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Cloud Native Superpowers with **eBPF**



Tracy P Holmes | **@tracypholmes**
Technical Community Advocate, Isovalent

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What is  **eBPF** ?

extended
Berkeley
Packet
Filter

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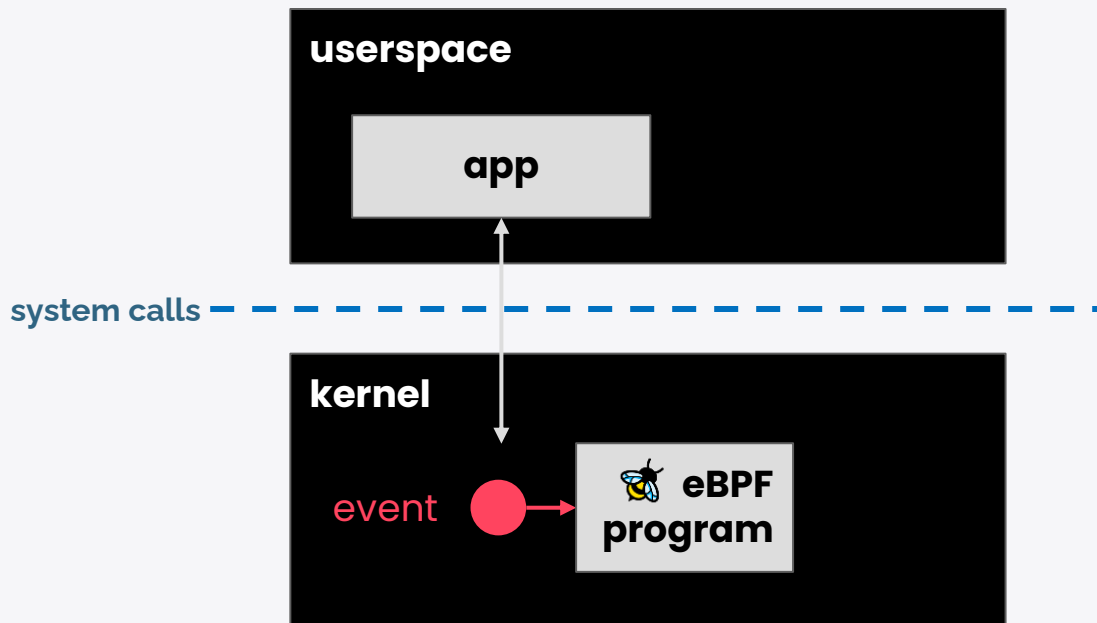
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What is  eBPF ?

Makes the kernel **programmable**

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Run custom code in the kernel



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Dynamically change kernel behavior

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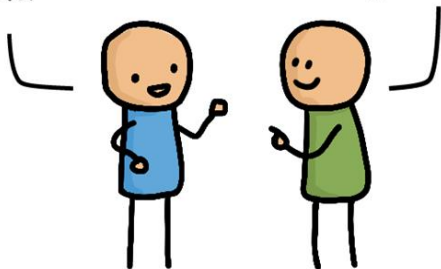
Application Developer:

I want this new feature to observe my app



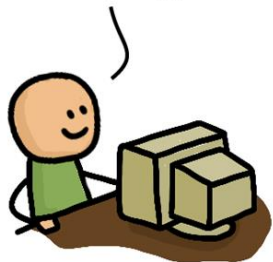
Hey kernel developer! Please add this new feature to the Linux kernel

OK! Just give me a year to convince the entire community that this is good for everyone.

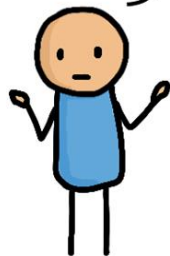


1 year later...

I'm done. The upstream kernel now supports this.



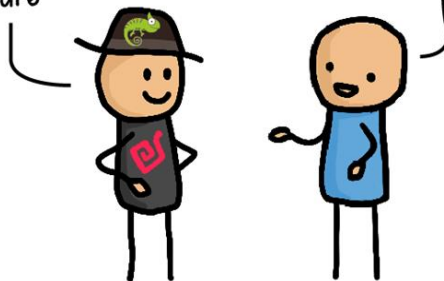
But I need this in my Linux distro



5 years later...

Good news. Our Linux distribution now ships a kernel with your required feature

OK but my requirements have changed since...



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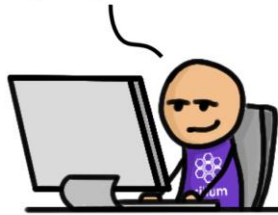
Application Developer:

i want this new feature
to observe my app



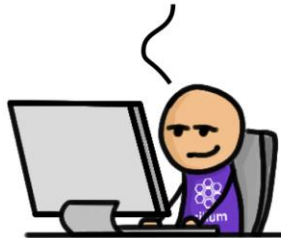
eBPF Developer:

OK! The kernel can't do this so let
me quickly solve this with eBPF.

