

Running Large-Scale Scheduling Simulations with Virtual Kubelet

KubeCon NA 2023 – Nov. 8

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Applied Computing does open-source research and development in distributed systems, with a particular focus on modeling, scheduling, and optimization.

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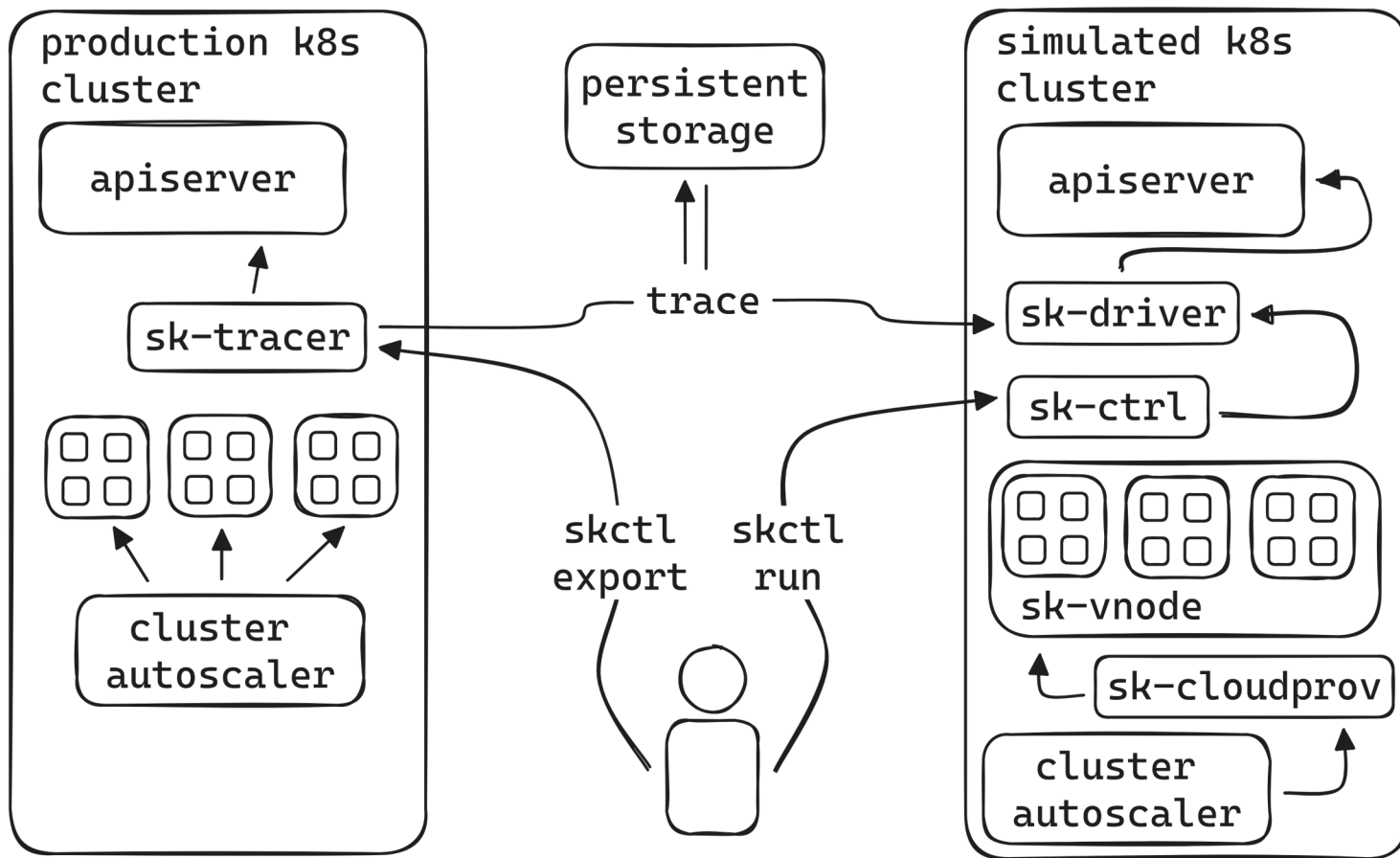
Why simulation?

