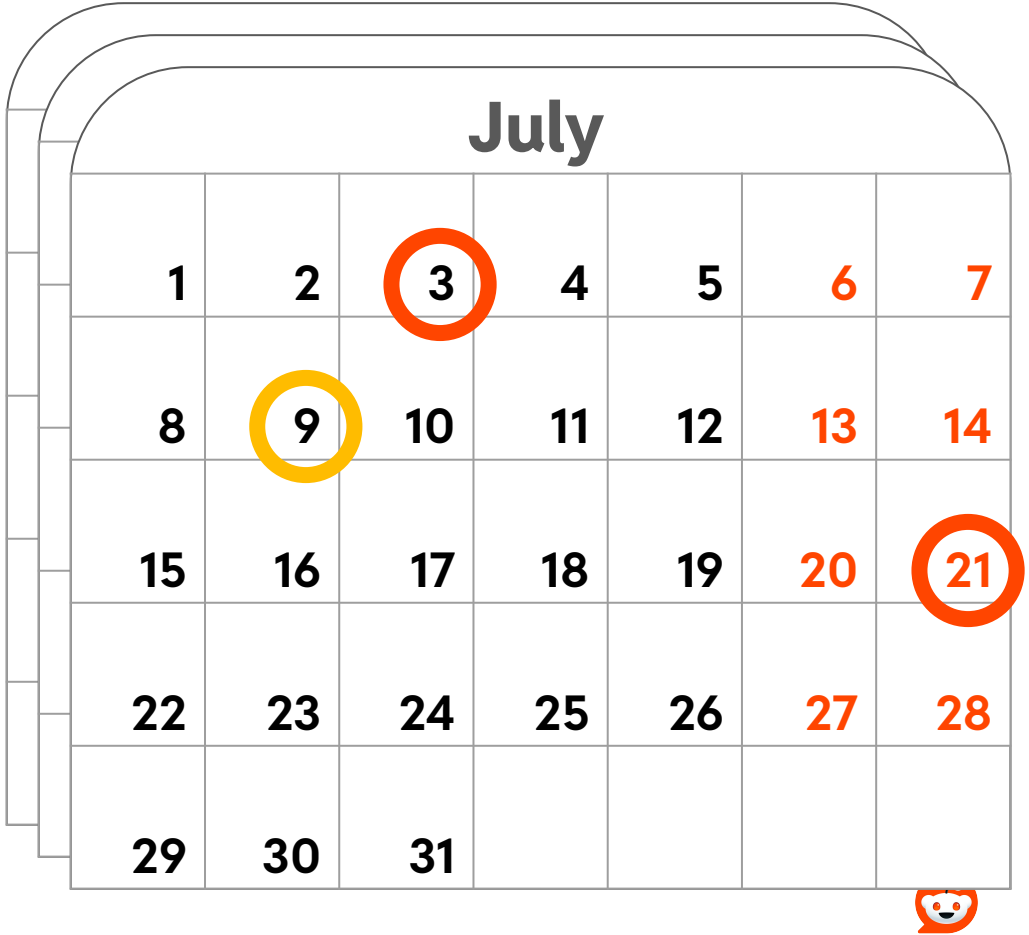




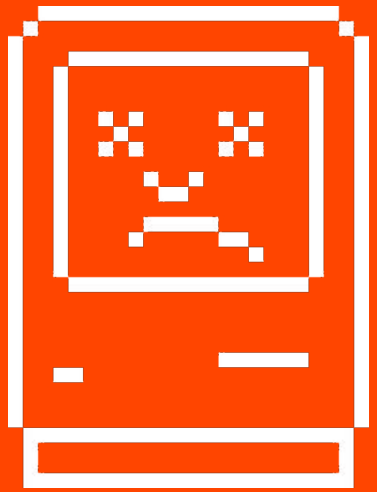
Incidents

5 + 7 + 2 = 14





Agenda



01 The telegraf case

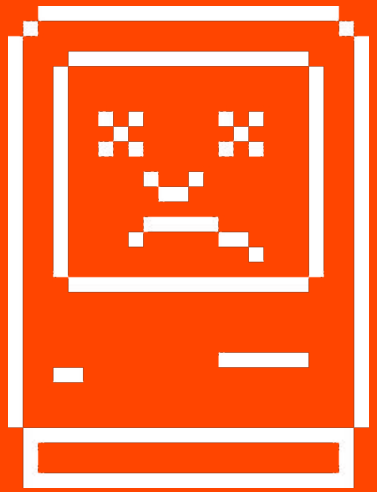
02 The session case

03 Network = CPU noise

04 Conntrack

05 What now?

Reddit Shaped



What is “Reddit-Shaped”

- 100M Daily-Active Users
- Several “large” Kubernetes Clusters
  - >75k CPUs
  - >30k pods
  - 96 CPU / 384GB memory nodes

(01)
The telegraf case

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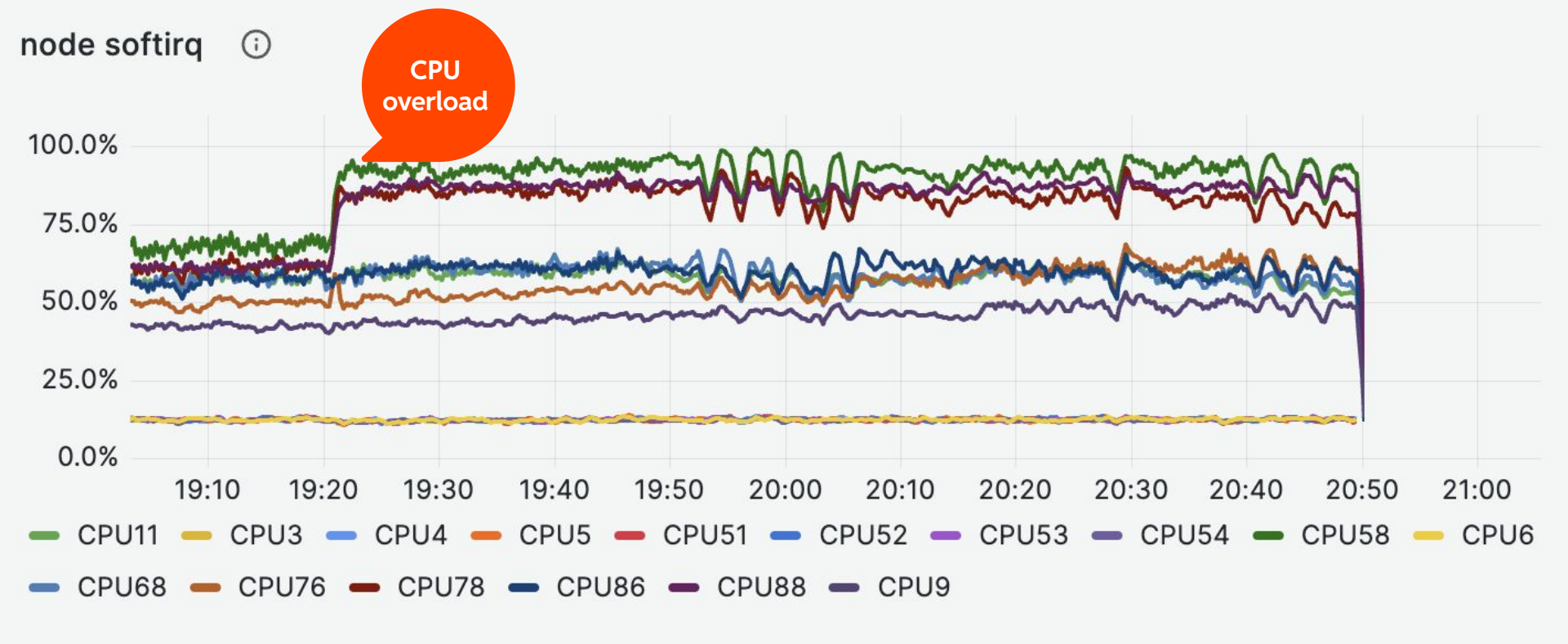