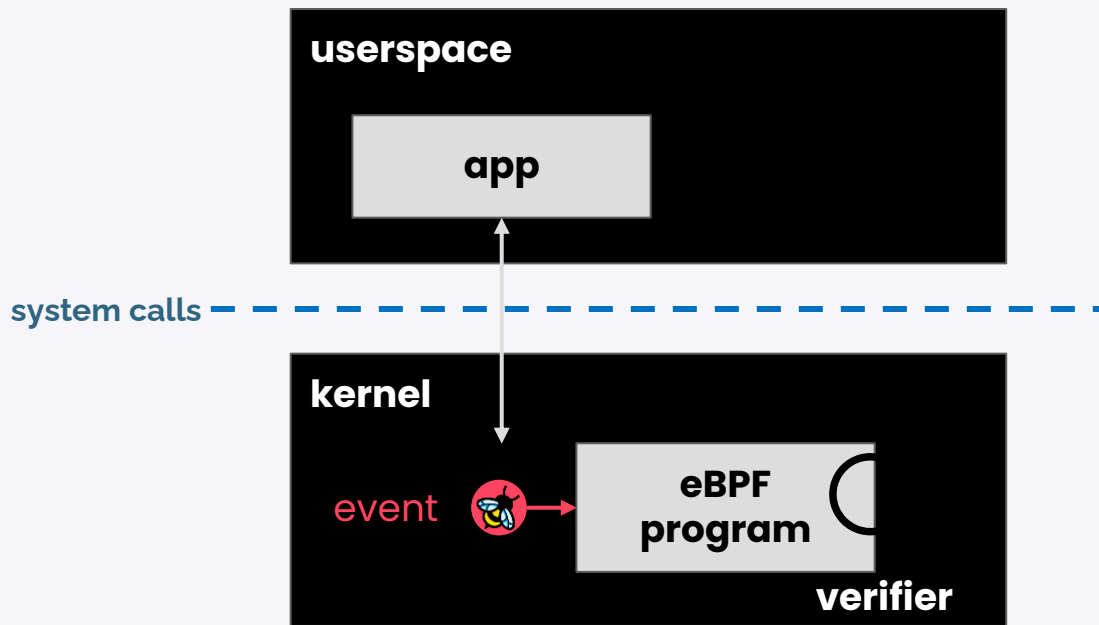


A couple of days later...

Here is a release of our eBPF project that has this feature
now. BTW, you don't have to reboot your machine.



eBPF code has to be safe

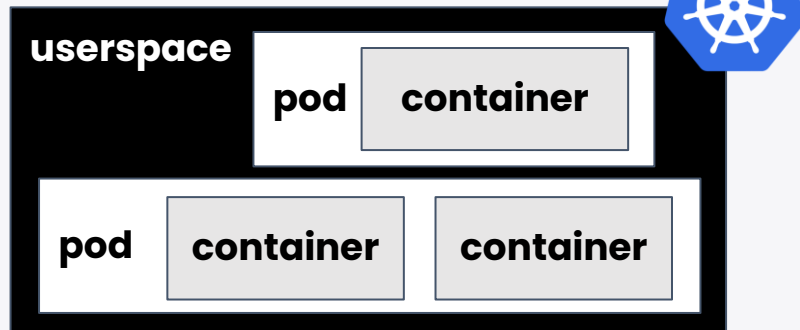


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Programmable kernel in Kubernetes