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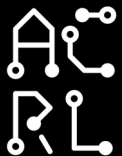


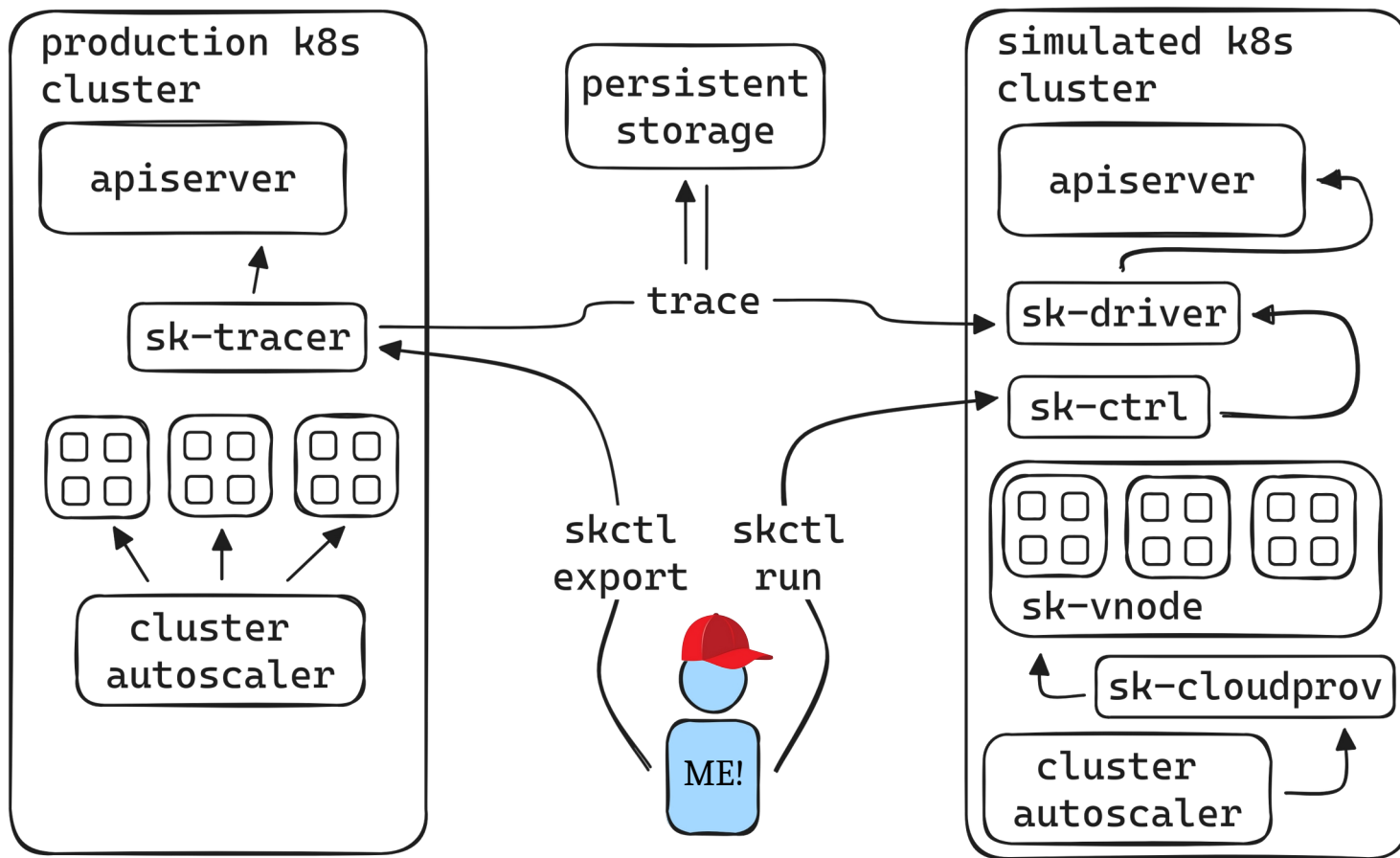