Receiving packets

AWS & Linux

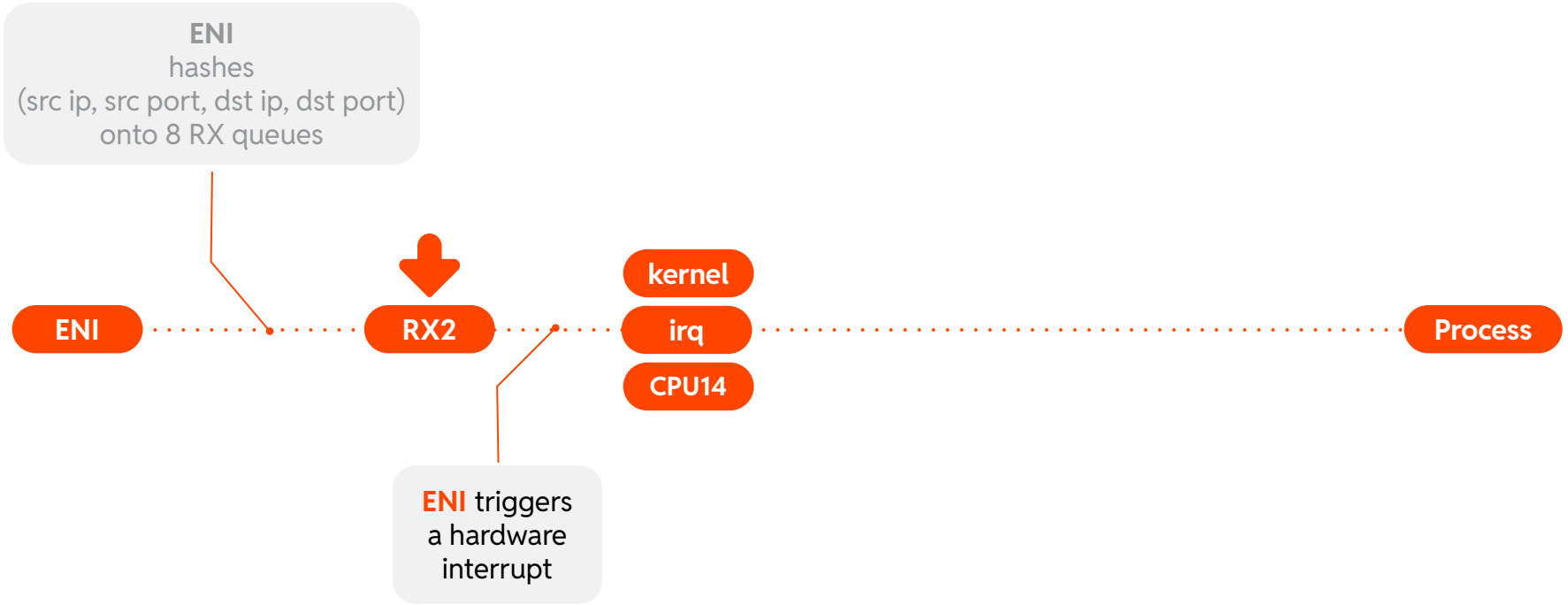
Receiving packets

AWS & Linux

ENI
hashes
(src ip, src port, dst ip, dst port)
onto 8 RX queues

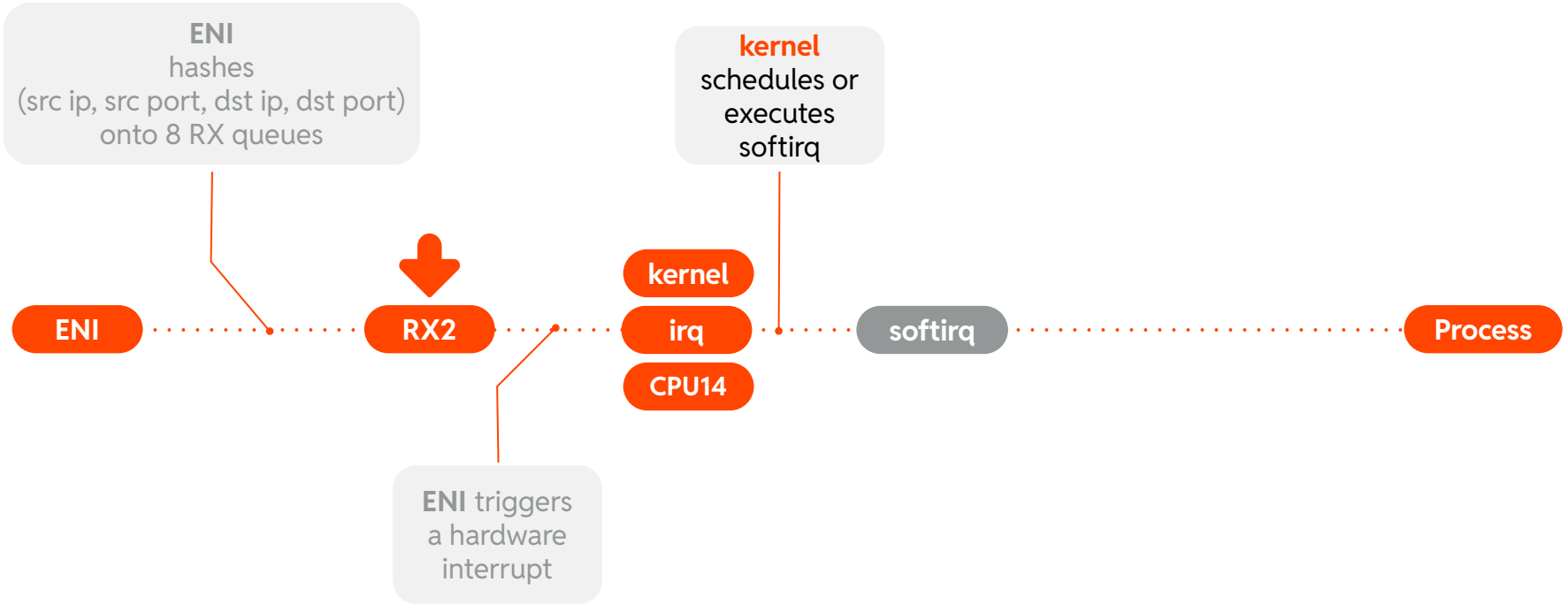
Receiving packets

AWS & Linux



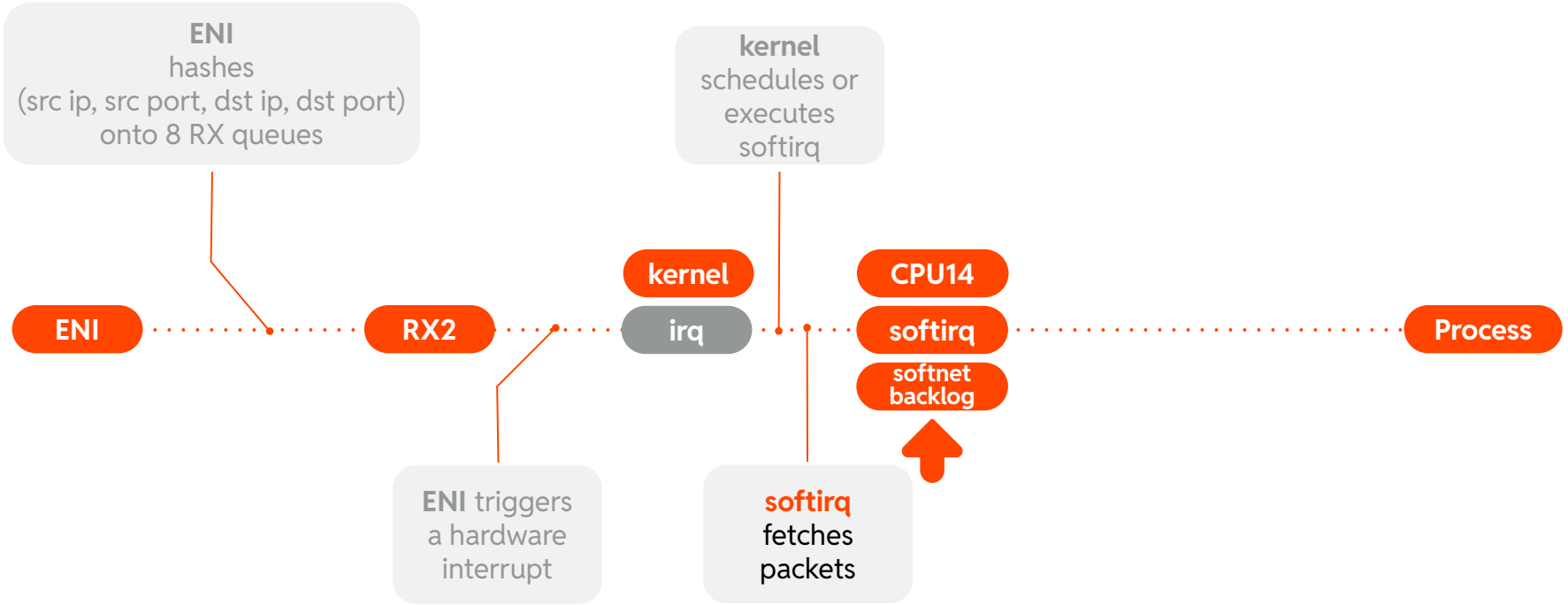
Receiving packets

AWS & Linux



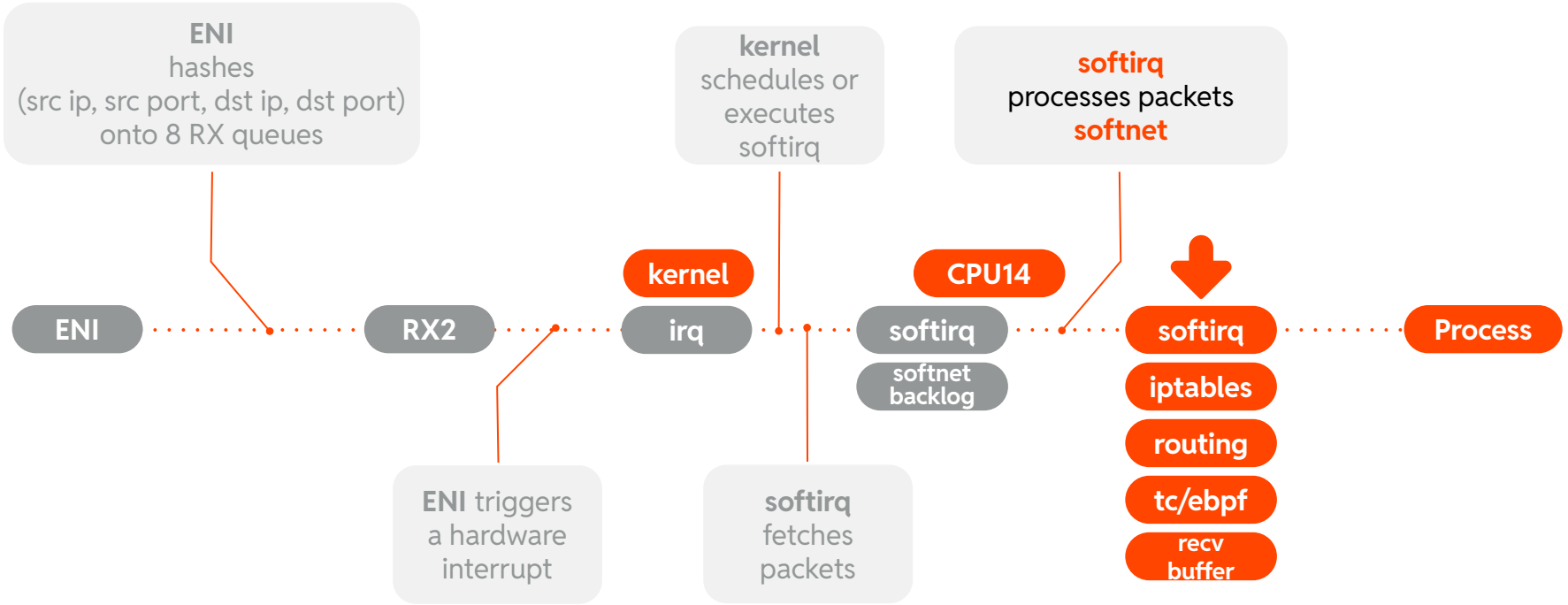
Receiving packets

AWS & Linux



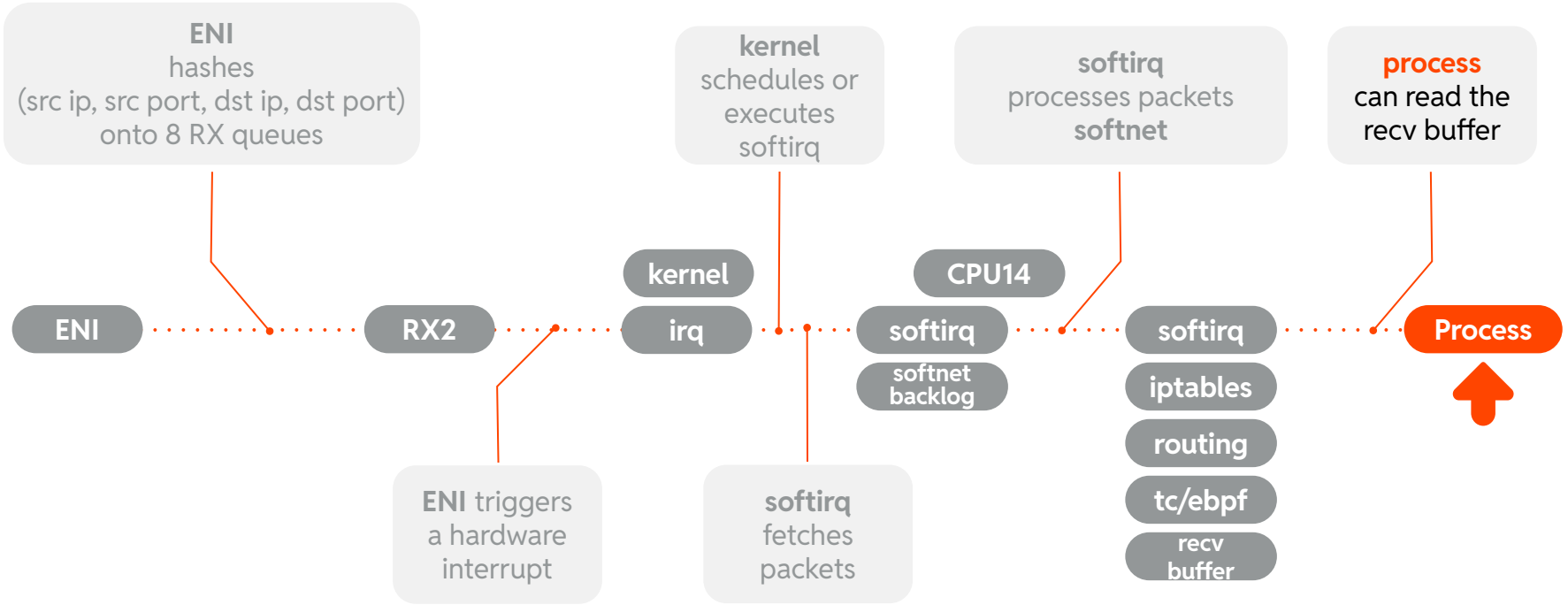
Receiving packets

AWS & Linux

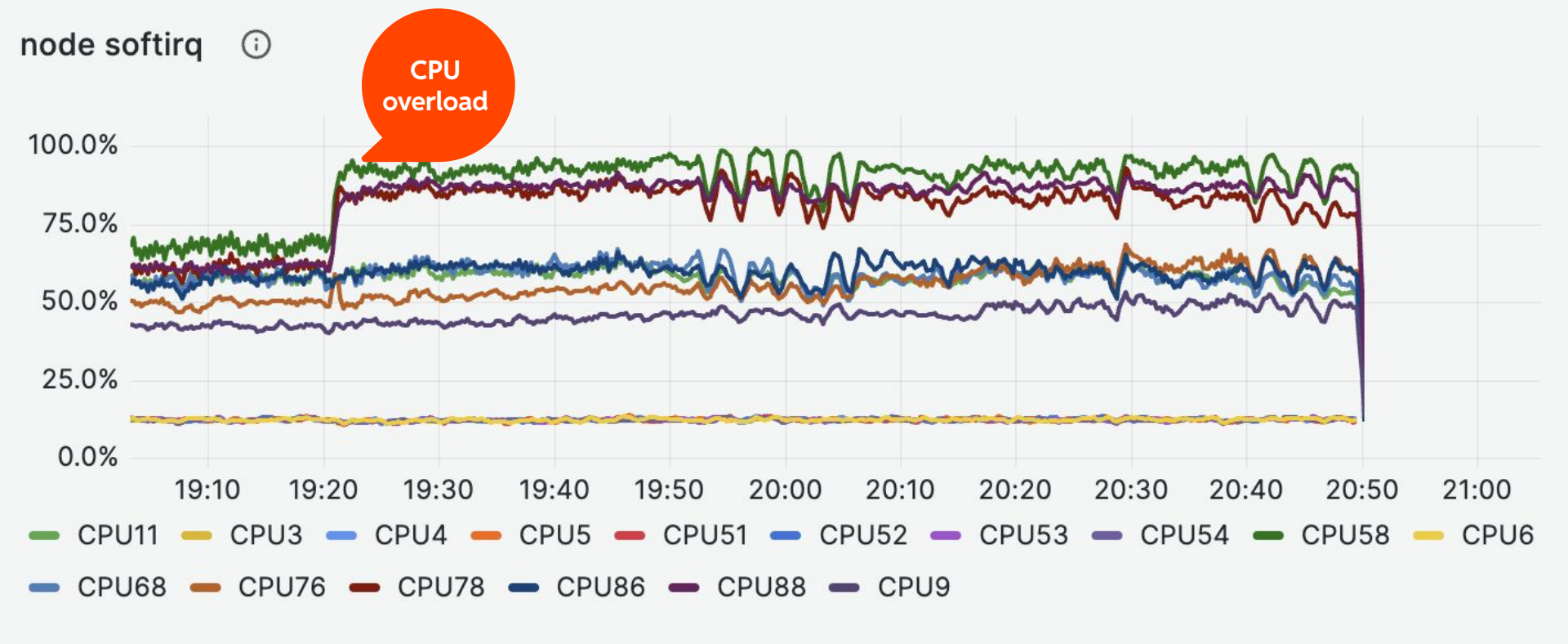


Receiving packets

AWS & Linux



(01) The telegraf case



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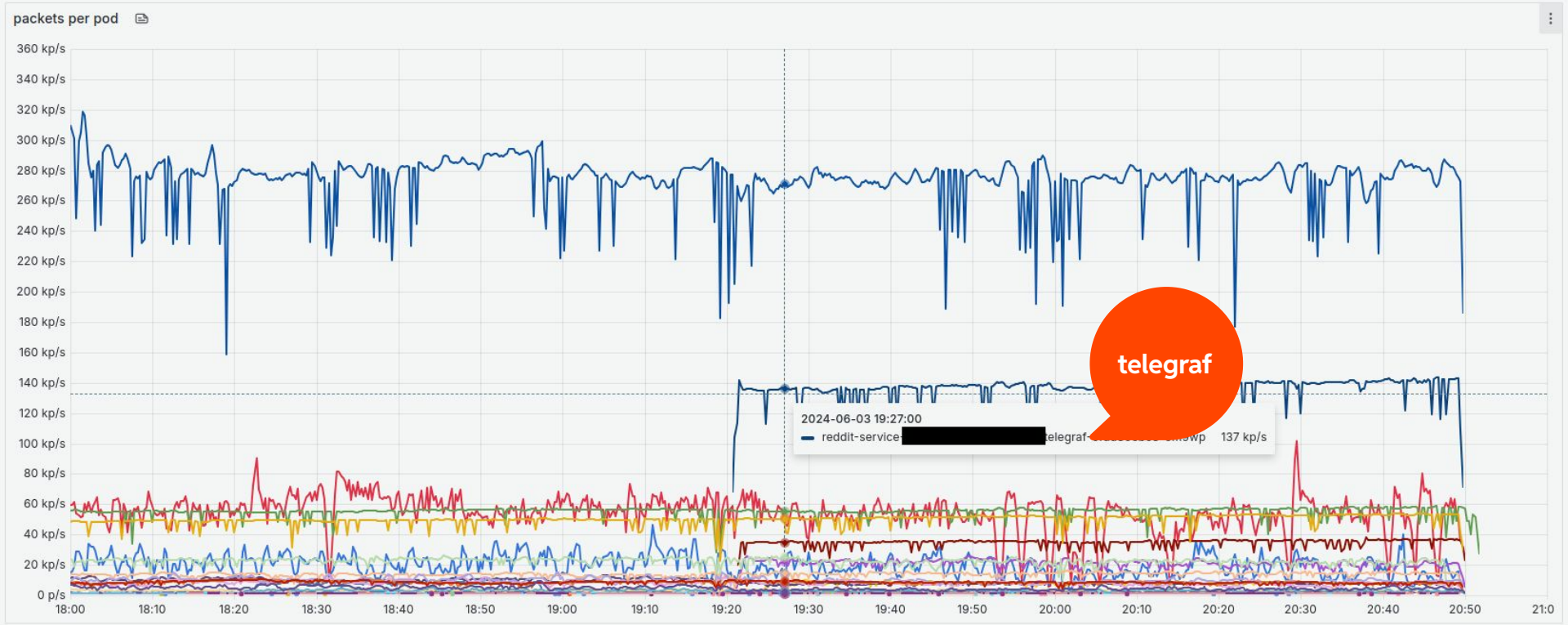

(01) The telegraf case - HOW?

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statsd metrics	many small udp packets

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4 sender, 1 receiver	loadtest like setup

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statsd metrics	many small udp packets
4 sender, 1 receiver	loadtest like setup
4 streams, 8 queues	load imbalance

(02)
The session case

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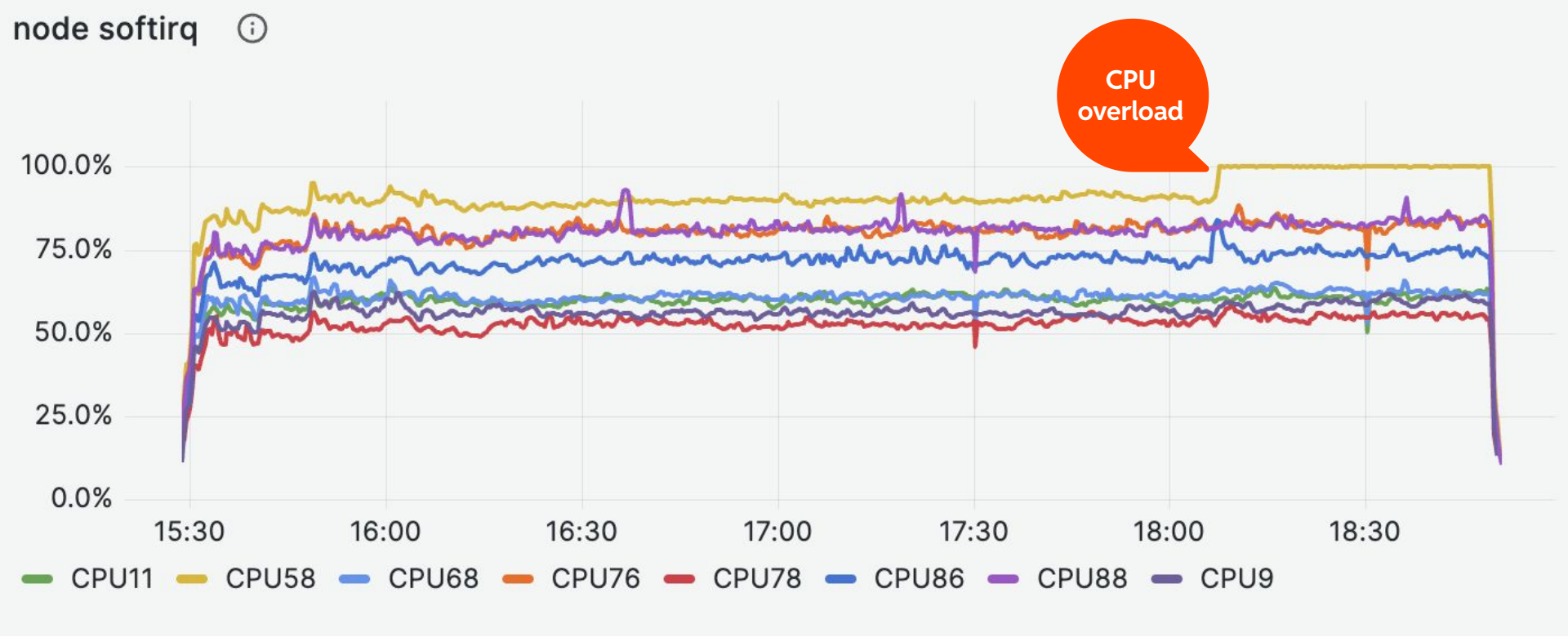
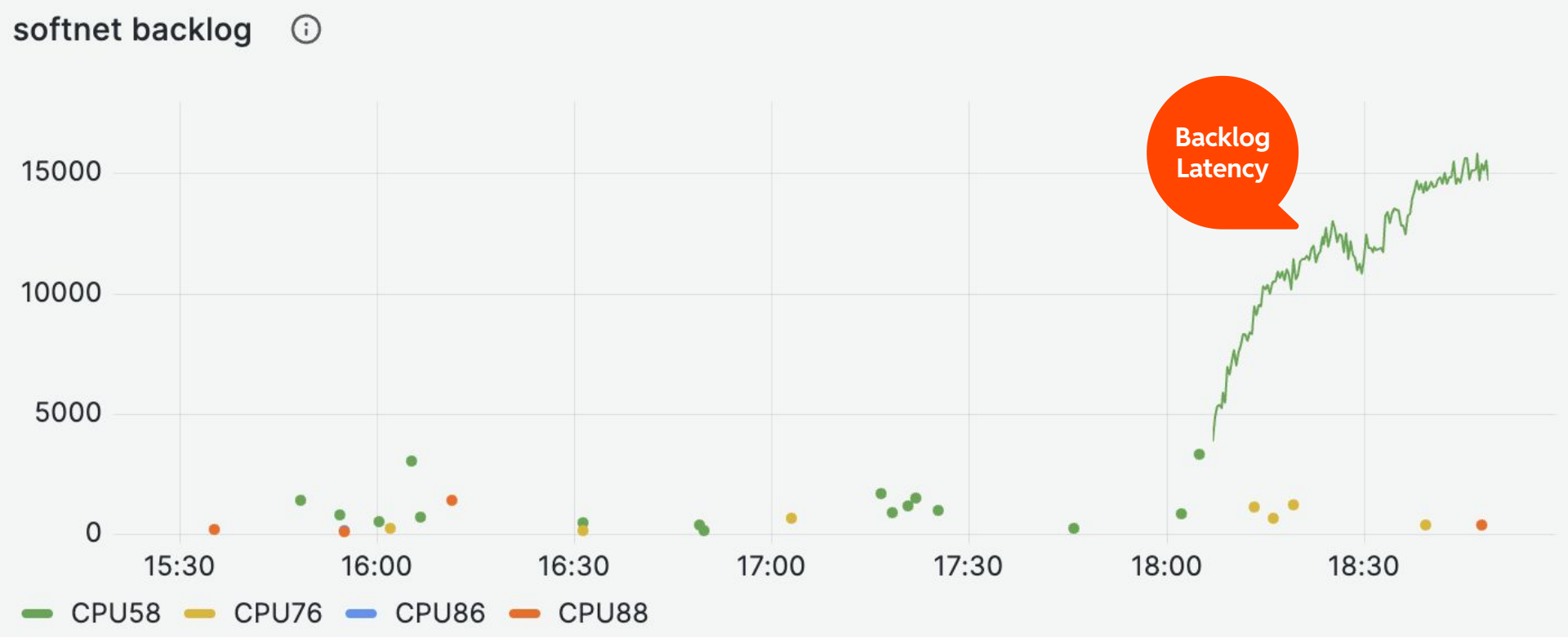


(02) The session case



(02) The session case - HOW?