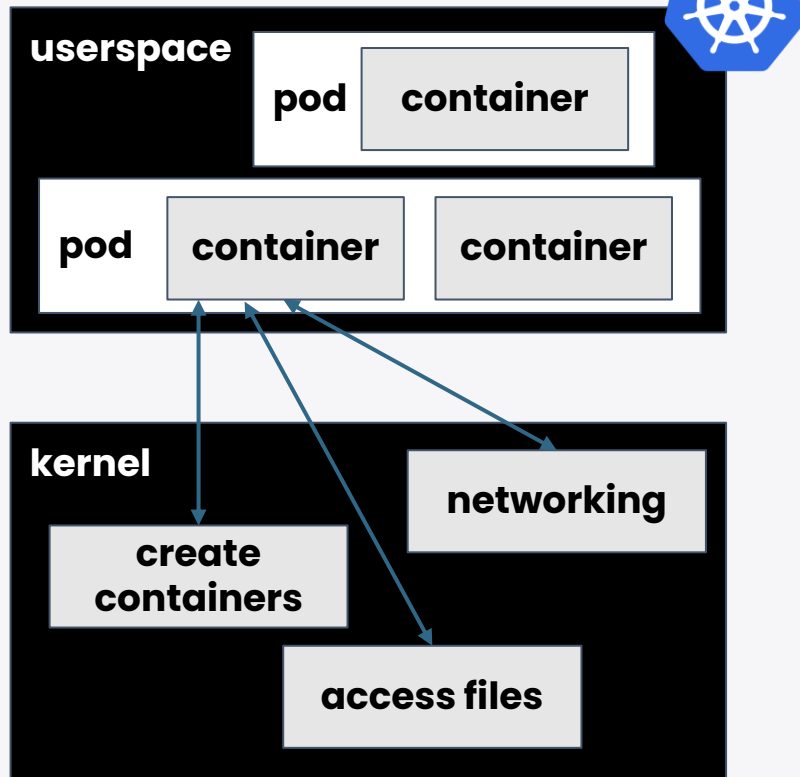
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**One kernel per
host**

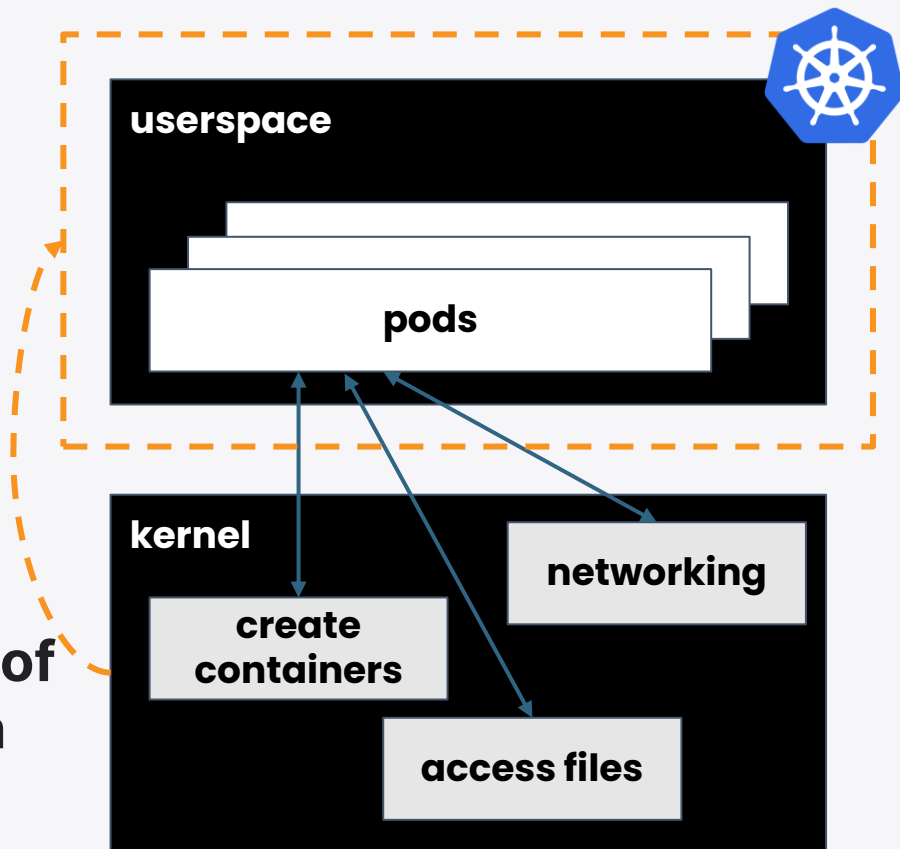
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One kernel per
host