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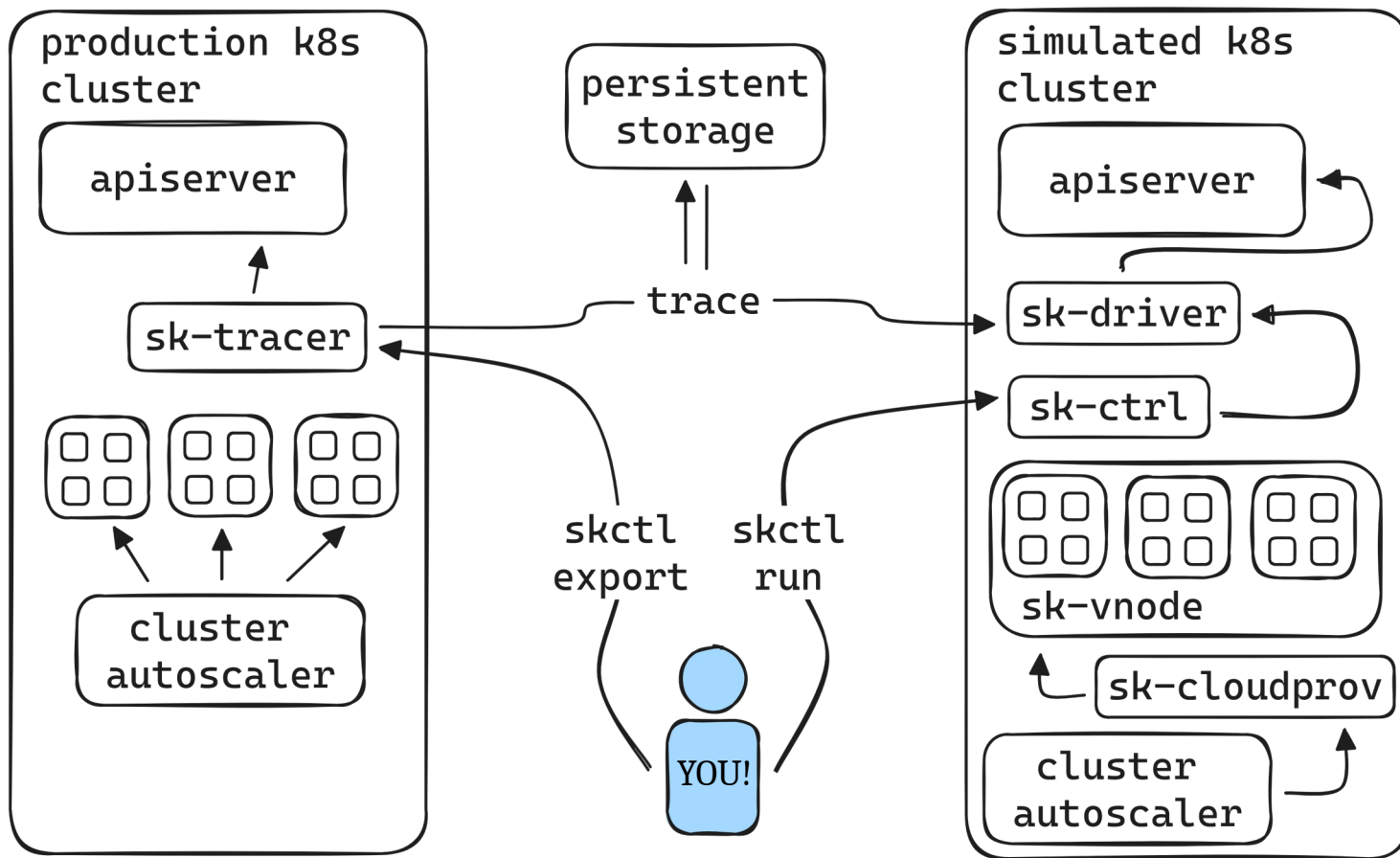