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16 session pods | scale-up event

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16 session pods	scale-up event
All cores pinned	throughput problem

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16 session pods	scale-up event
All cores pinned	throughput problem
netdev_max_backlog	>>1000

(02) The session case - core pinning

16 session pods | **5 pinned cpus**

CORE0	CPU0 CPU48
CORE1	CPU1 CPU49
CORE2	CPU2 CPU50
CORE3	CPU3 CPU51

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16×2.5 = 40 | 16×3 = 48

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8 cores for network?

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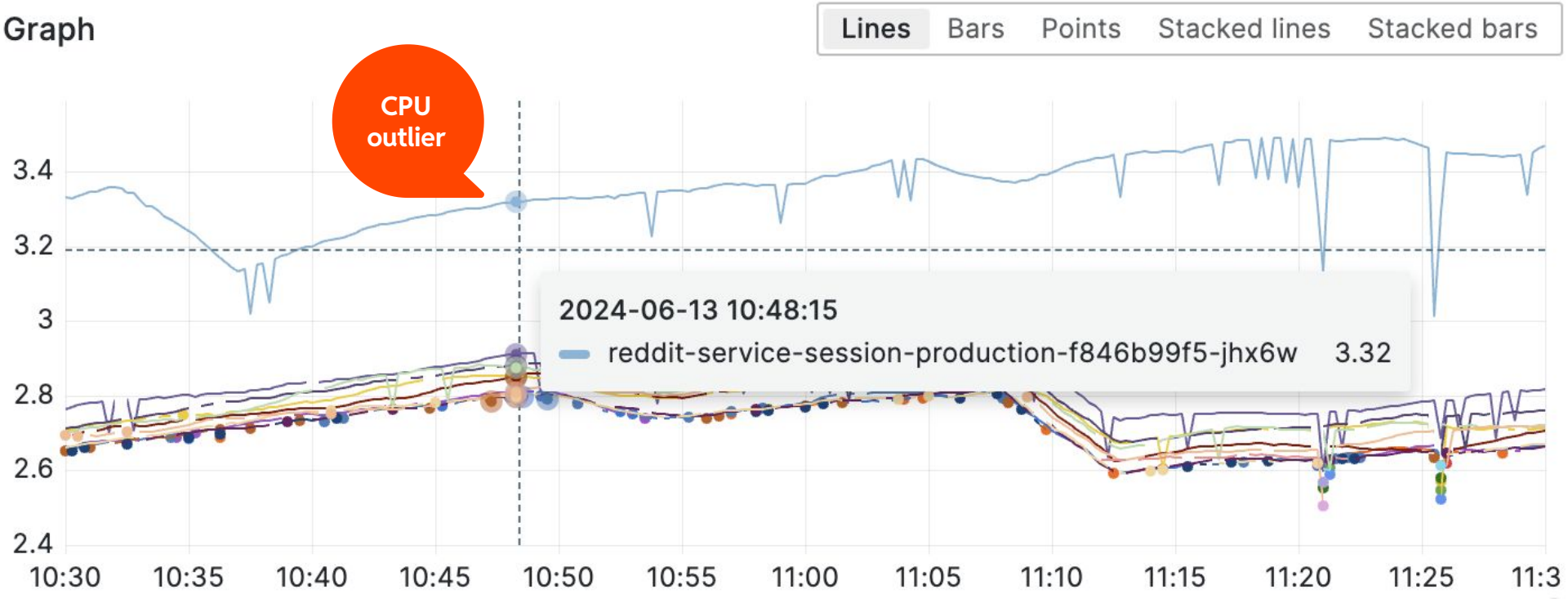
16×2.5 = 40 | 16×3 = 48

8 cores for network?

hyper threading != isolation

(03)
Network = CPU noise
(session again)

(03) Network = CPU noise



(03) Network = CPU noise

CORE9	CPU9 CPU57
CORE10	CPU10 CPU58
CORE11	CPU11 CPU59

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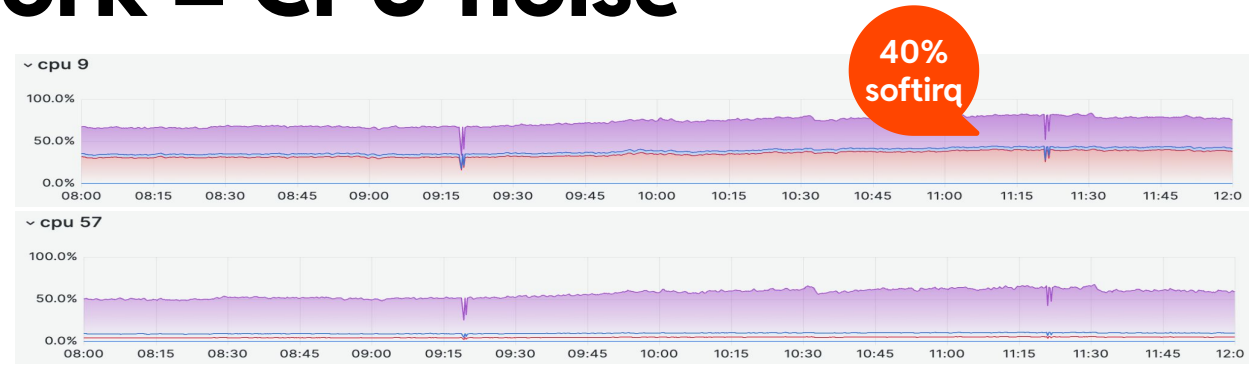

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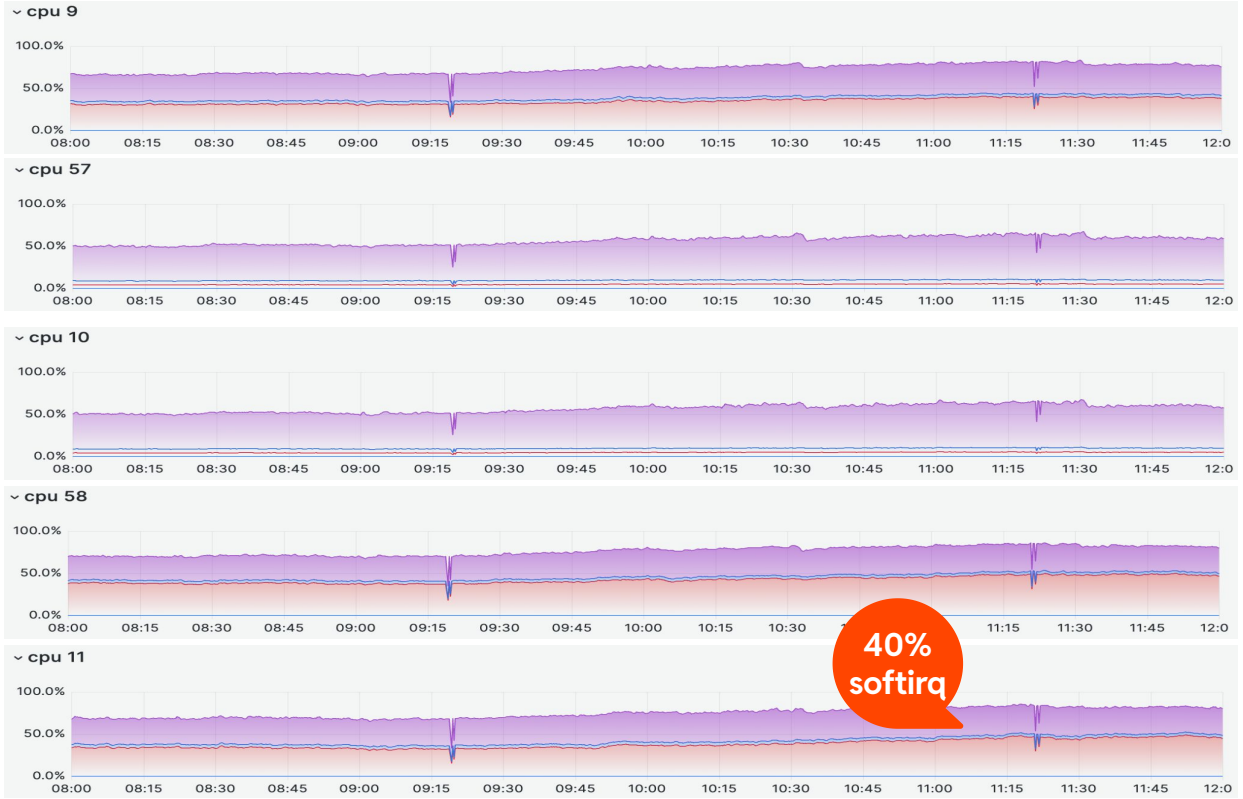

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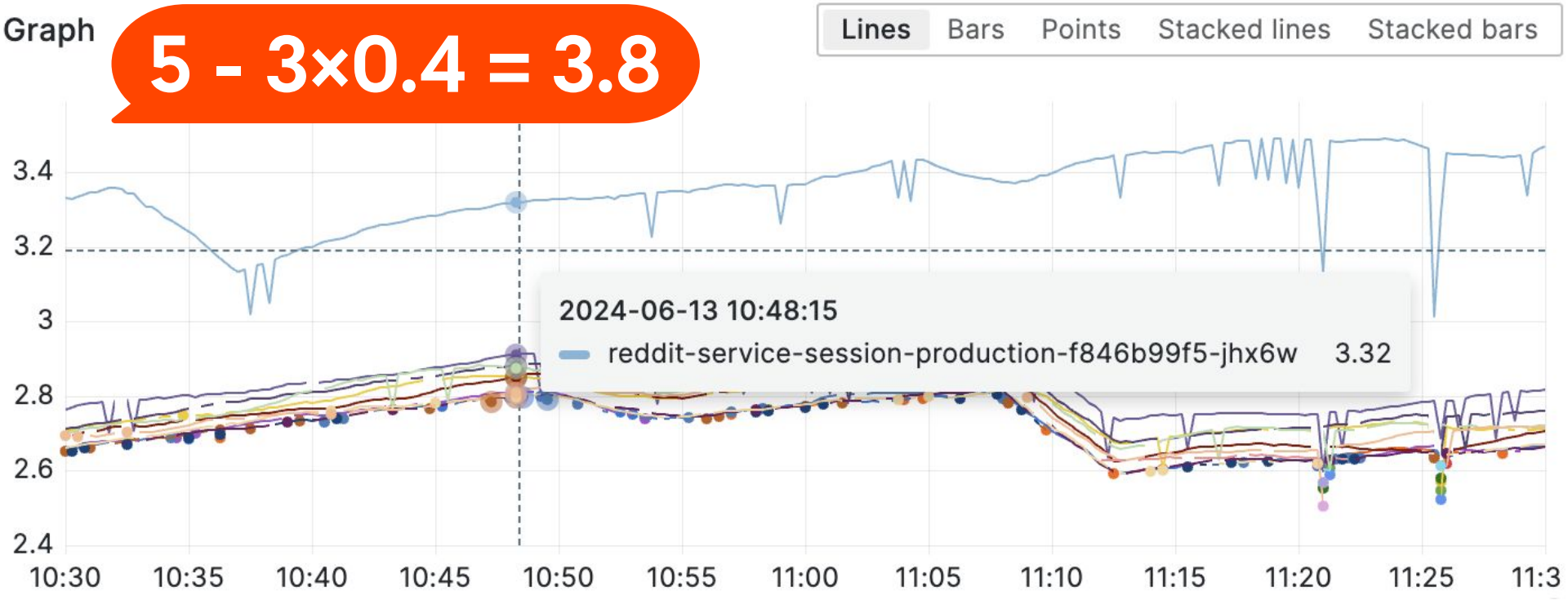

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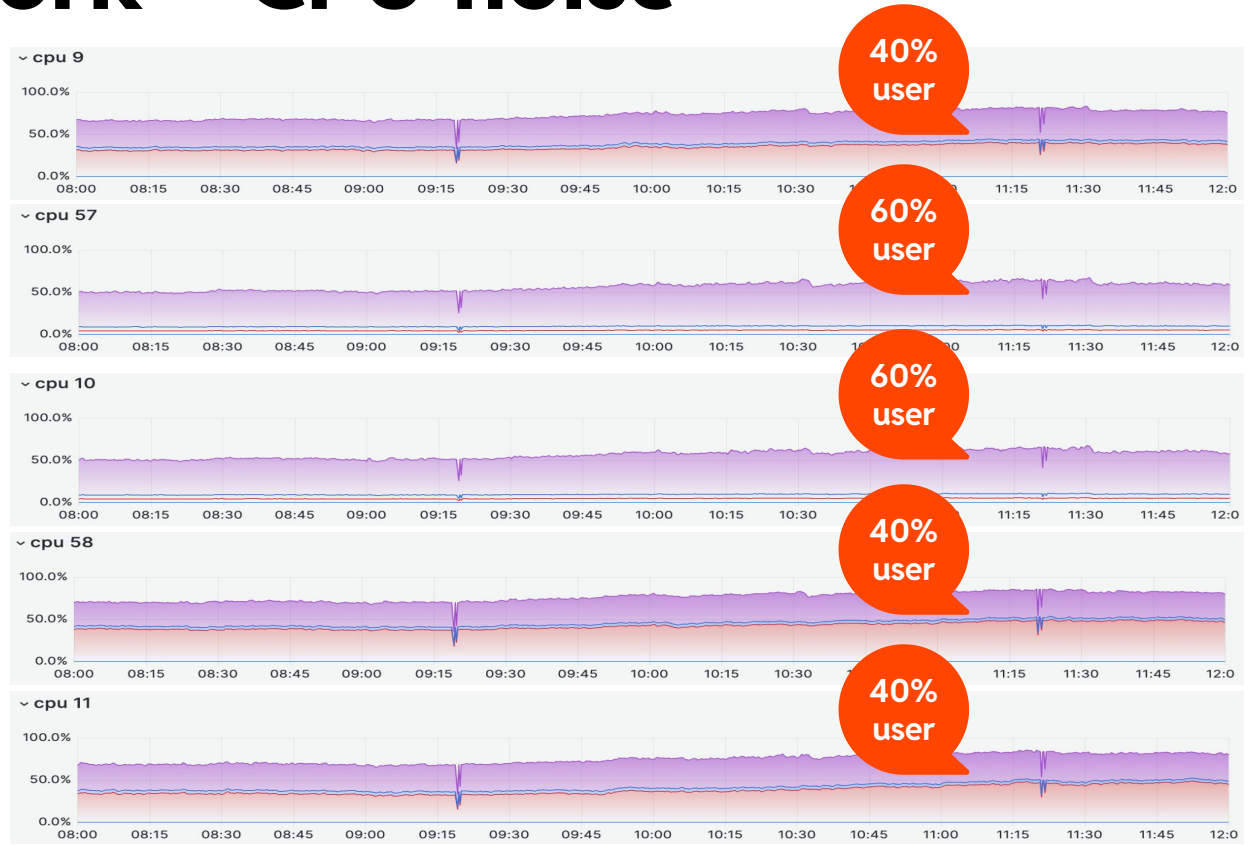

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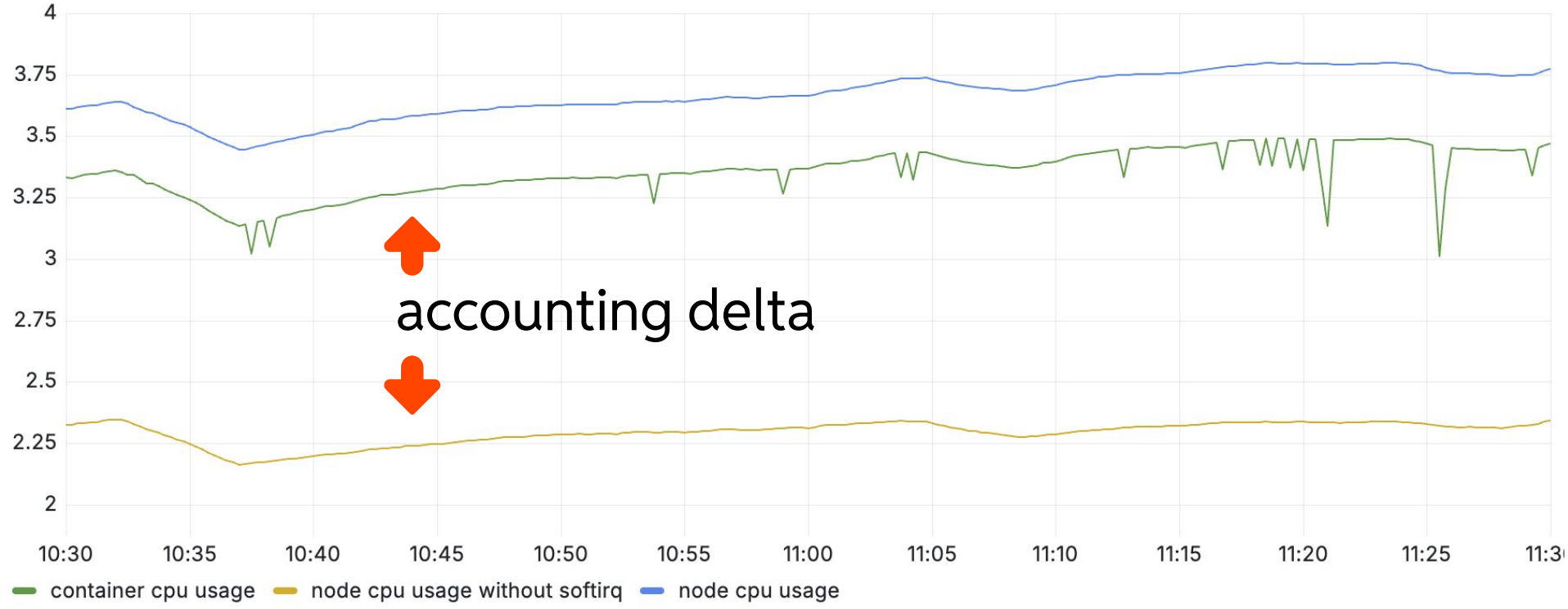

(03) Network = CPU noise - HOW?