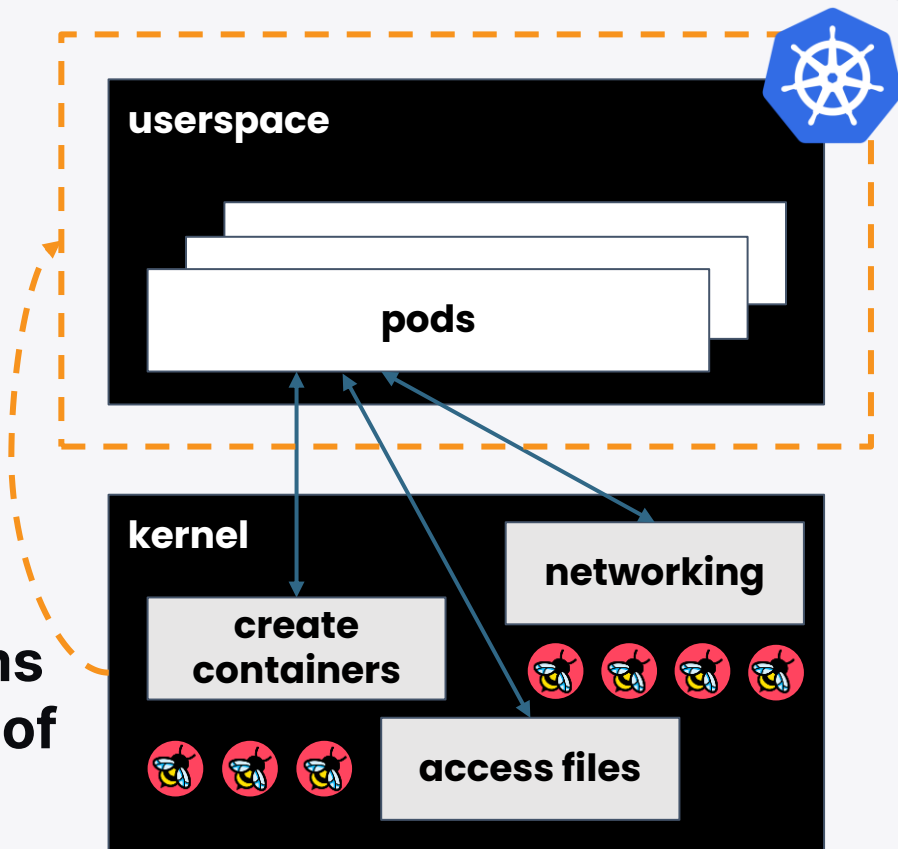
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Kernel aware of
everything on
the host



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eBPF programs
can be aware of
everything



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**eBPF apps have a view
across the entire node**

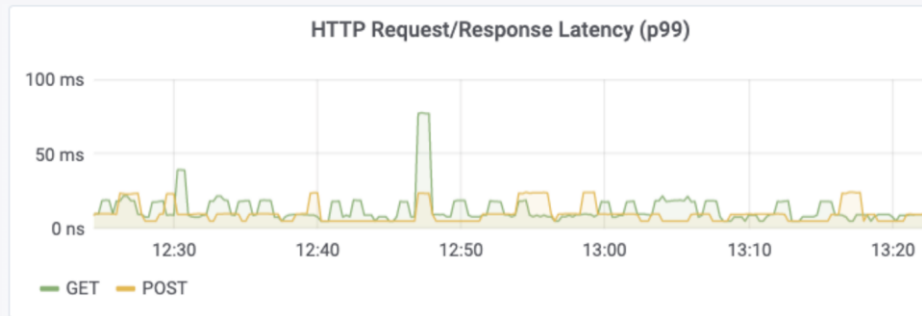
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**eBPF tools have a view
across the entire node
enabling deep observability**

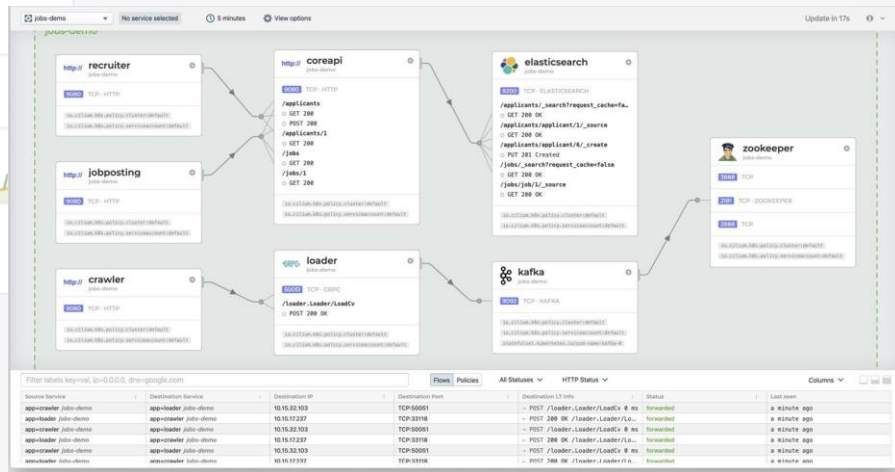
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Cilium Hubble observability



- Network flow logs
- Metrics
- Service map
- L3/4 & L7 (HTTP, DNS, Kafka, ...)
- Aware of Kubernetes identities



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**eBPF tools have a view
across the entire node**