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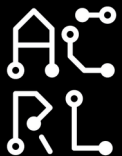


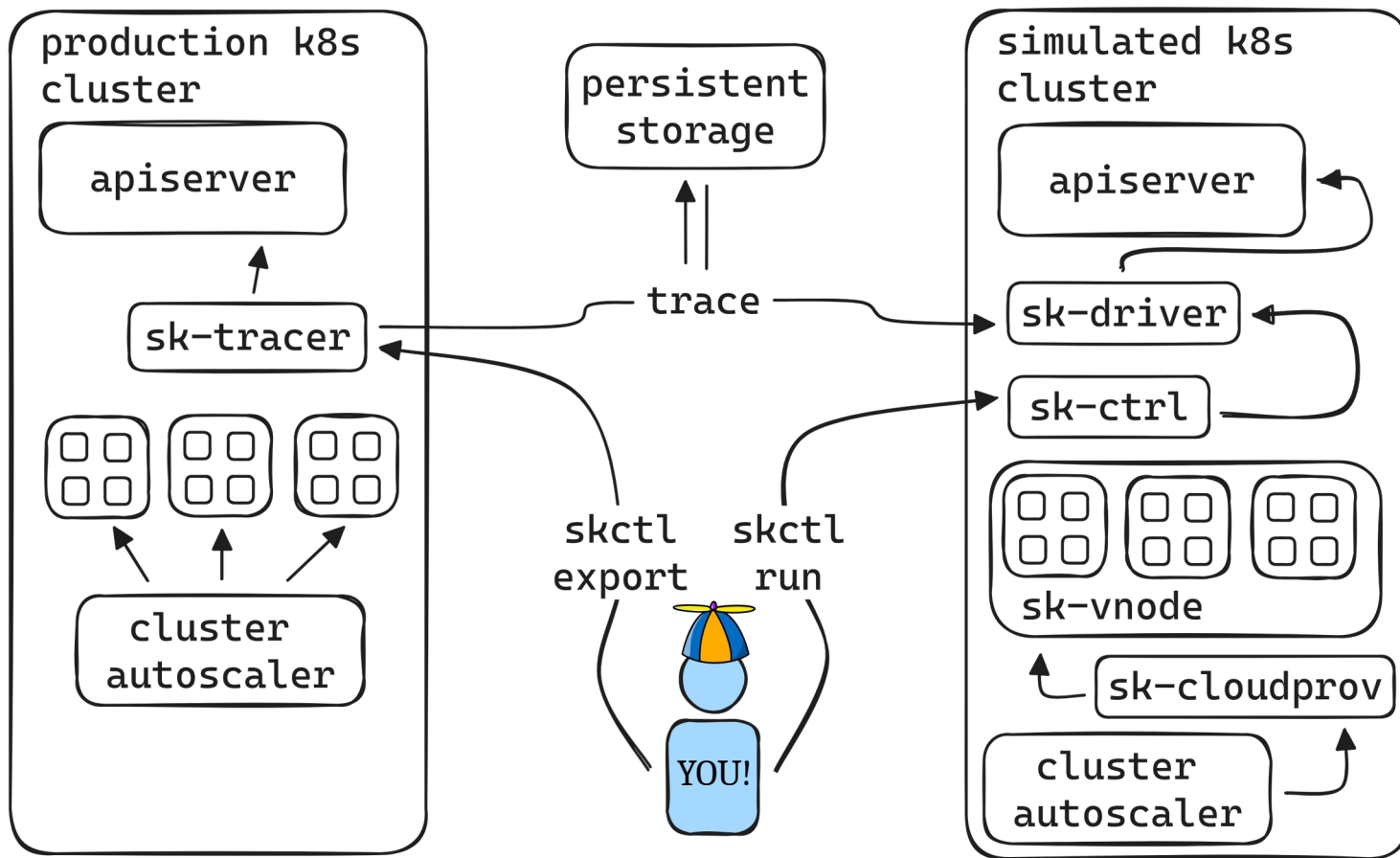