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pinned cpus	kernel won’t move you

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high softirq node	reduced cpu available

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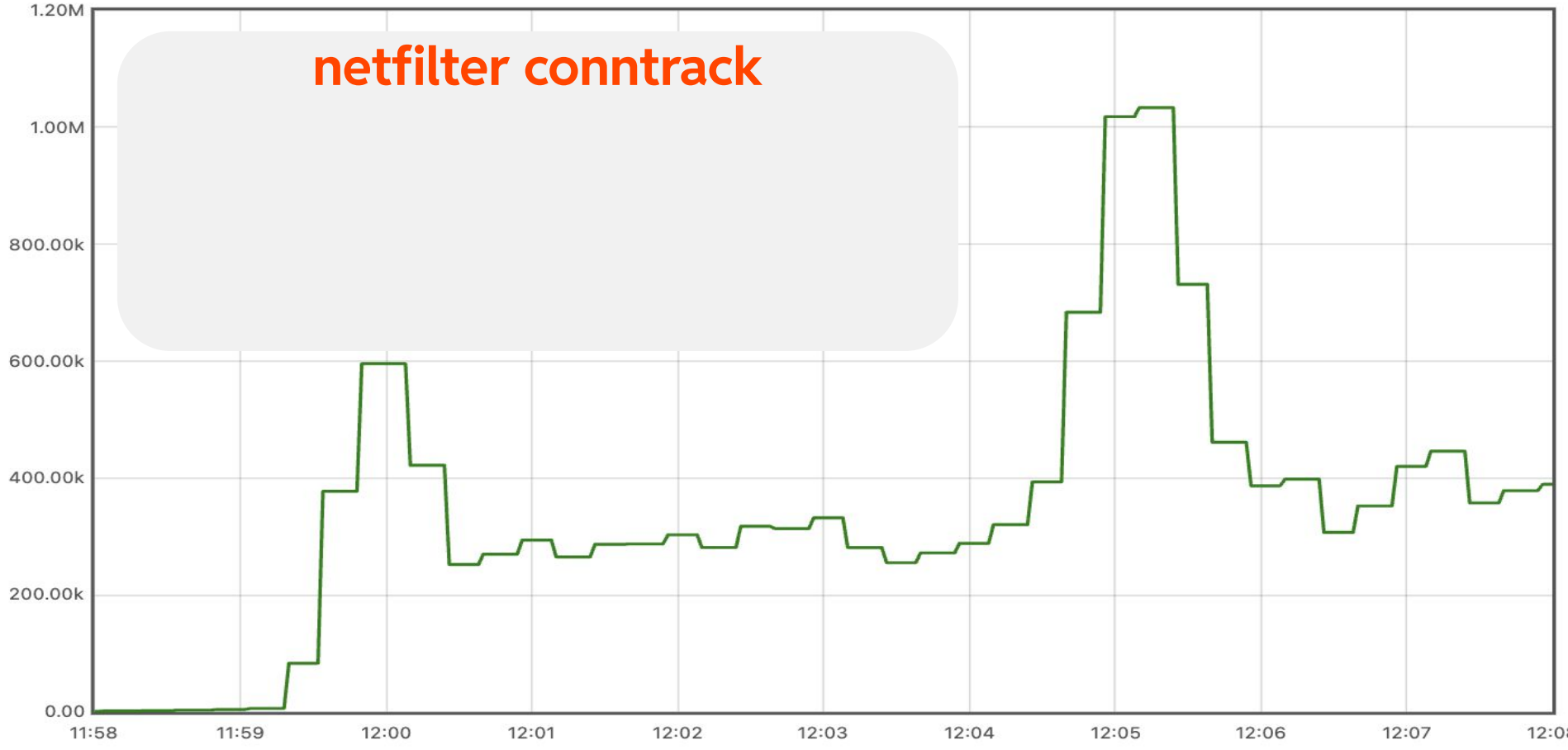
pinned cpus	kernel won’t move you
high softirq node	reduced cpu available
unlucky core pick	probabilities…

(04)
Conntrack

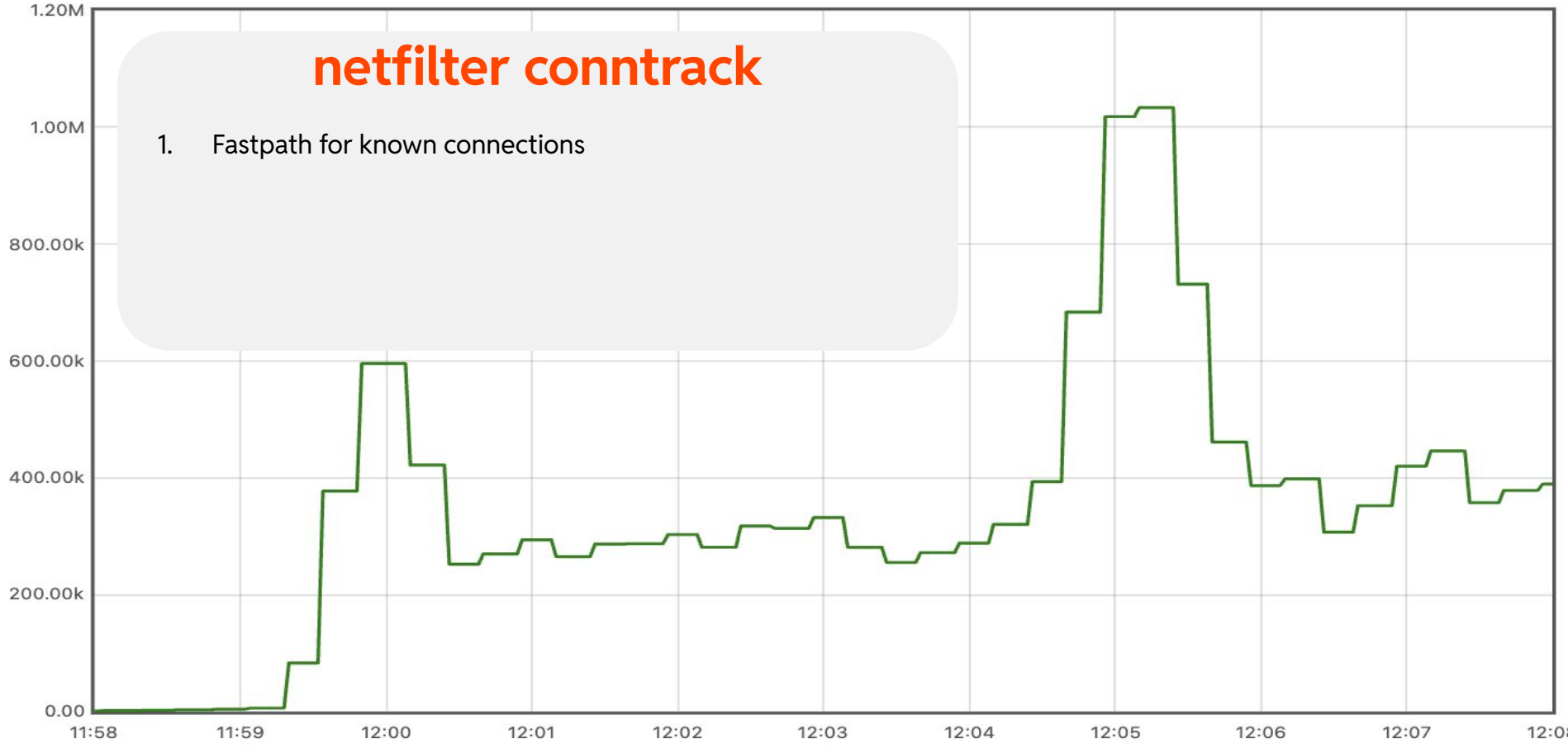
(04) Conntrack



(04) Conntrack

netfilter conntrack

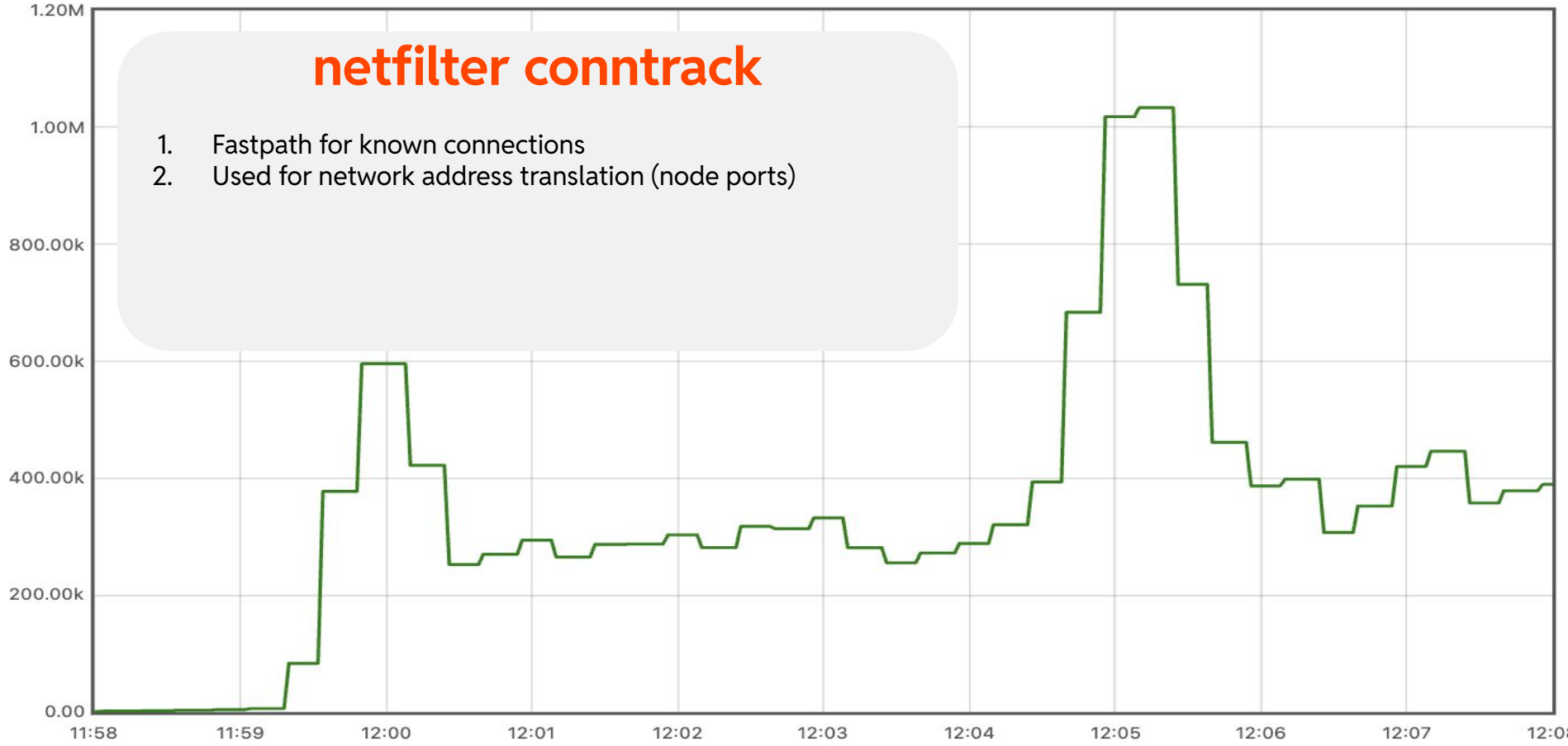
1. Fastpath for known connections



(04) Conntrack

netfilter conntrack

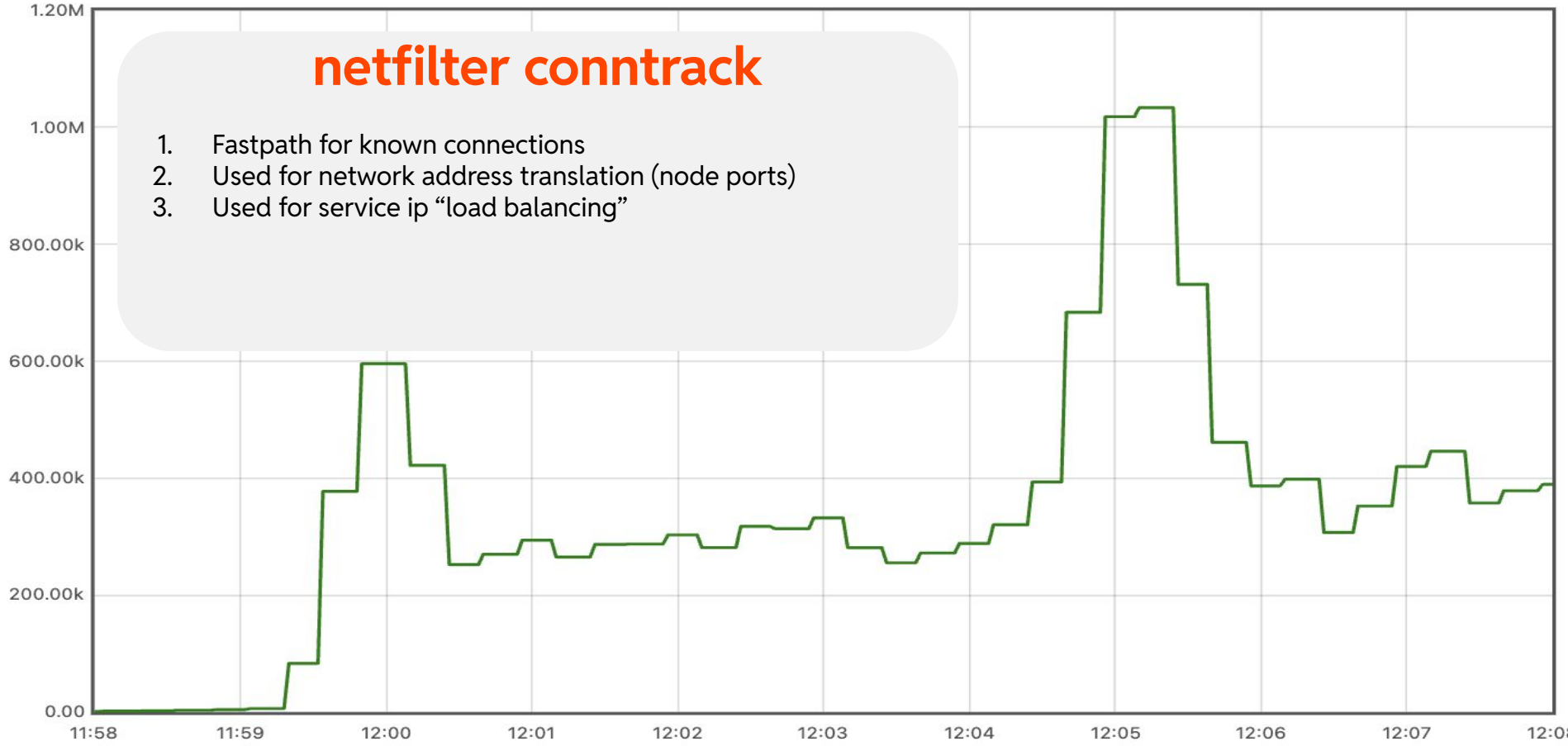
1. Fastpath for known connections
2. Used for network address translation (node ports)



(04) Conntrack

netfilter conntrack

1. Fastpath for known connections
2. Used for network address translation (node ports)
3. Used for service ip “load balancing”



(04) Conntrack

netfilter conntrack

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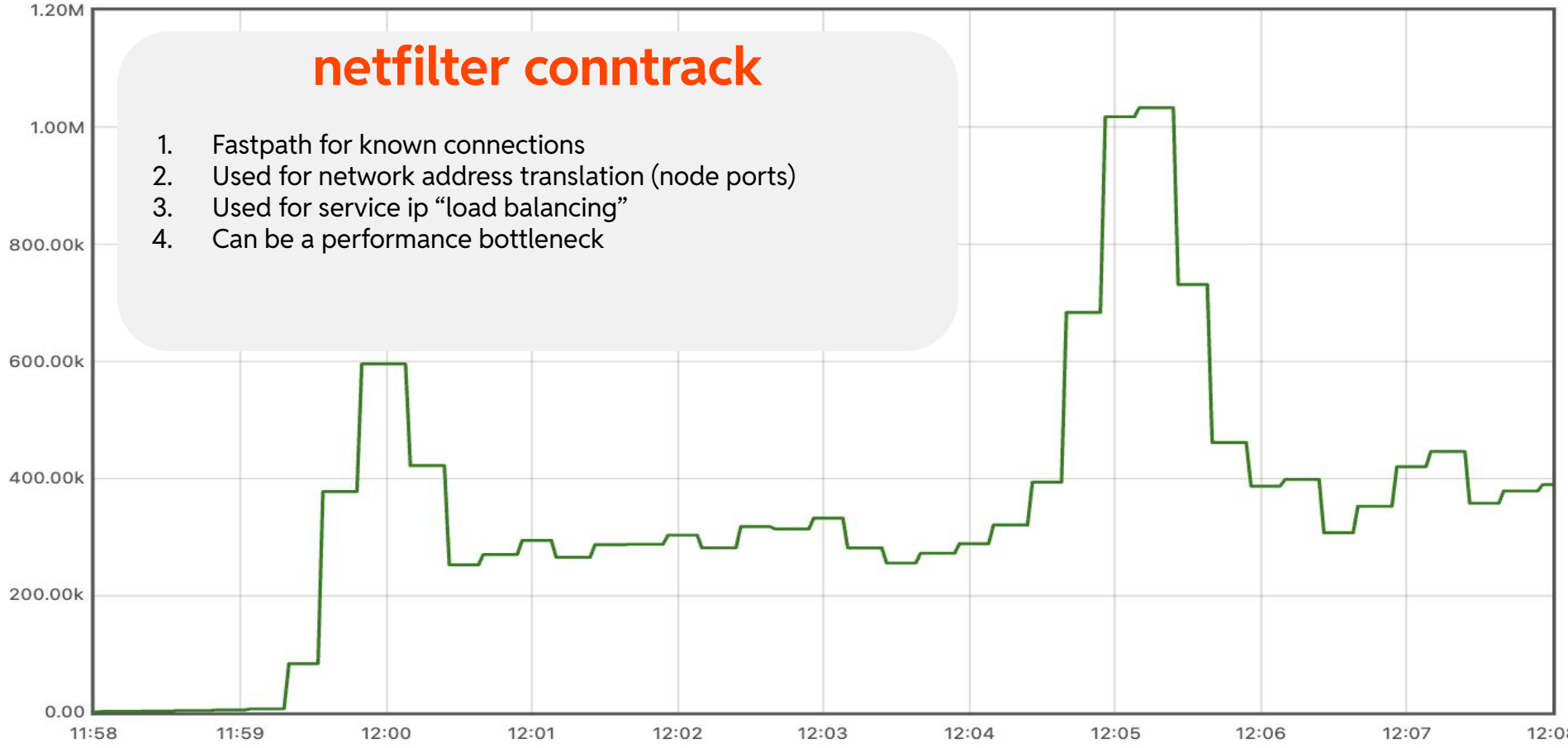
3. Used for service ip “load balancing”
4. Can be a performance bottleneck