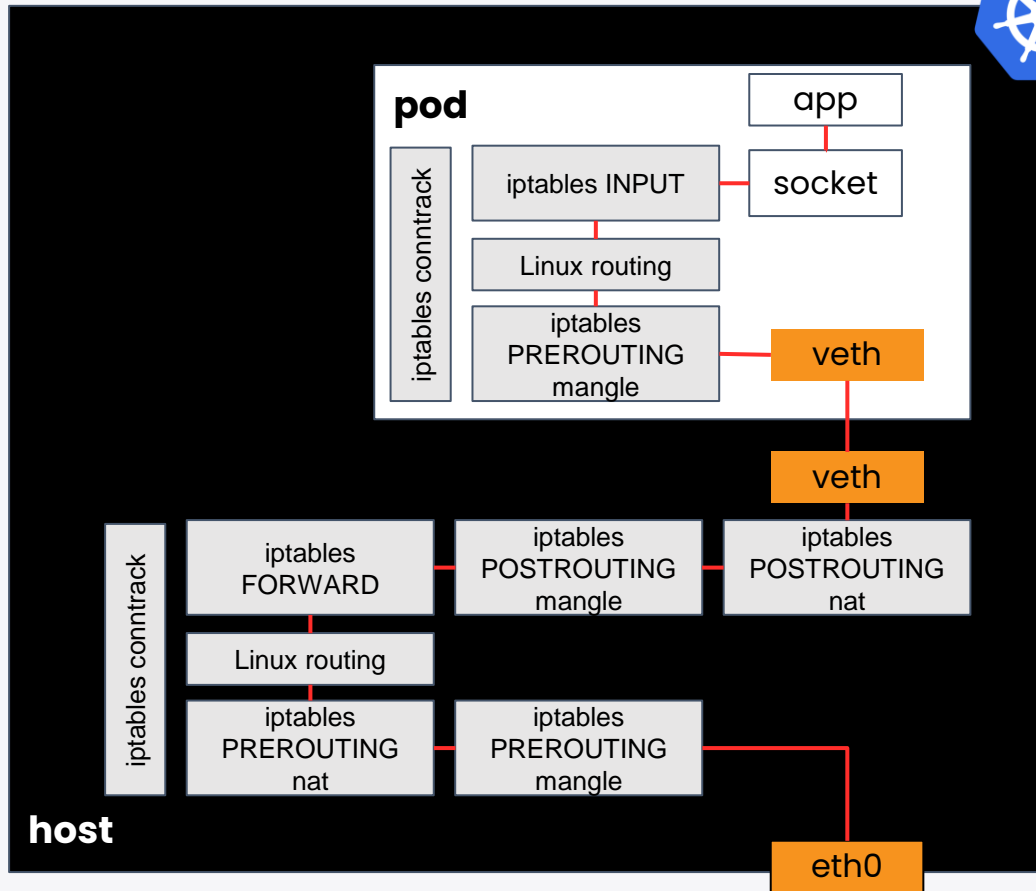
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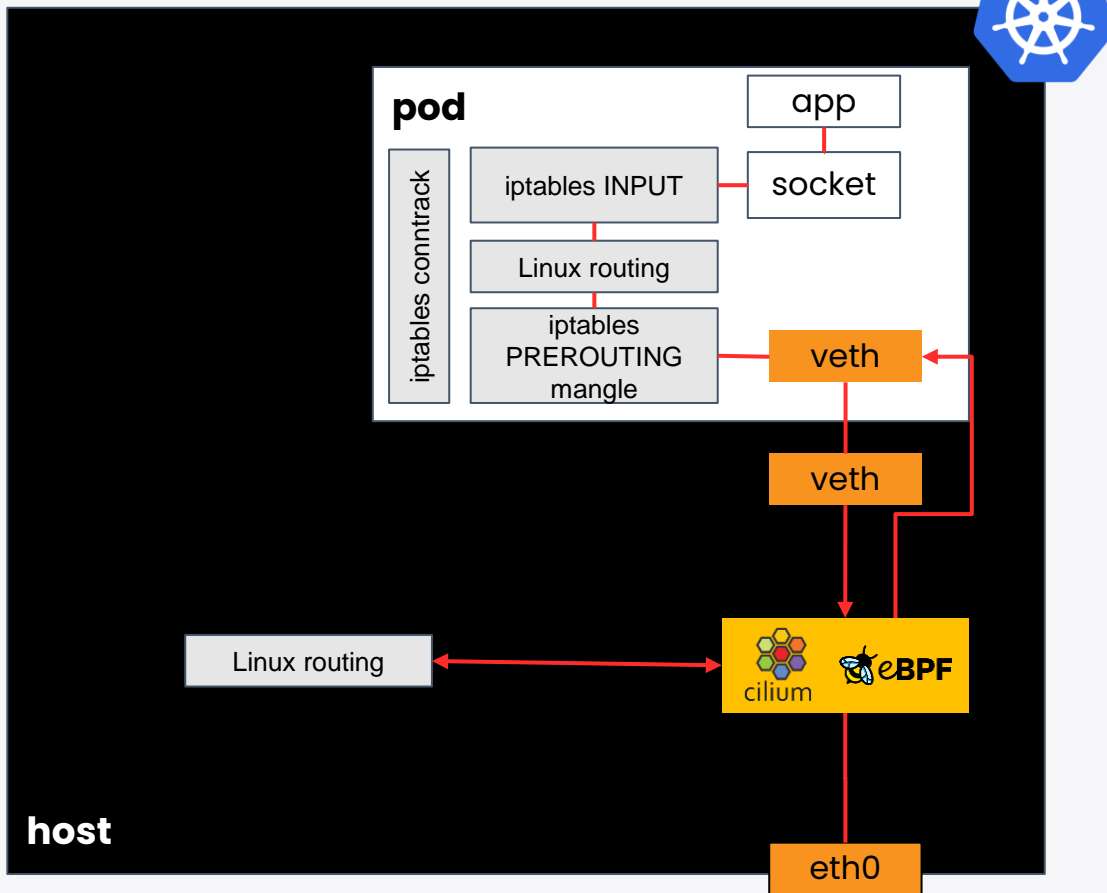
**eBPF tools have a view
across the entire node
enabling network efficiency**