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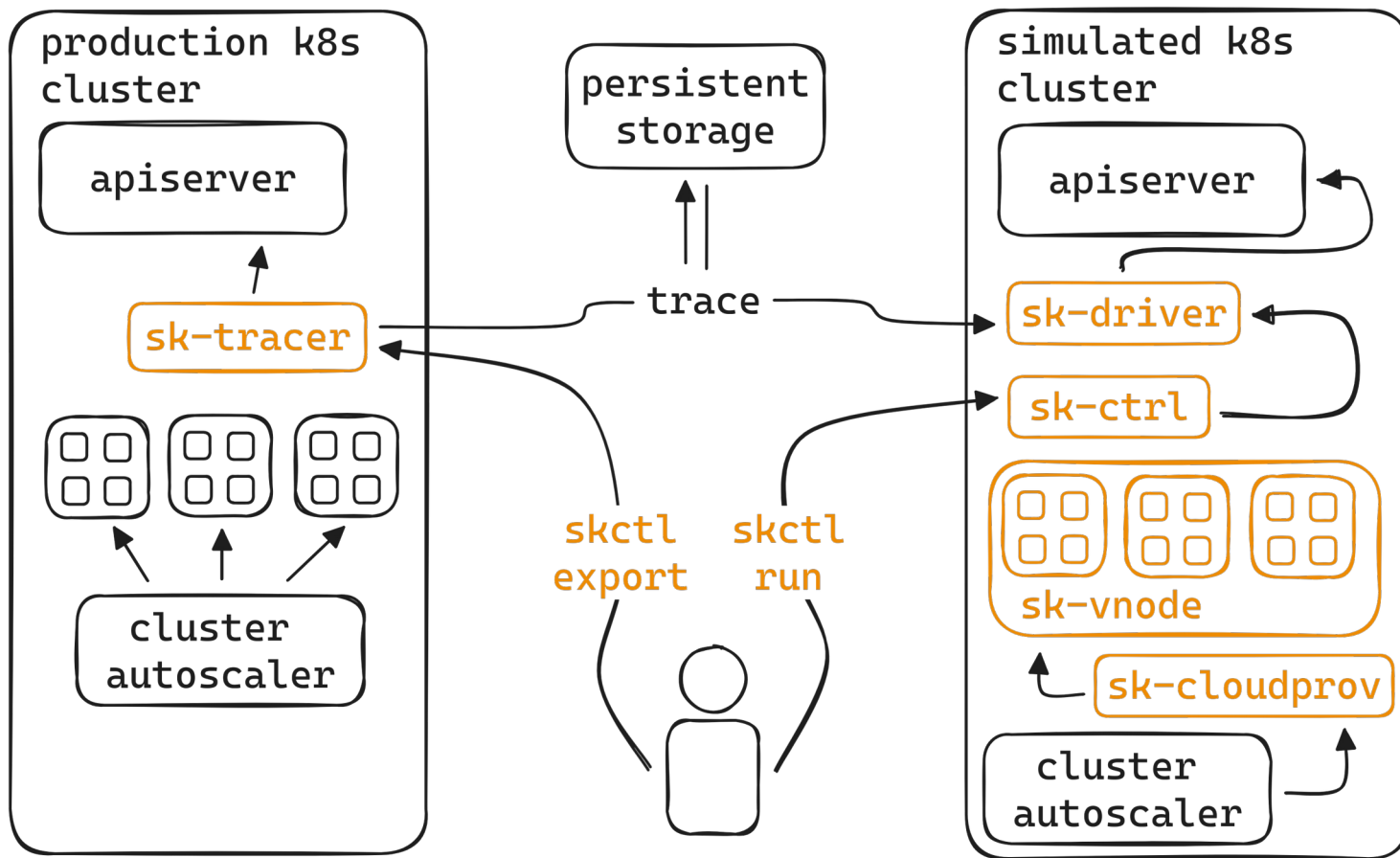