(04) Conntrack

netfilter conntrack

1. Fastpath for known connections
2. Used for network address translation (node ports)
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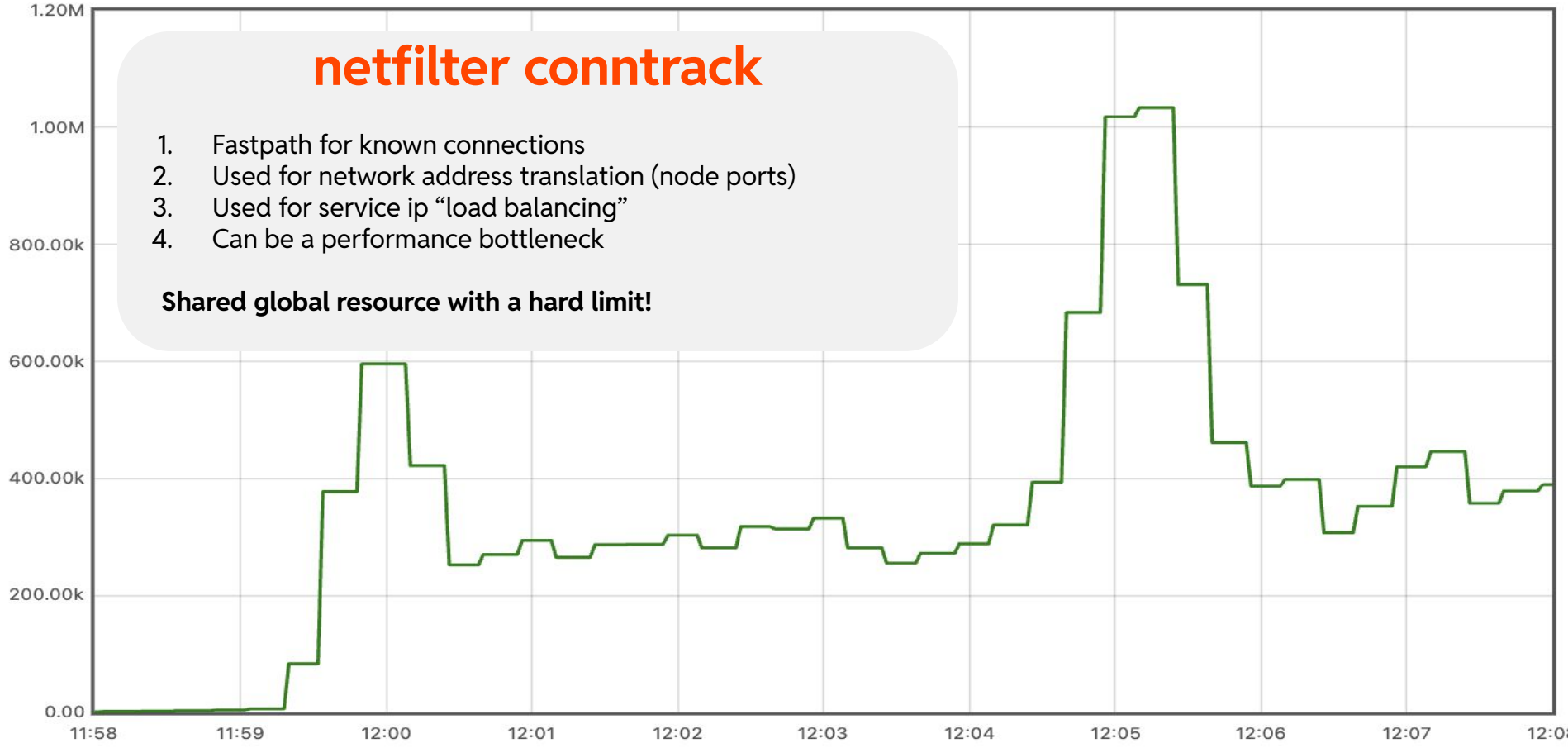
4. Can be a performance bottleneck

Shared global resource with a hard limit!



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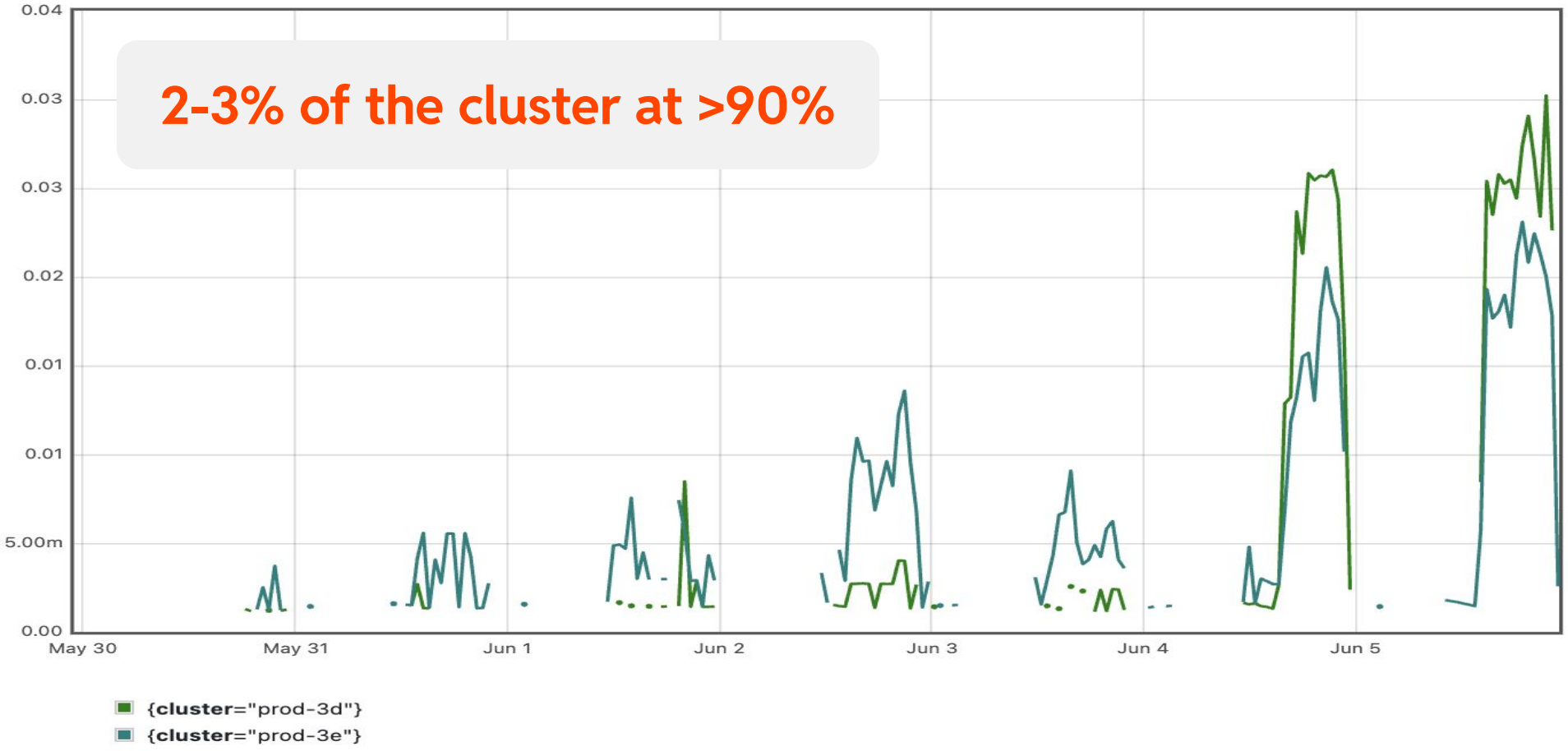

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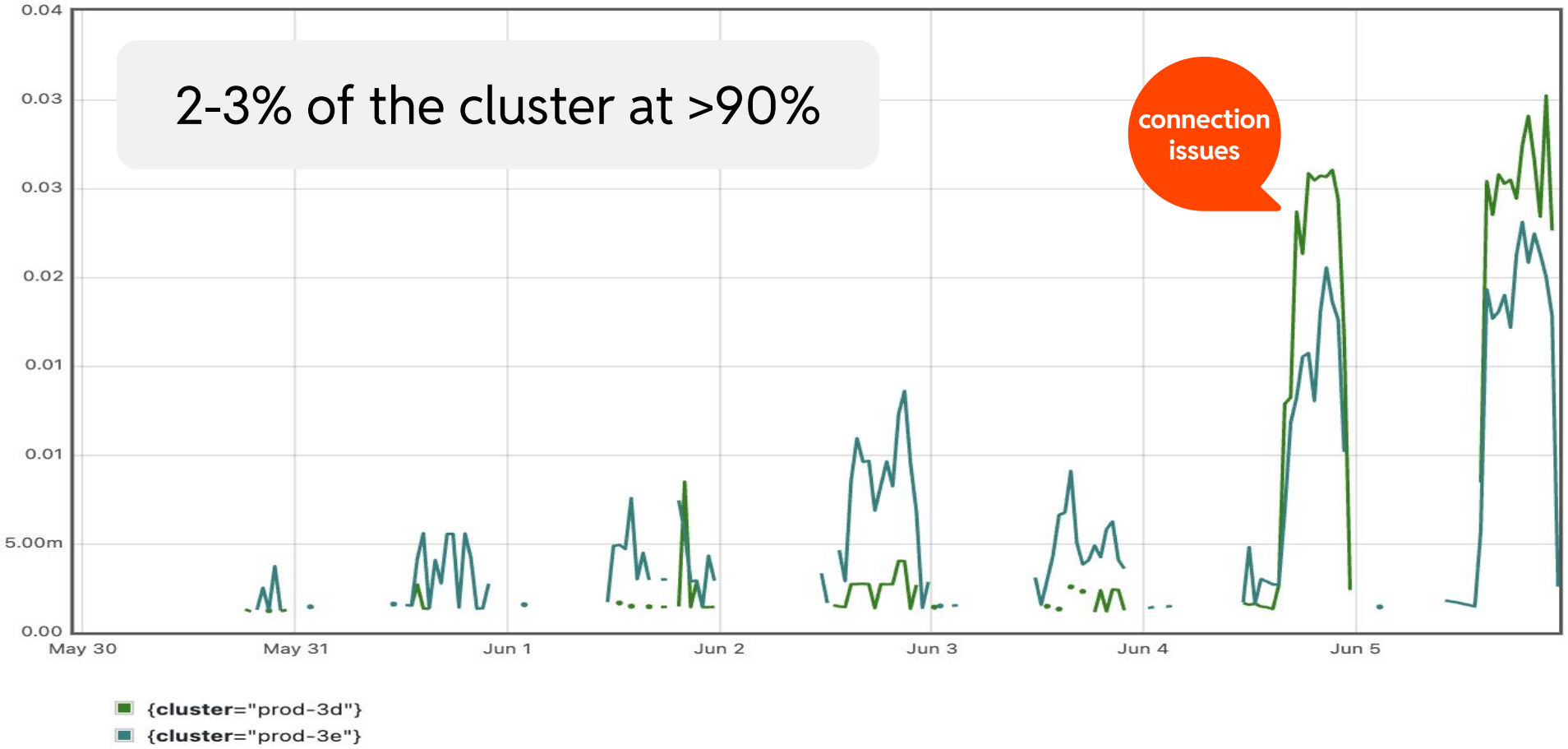

(04) Conntrack - HOW?

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k8s AMI update	undetected config change

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1M conntrack limit	way lower

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k8s upgrade	node rollover

(04) Conntrack - HOW?

k8s AMI update	undetected config change
1M conntrack limit	way lower
k8s upgrade	node rollover
1 week buildup	kube-proxy bugfix

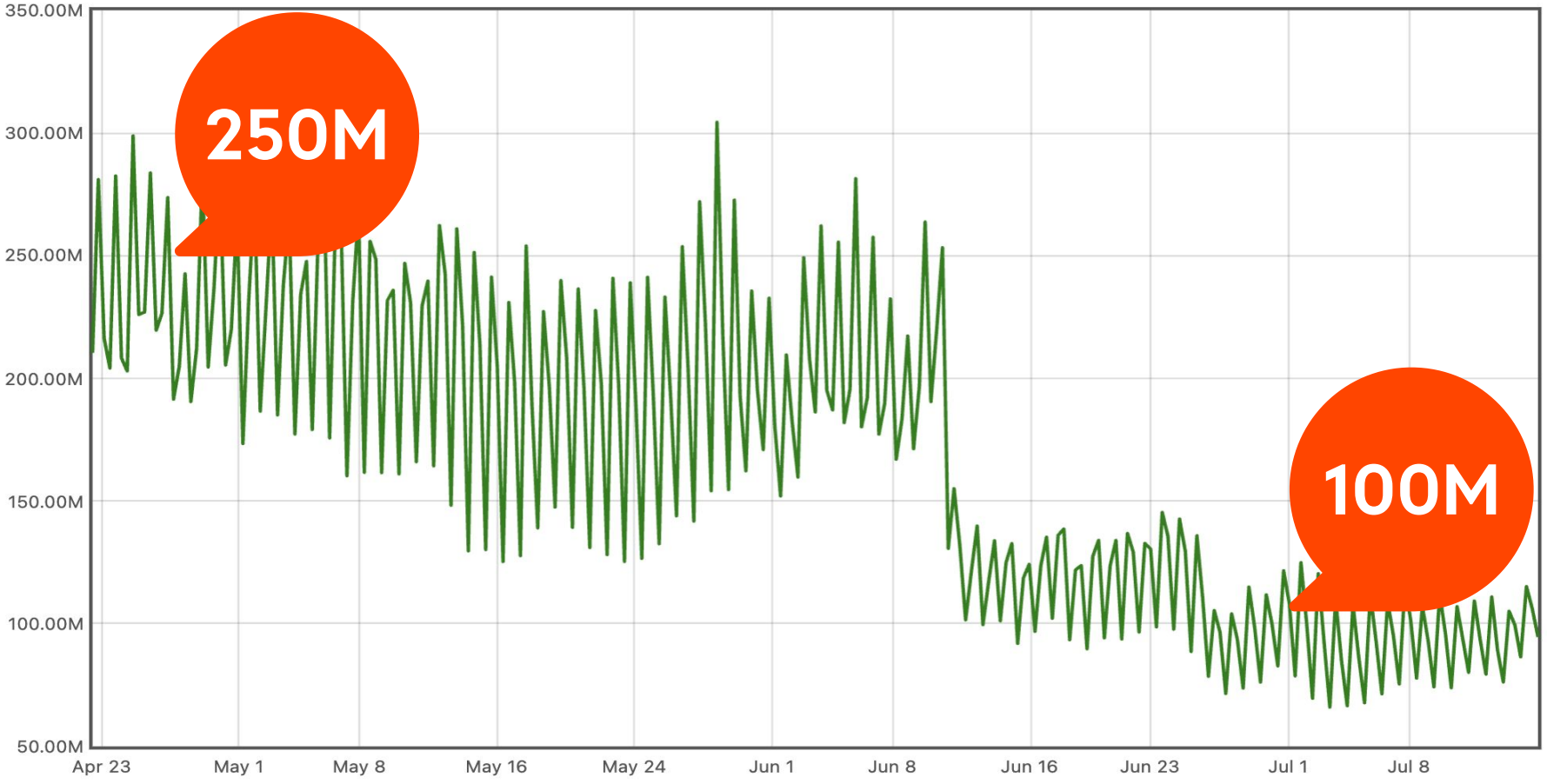
05

What now?