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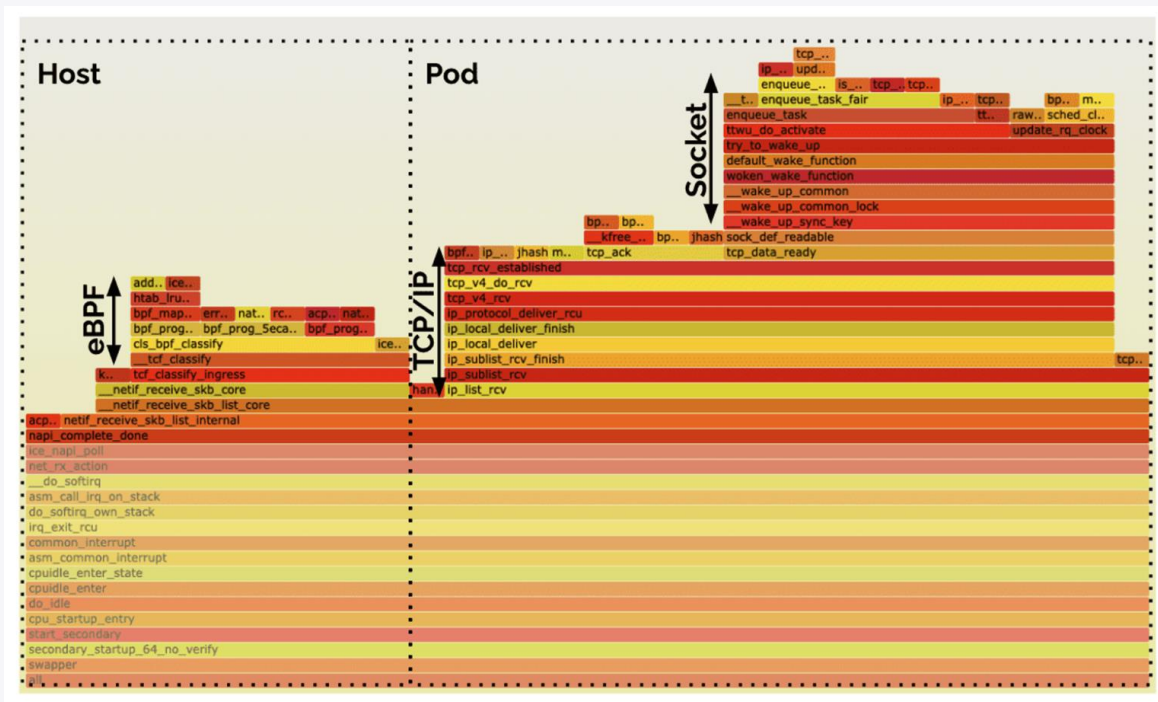
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Cilium eBPF (receive path)