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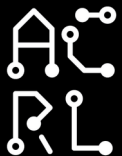


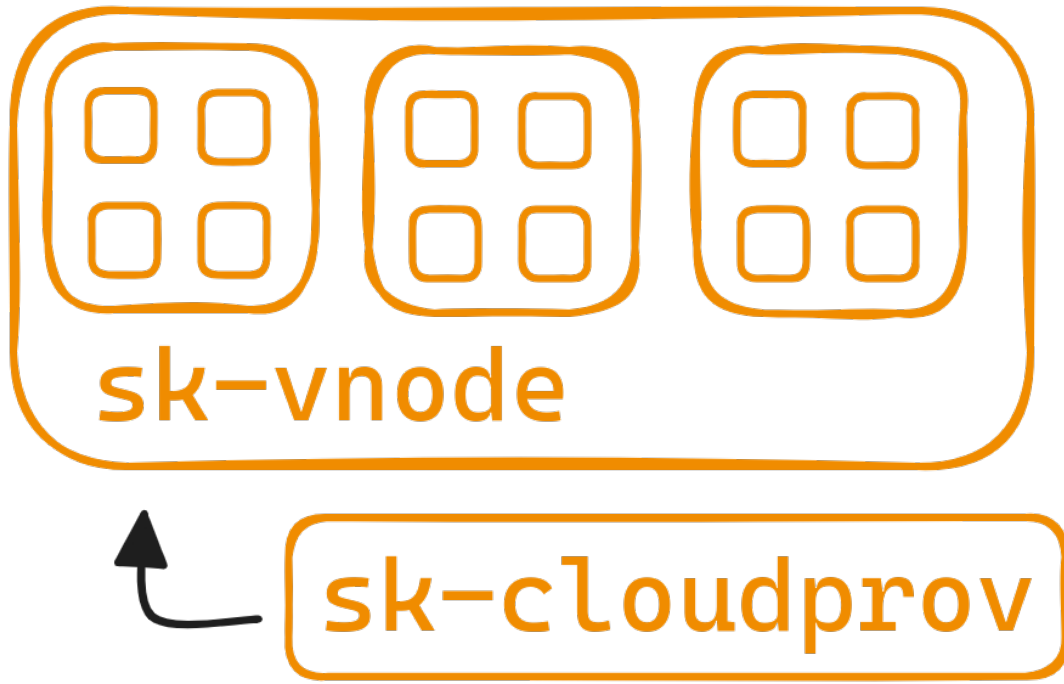


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- `sk-vnode`:
 - [Virtual Kubelet](#)-based
 - Configurable node properties
 - Watches annotations to control pod lifecycle
- `sk-cloudprov`
 - [gRPC cloud provider](#) for Cluster Autoscaler
 - Scales the `sk-vnode` deployment up and down
 - Uses [pod deletion cost](#) feature to select nodes to terminate

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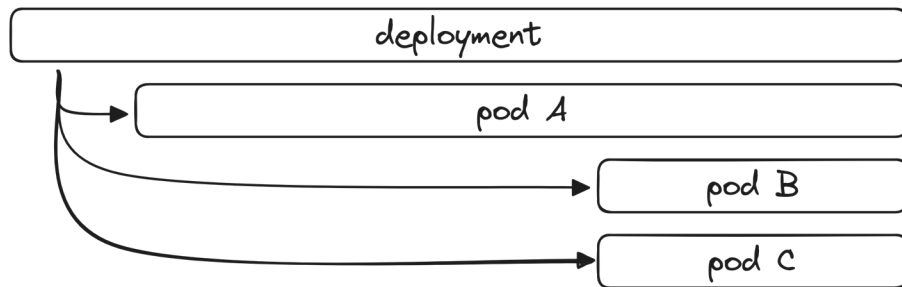
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sk-tracer

- sk-tracer:
 - Watches apiserver for resources and pods
 - Records a timeline of “important” events
 - Exports data to persistent storage on-demand