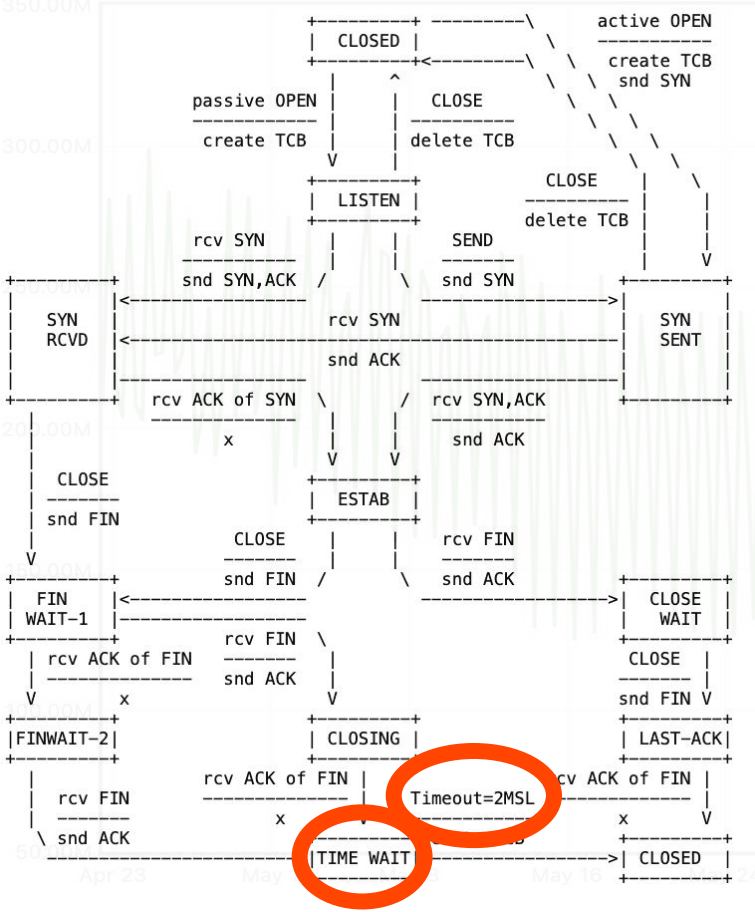
(05) What now? conntrack

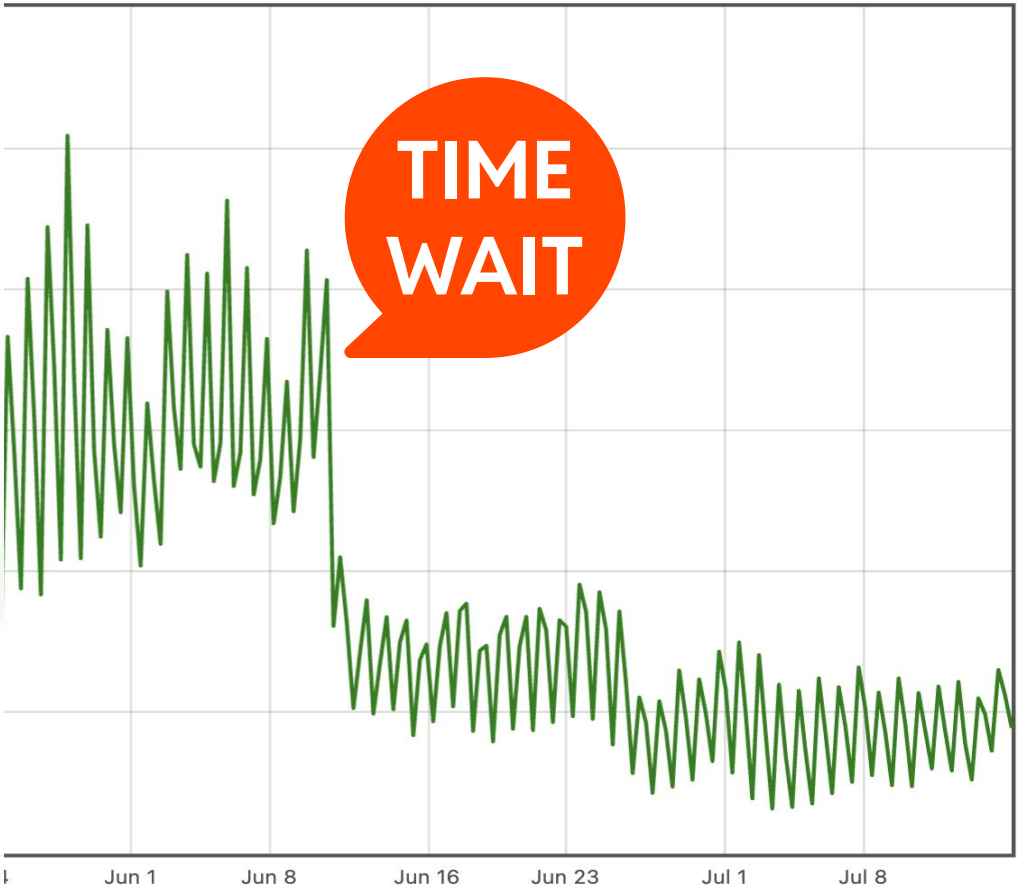
(05) What now? conntrack / optimize

(05) What now? conntrack / optimize

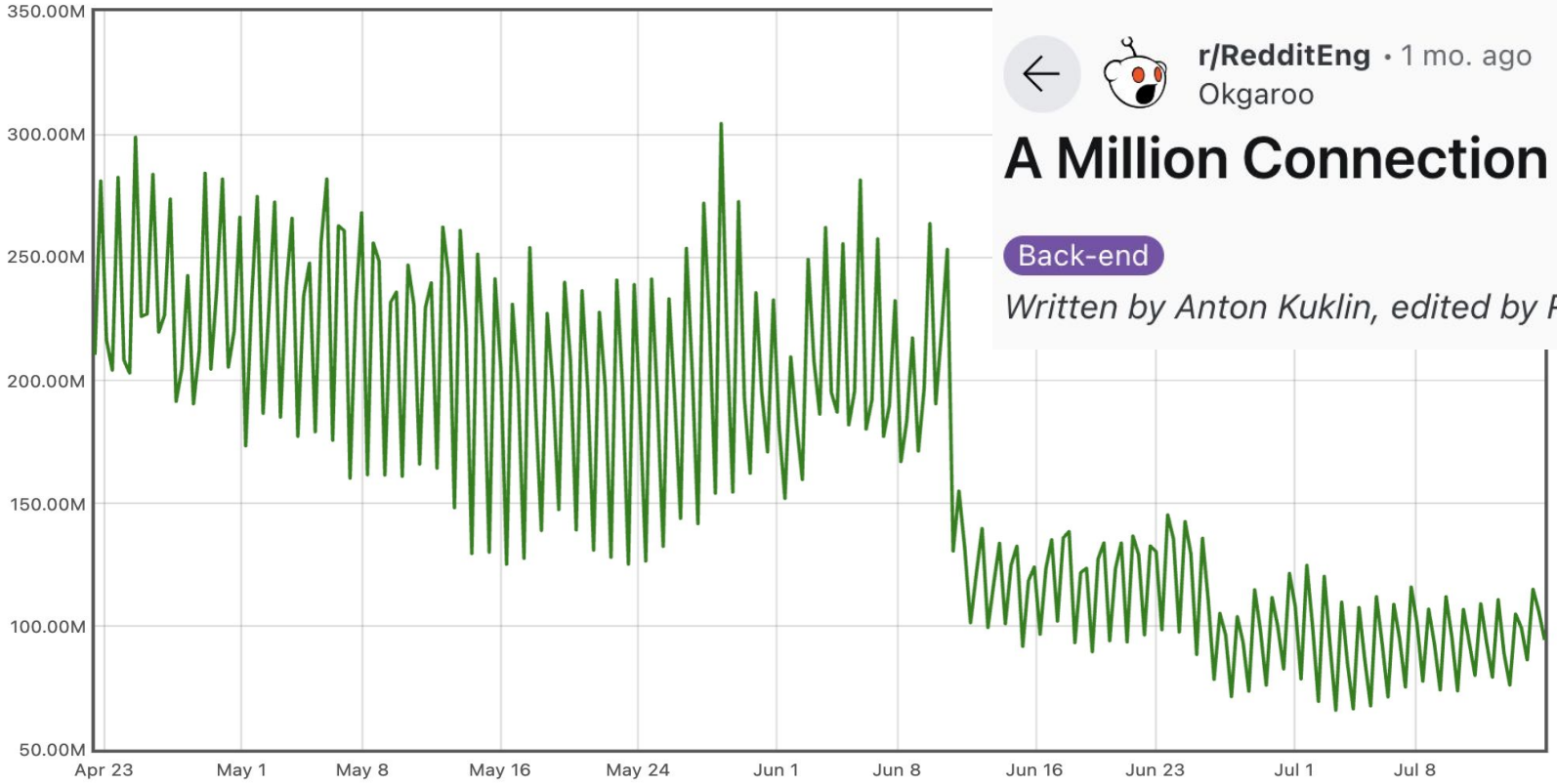


(05) What now? conntrack / optimize





(05) What now? conntrack / optimize



r/RedditEng • 1 mo. ago
Okgaroo

A Million Connection Problem

Back-end

Written by Anton Kuklin, edited by René Treffer

https://www.reddit.com/r/RedditEng/comments/1fnt8af/a_million_connection_problem/

(05) What now? conntrack / alerting

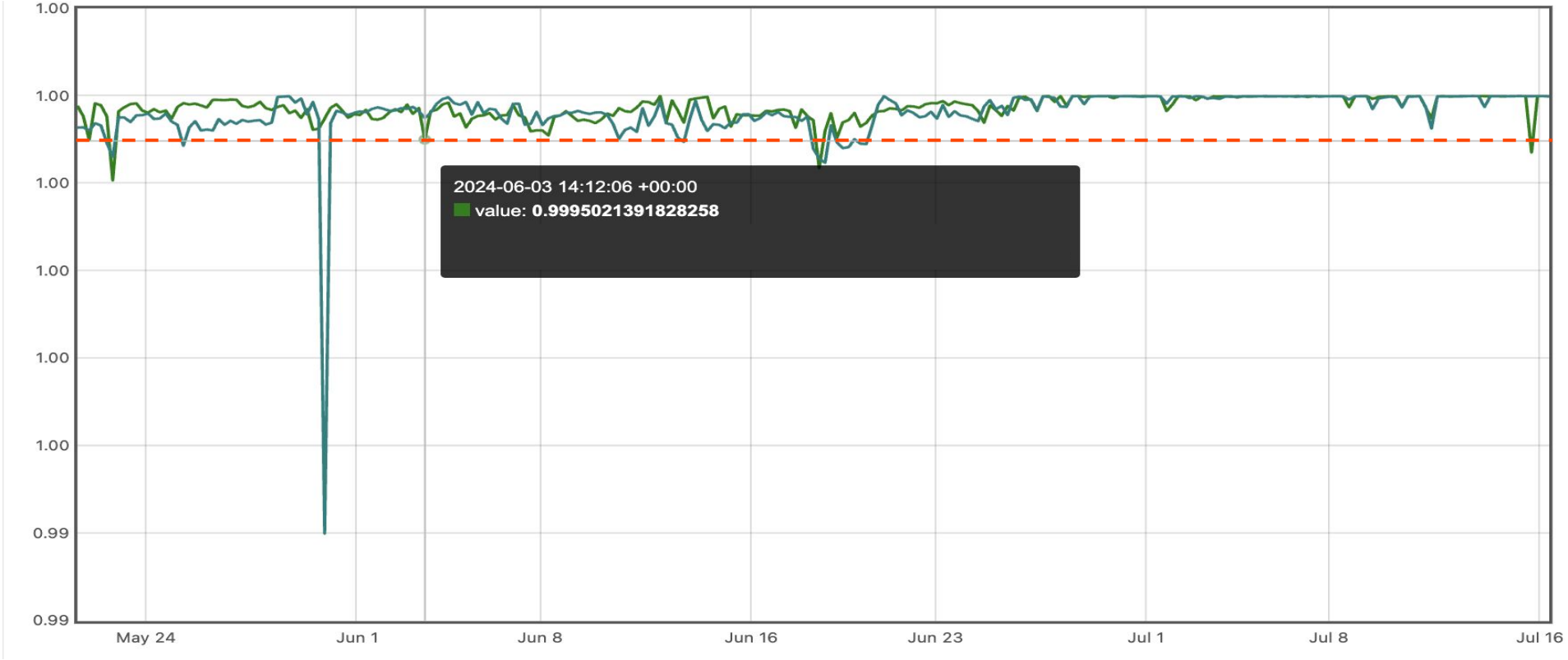
```
alert: NodesNumbWithTooManyConntrackRowsTooHigh
annotations:
  summary: "prod-3d: Too many nodes exceeding conntrack rows threshold"
  description: "prod-3d: Too many nodes exceeding conntrack rows threshold, which is <=15% of nodes with >=400k rows"
  dashboard: https://grafana.kubernetes.ue1.snoogutc.net/d/eecf4fdb-46f5-4063-9eb8-f22a76caf614/node-network-issues?orgId=1
expr: |
  count(
    node_nf_conntrack_entries{} > 400000
  )
  /
  count(
    node_nf_conntrack_entries{}
  ) > 0.15
```

400k soft limit

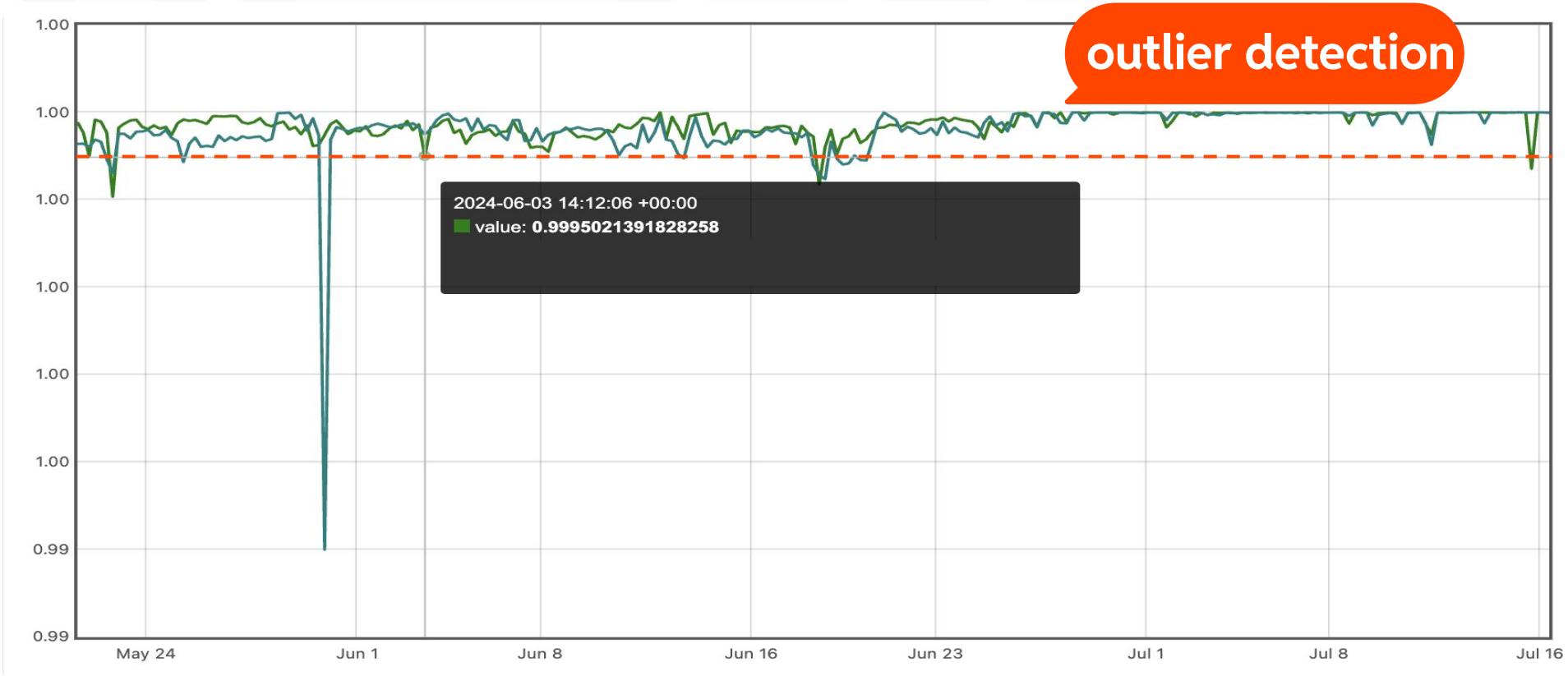
15% of nodes

(05) What now? Session

(05) What now? Session



(05) What now? Session



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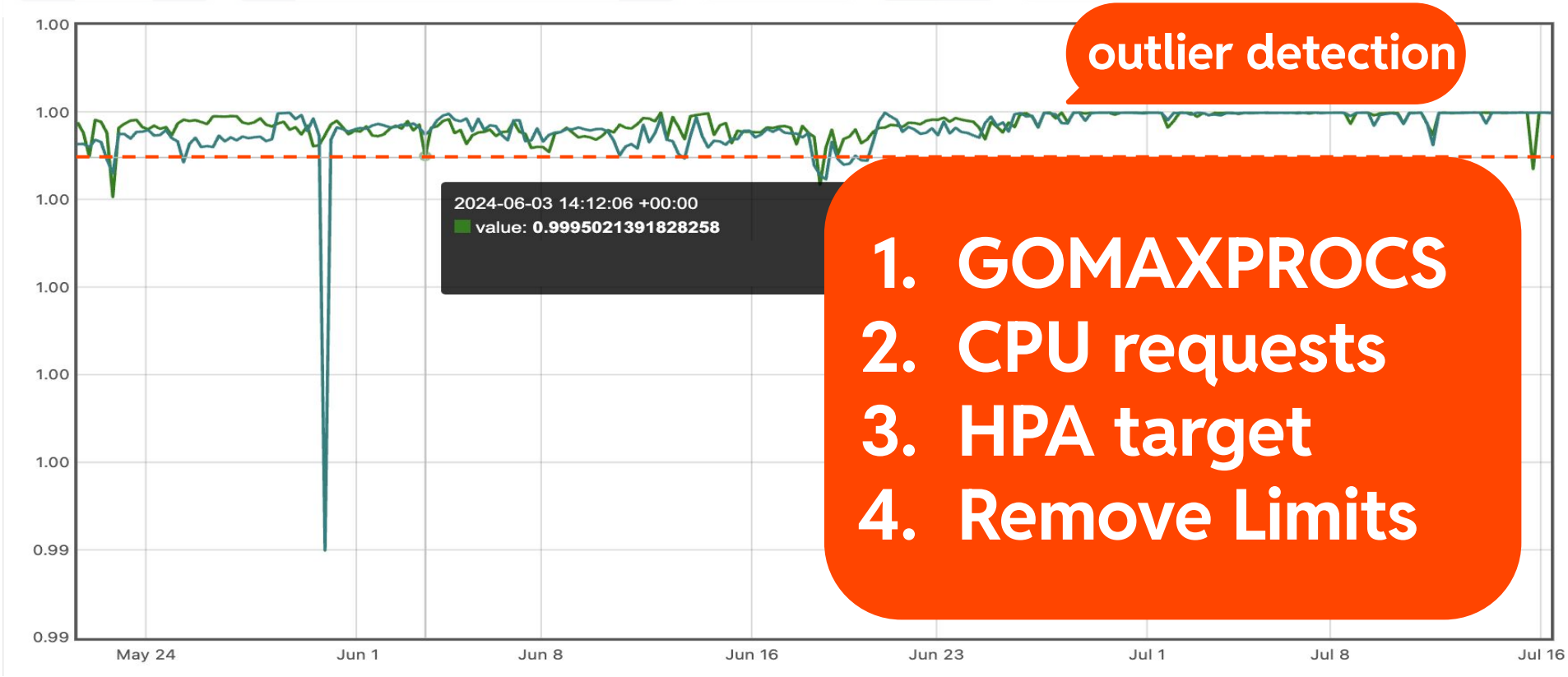