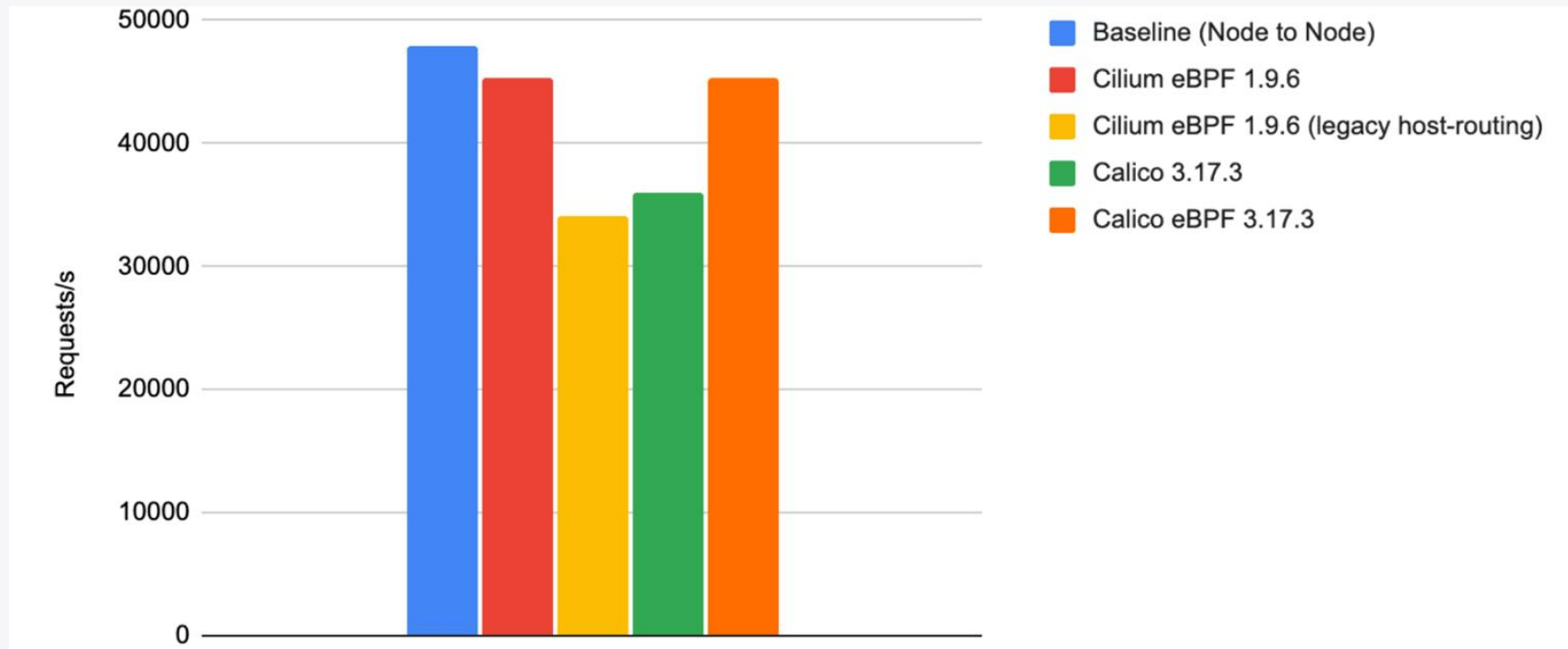


<https://cilium.io/blog/2021/05/11/cni-benchmark>

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TCP RR (higher is better)



<https://cilium.io/blog/2021/05/11/cni-benchmark>

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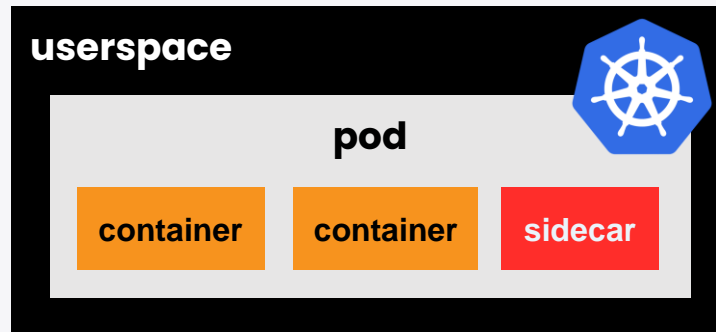
**eBPF tools have a view
across the entire node**

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**eBPF tools have a view
across the entire node
without any app or config changes**

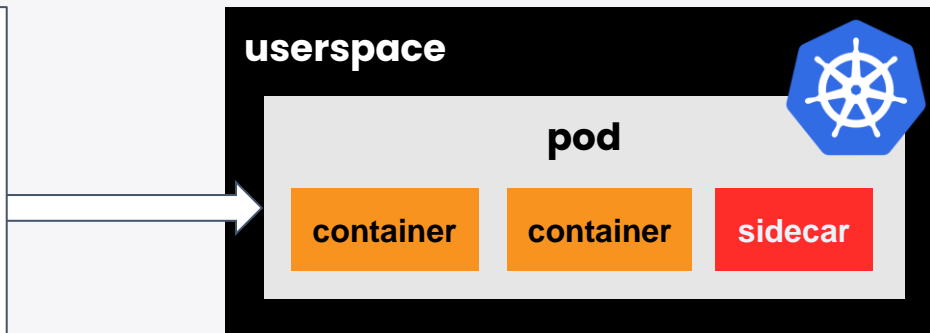
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A sidecar has a view across one pod