(05) What now? Telegraf

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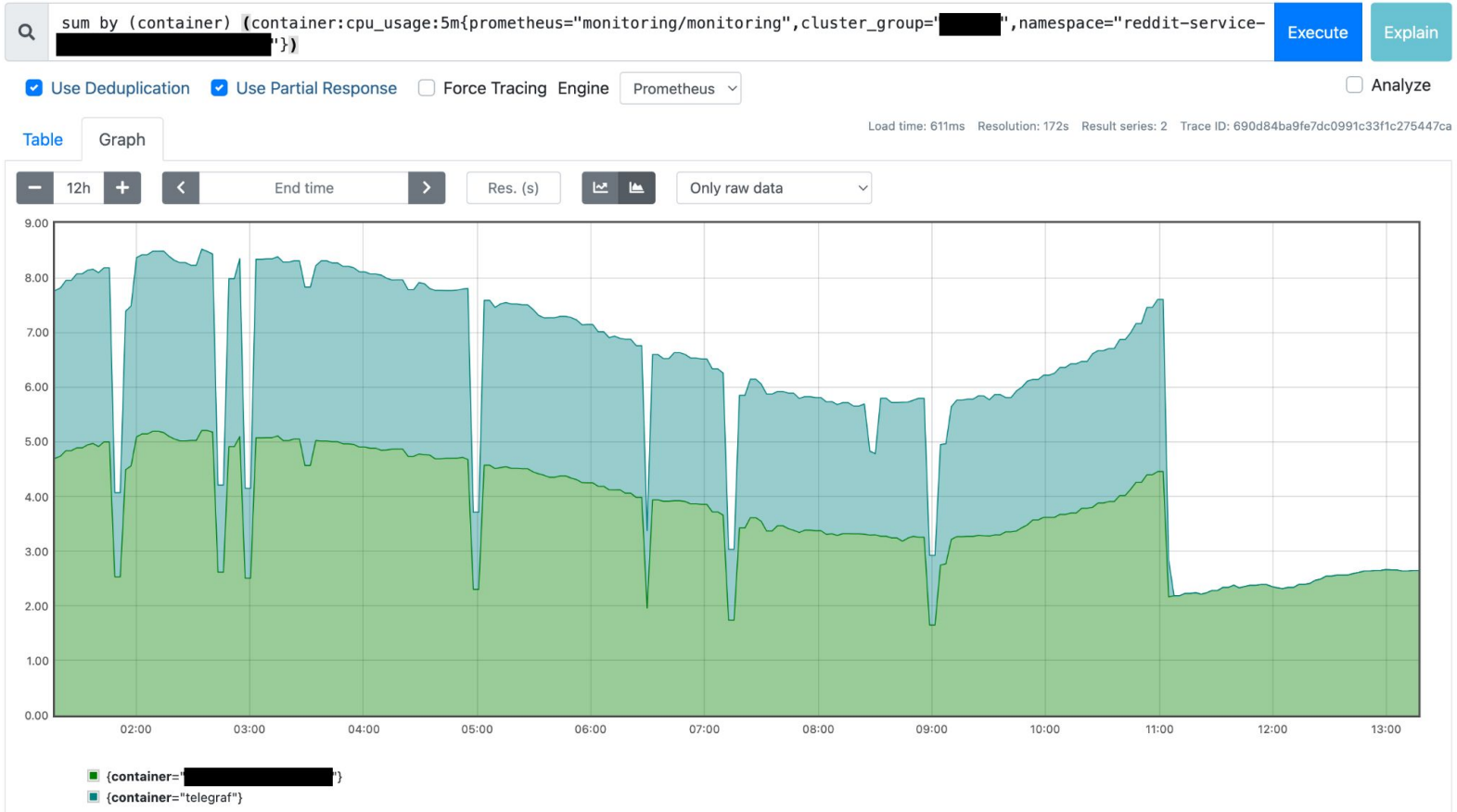
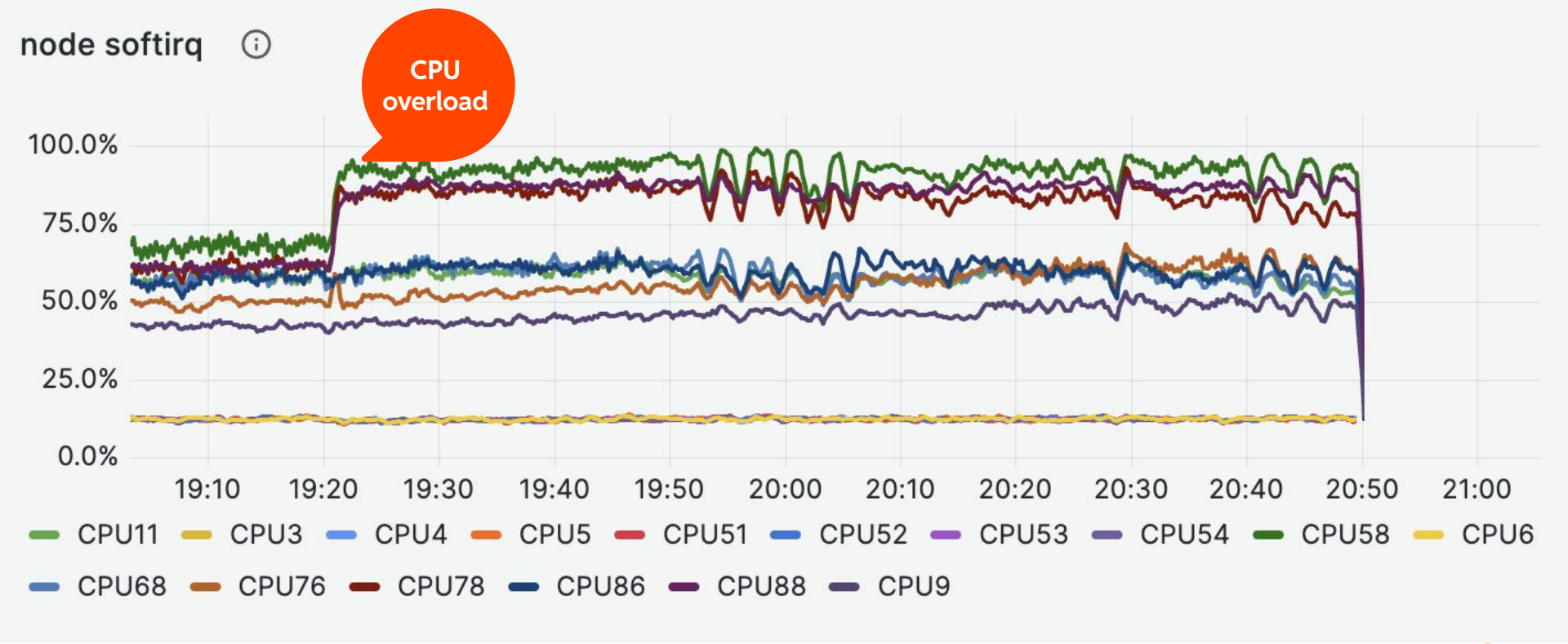
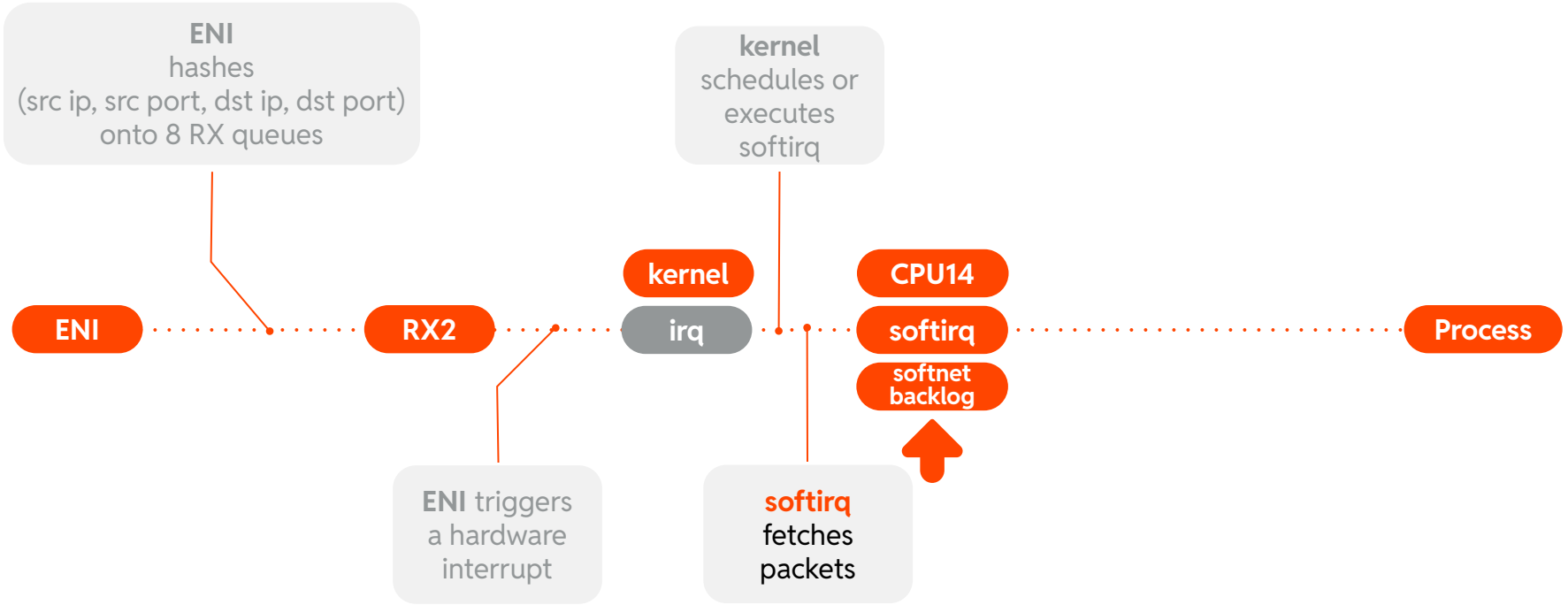


(05) What now? CPU overload...



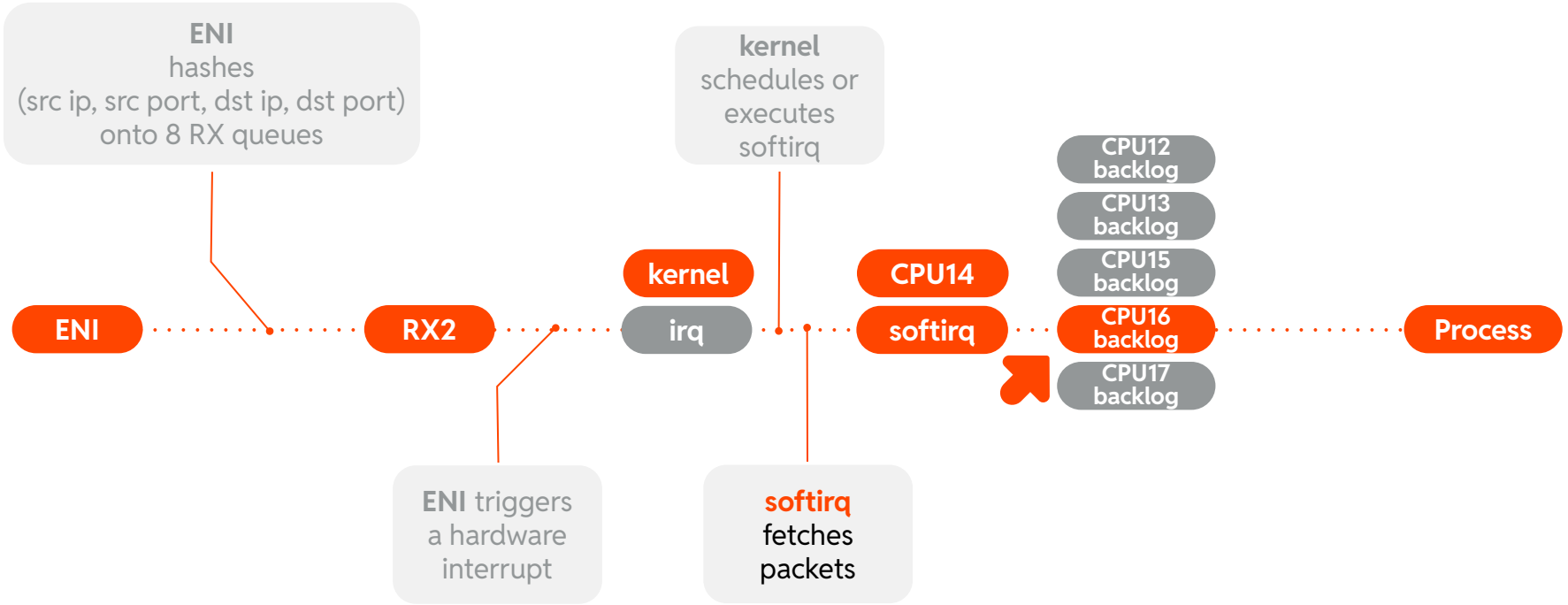
Receiving packets

AWS & Linux



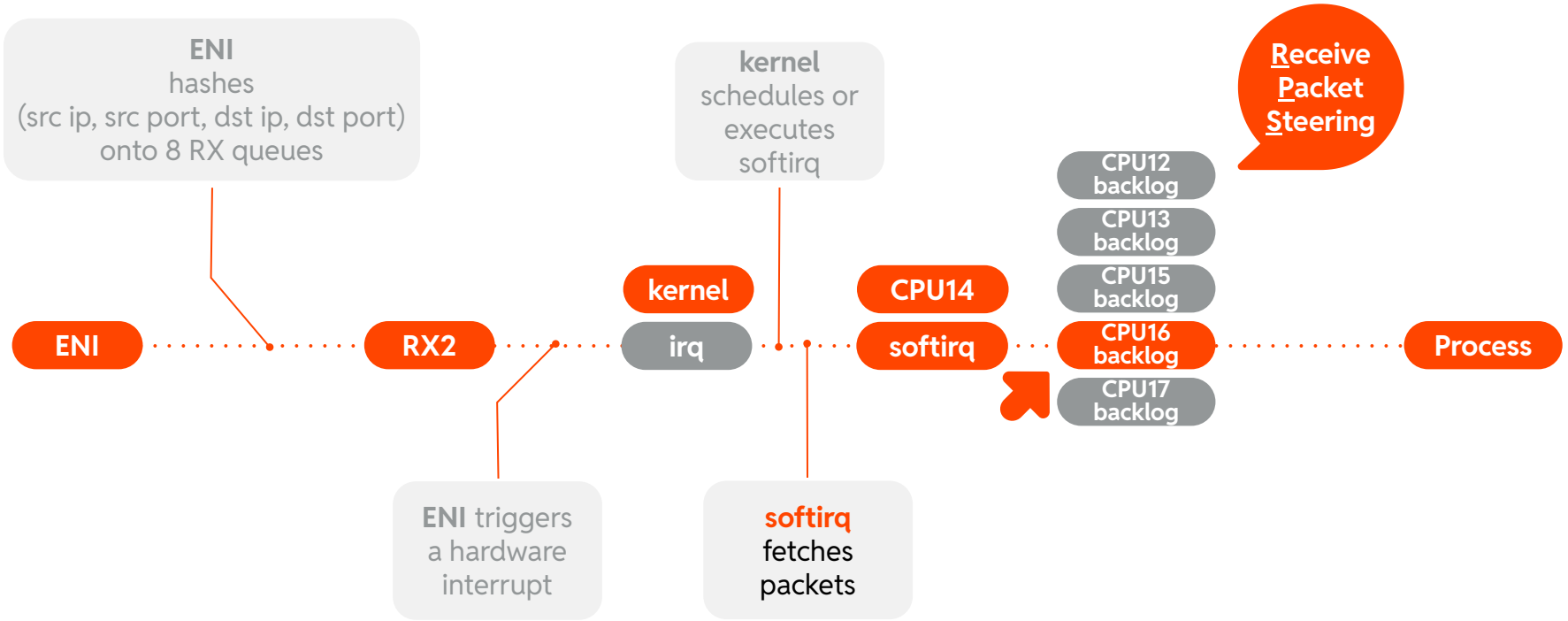
Receiving packets

AWS & Linux

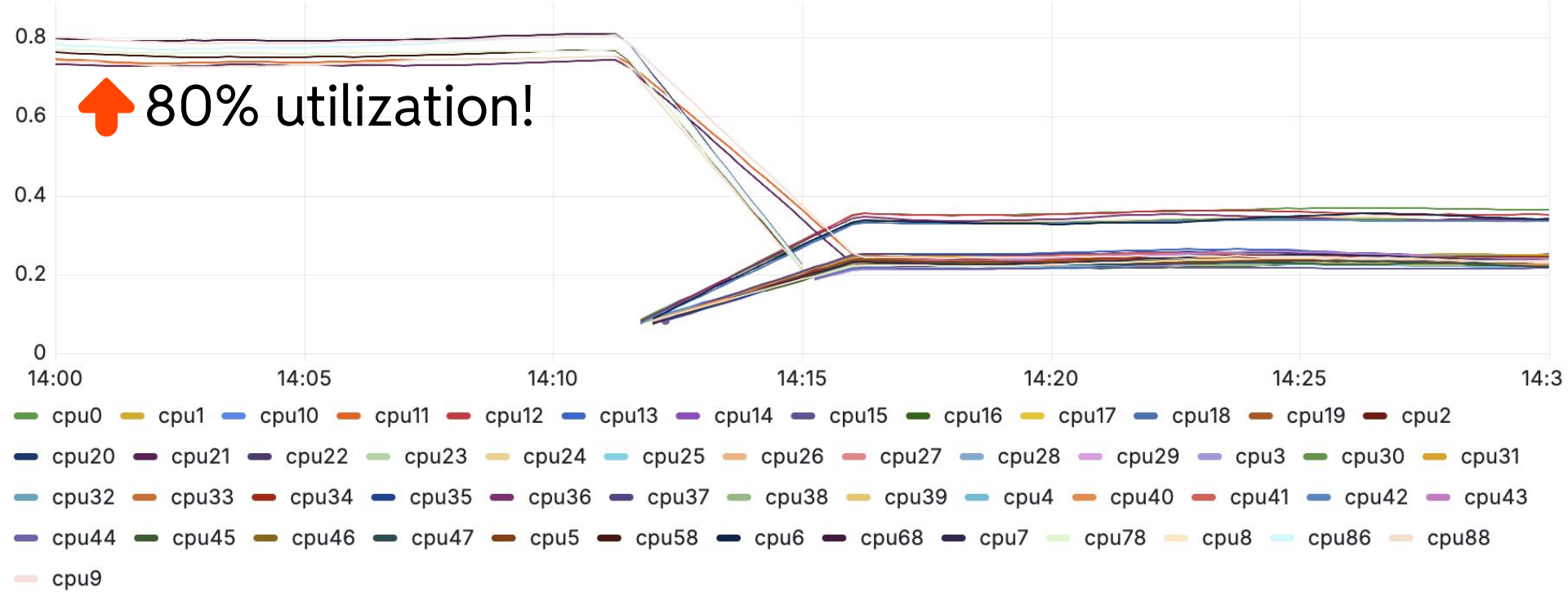


Receiving packets

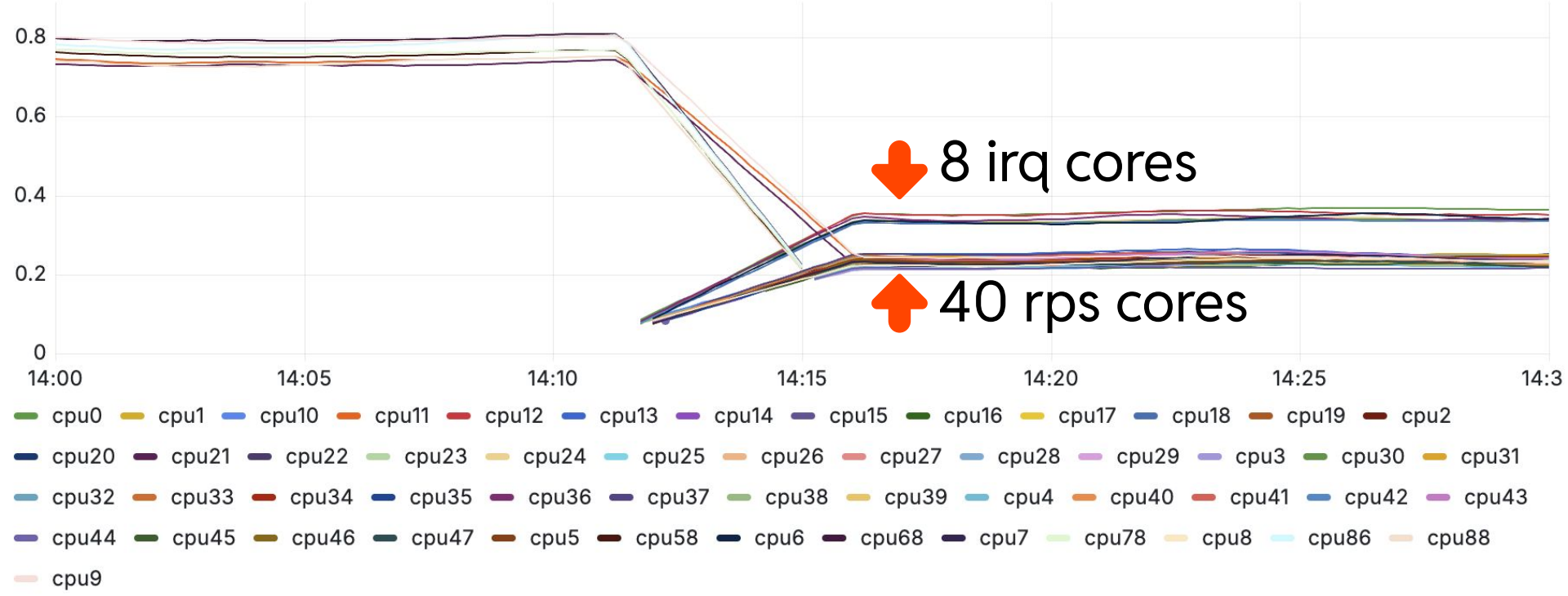
AWS & Linux



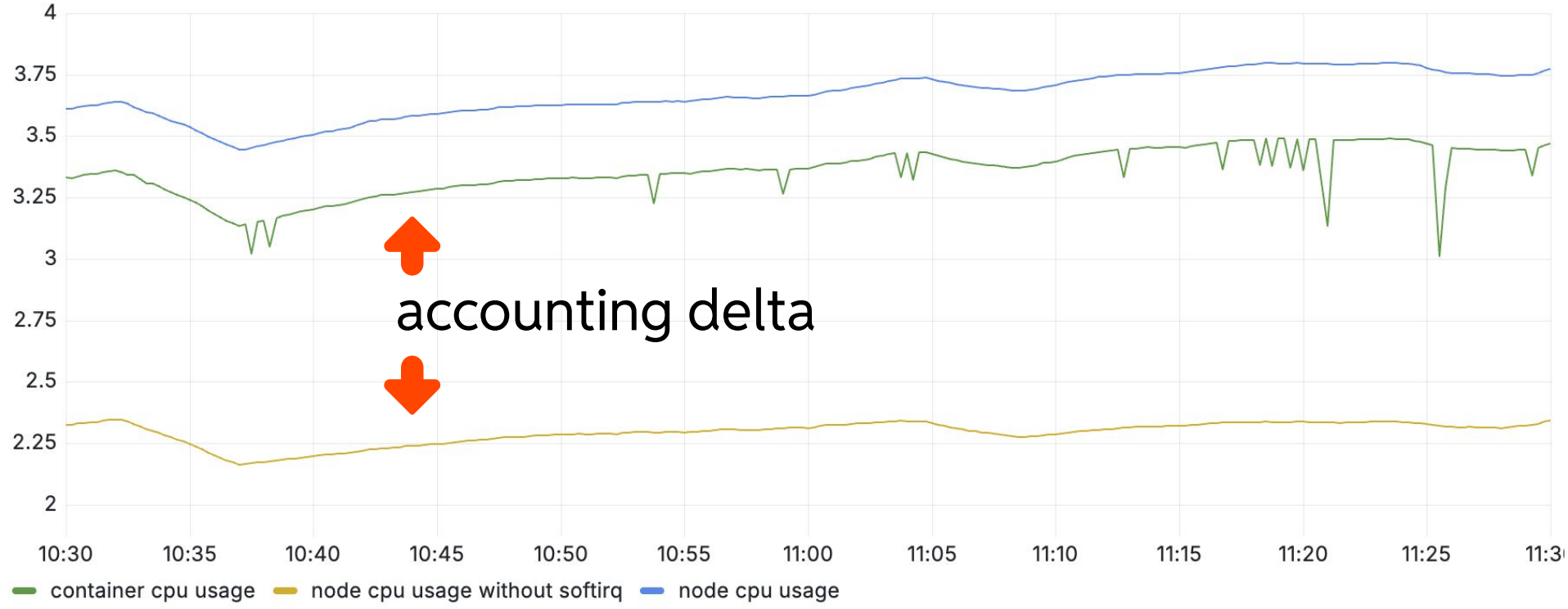
Receiving packets - The Fix



Receiving packets - The Fix

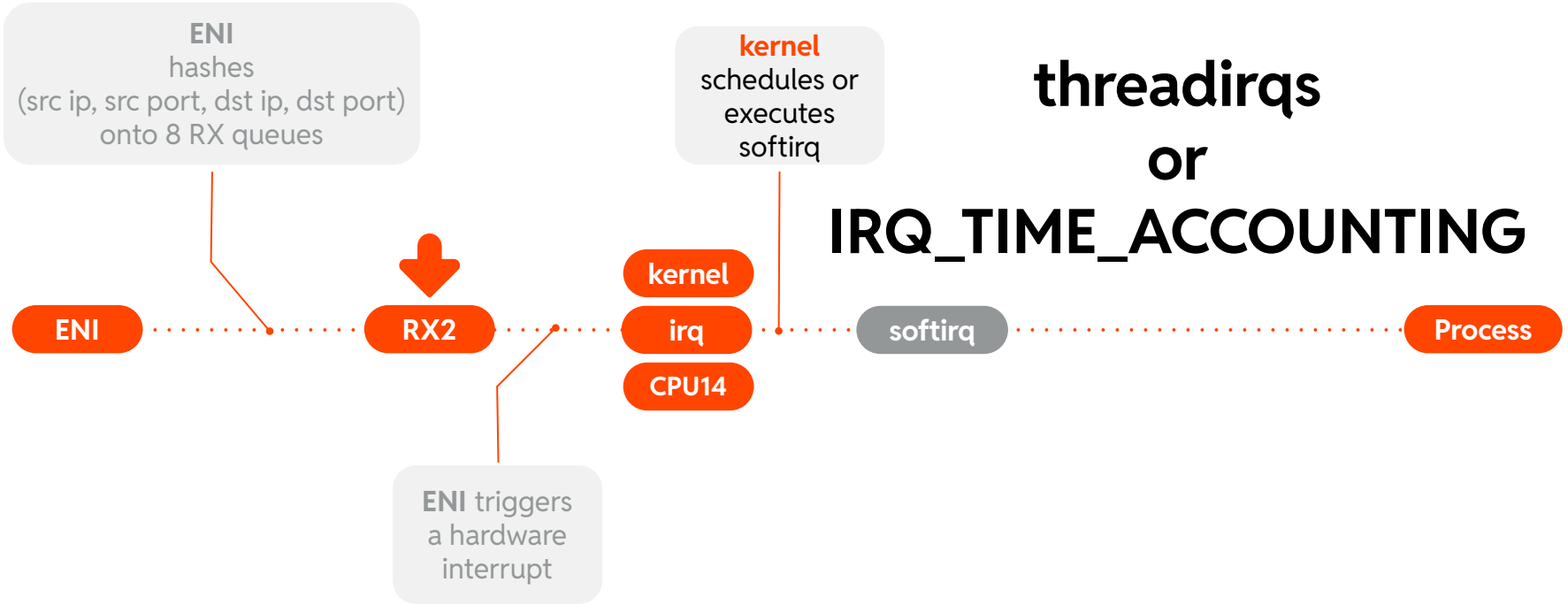


(05) What now? Accounting



Receiving packets

AWS & Linux



(05) What now? CPU cost (unsolved)

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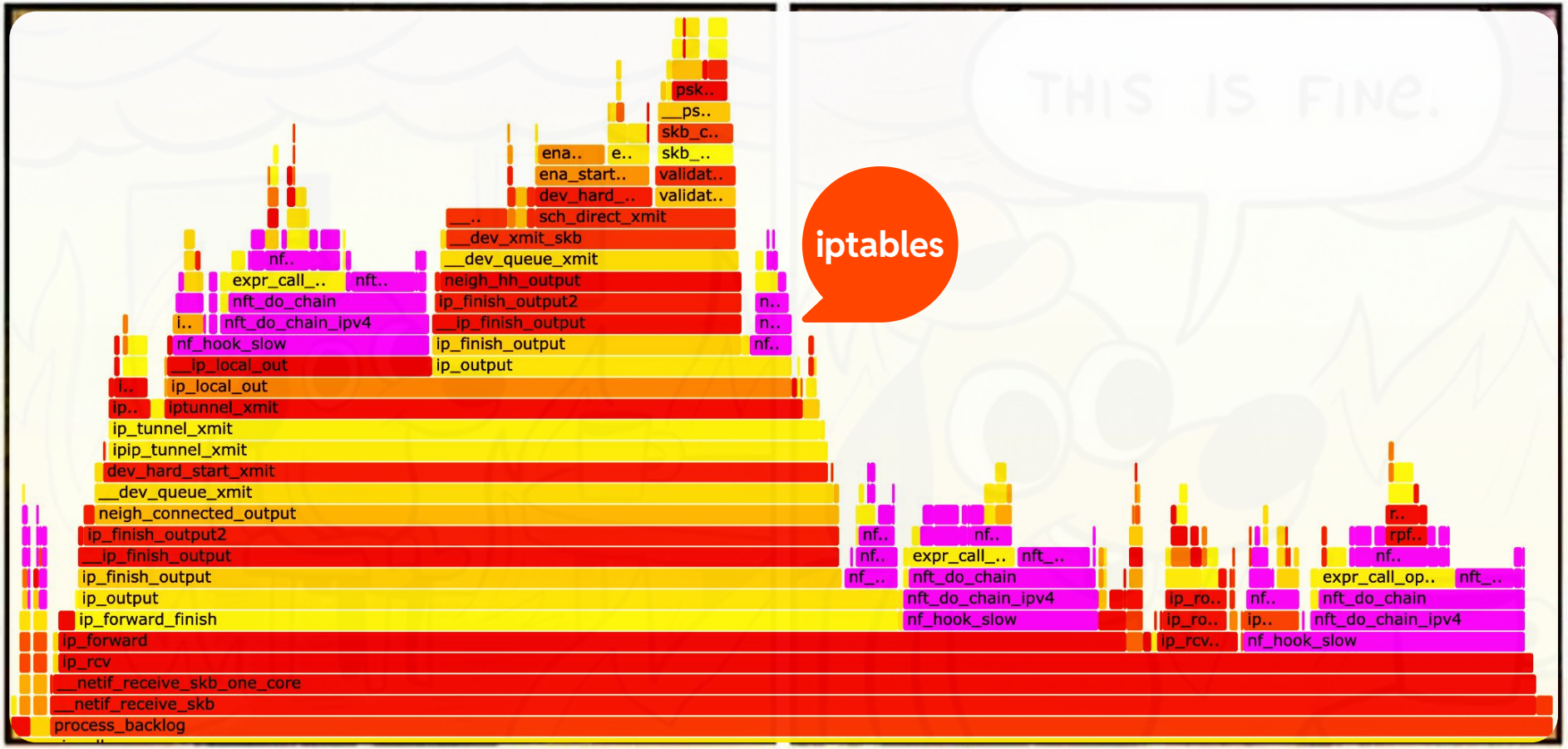
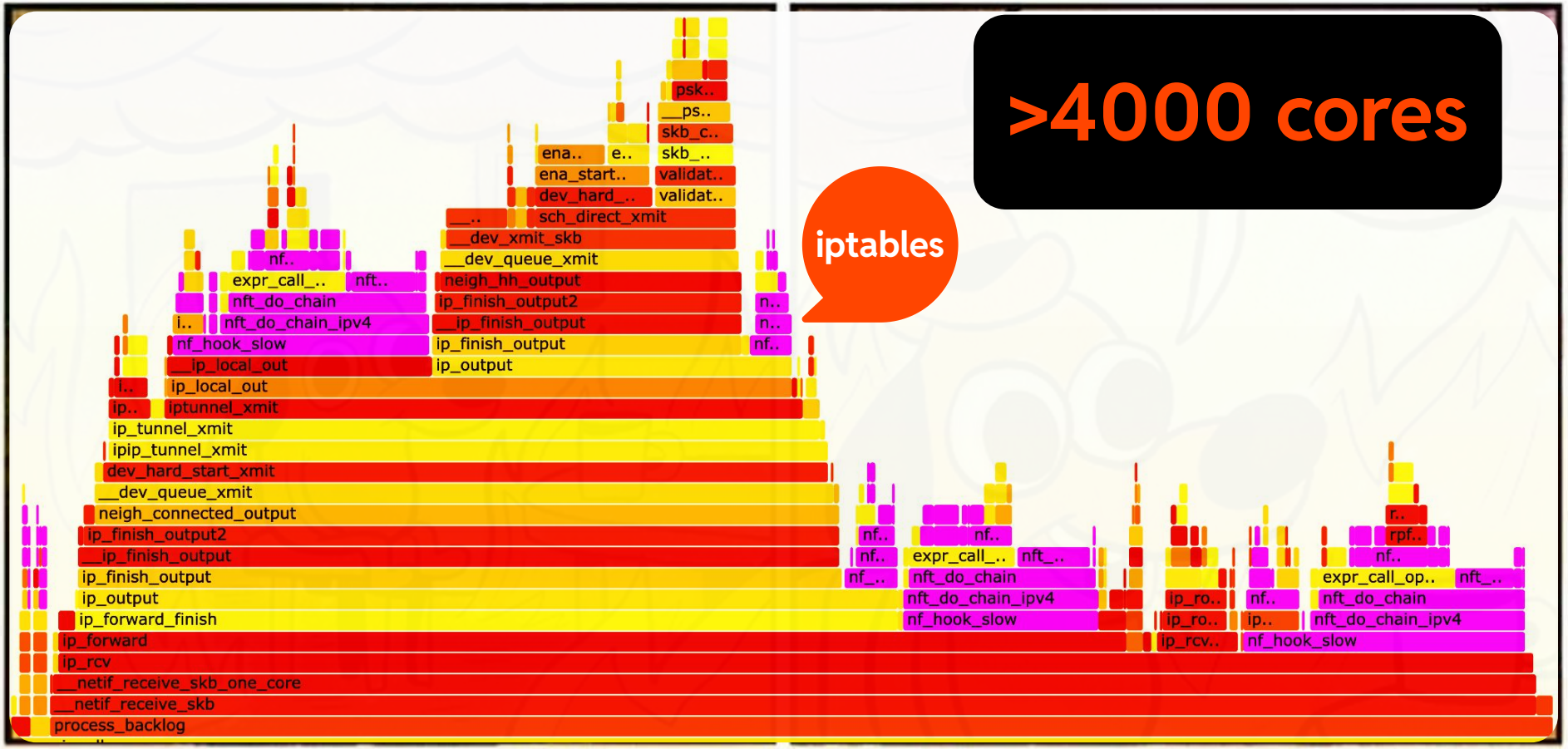


(05) What now? CPU cost (unsolved)



Special thanks

To the teams involved

reddit

Thank you