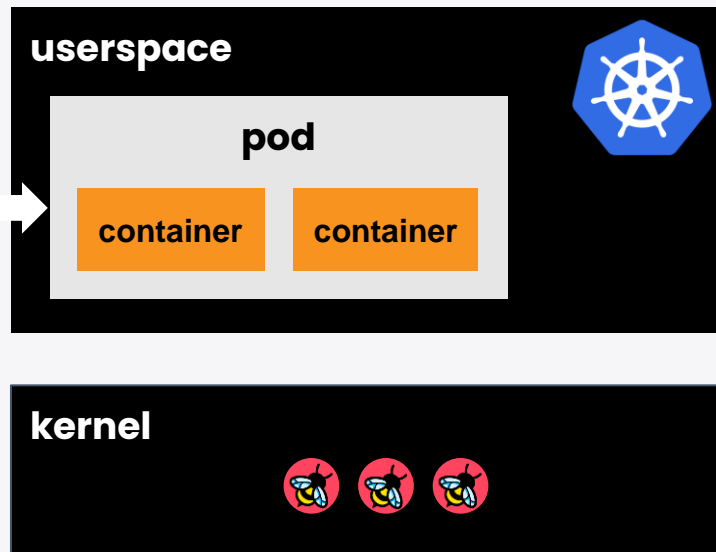
Sidecars need YAML

```
my-app.yaml
containers:
- name: my-app
  ...
- name: my-app-init
  ...
- name: my-sidecar
  ...
```



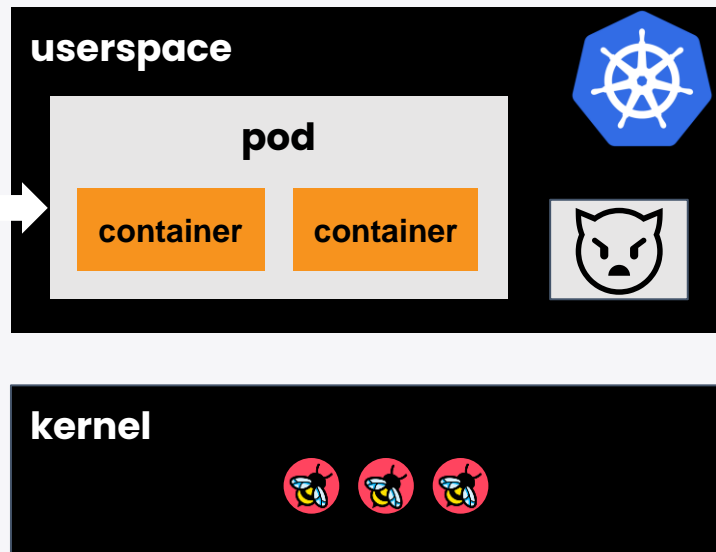
eBPF does not need any app changes

```
my-app.yaml
containers:
- name: my-app
  ...
- name: my-app-init
  ...
```



eBPF can see ALL activity on the node

```
my-app.yaml
containers:
- name: my-app
  ...
- name: my-app-init
  ...
```



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eBPF enables powerful Cloud Native tools

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eBPF in the CNCF



cilium



hubble







Tetragon

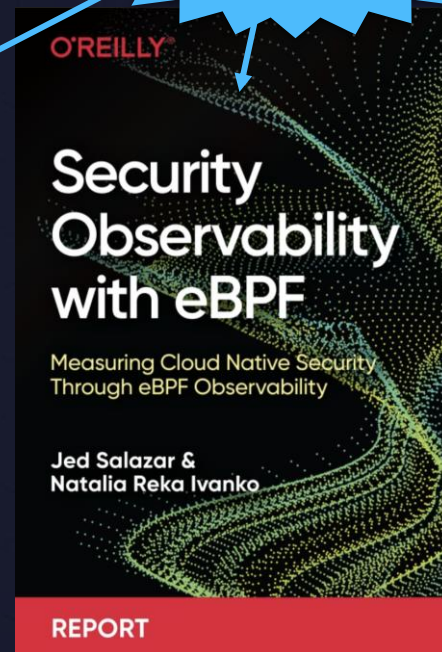


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Thank you

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 [@ciliumproject](https://twitter.com/ciliumproject)
 cilium.io
 slack.cilium.io

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