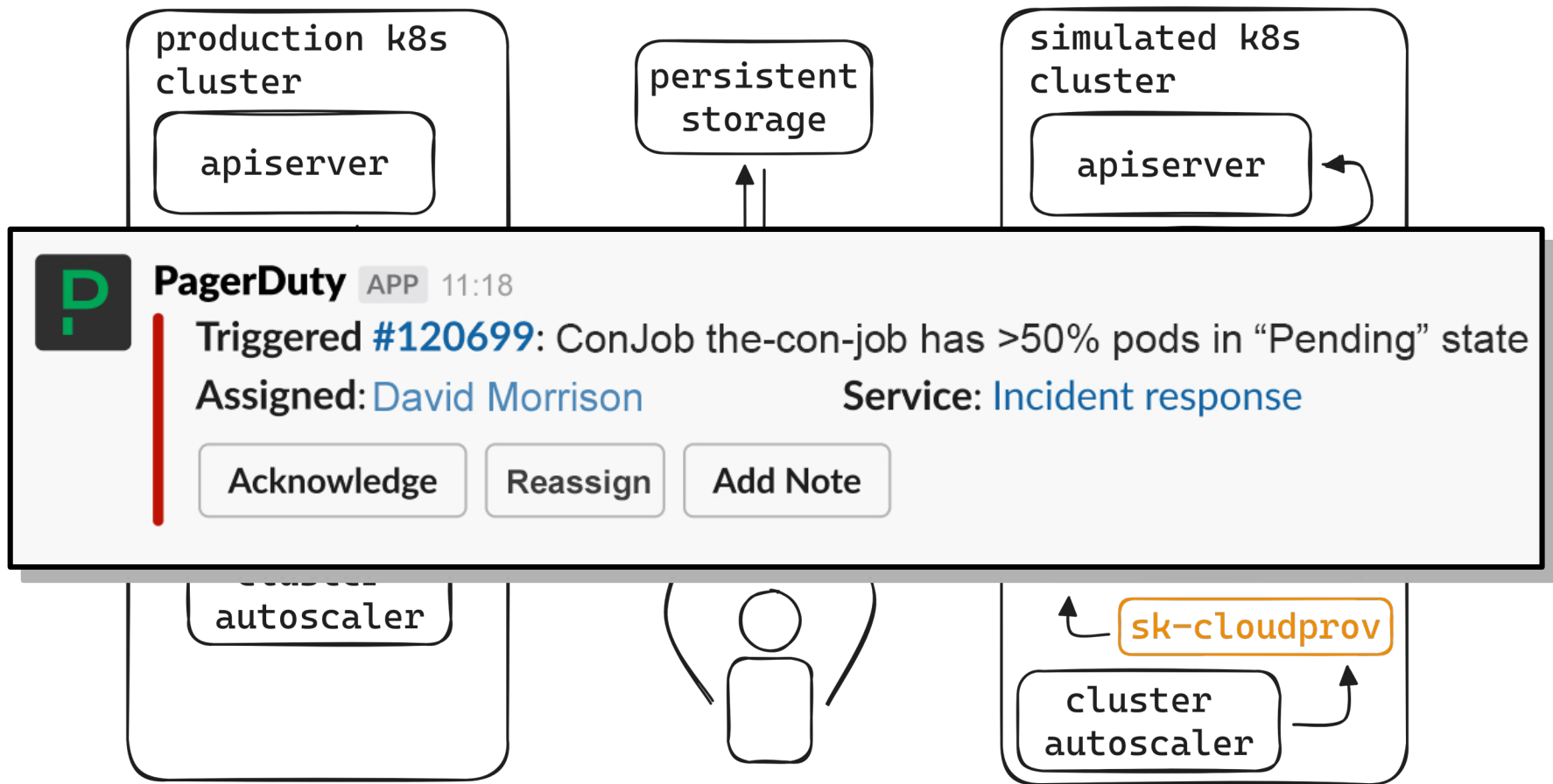


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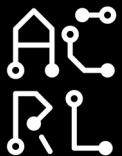


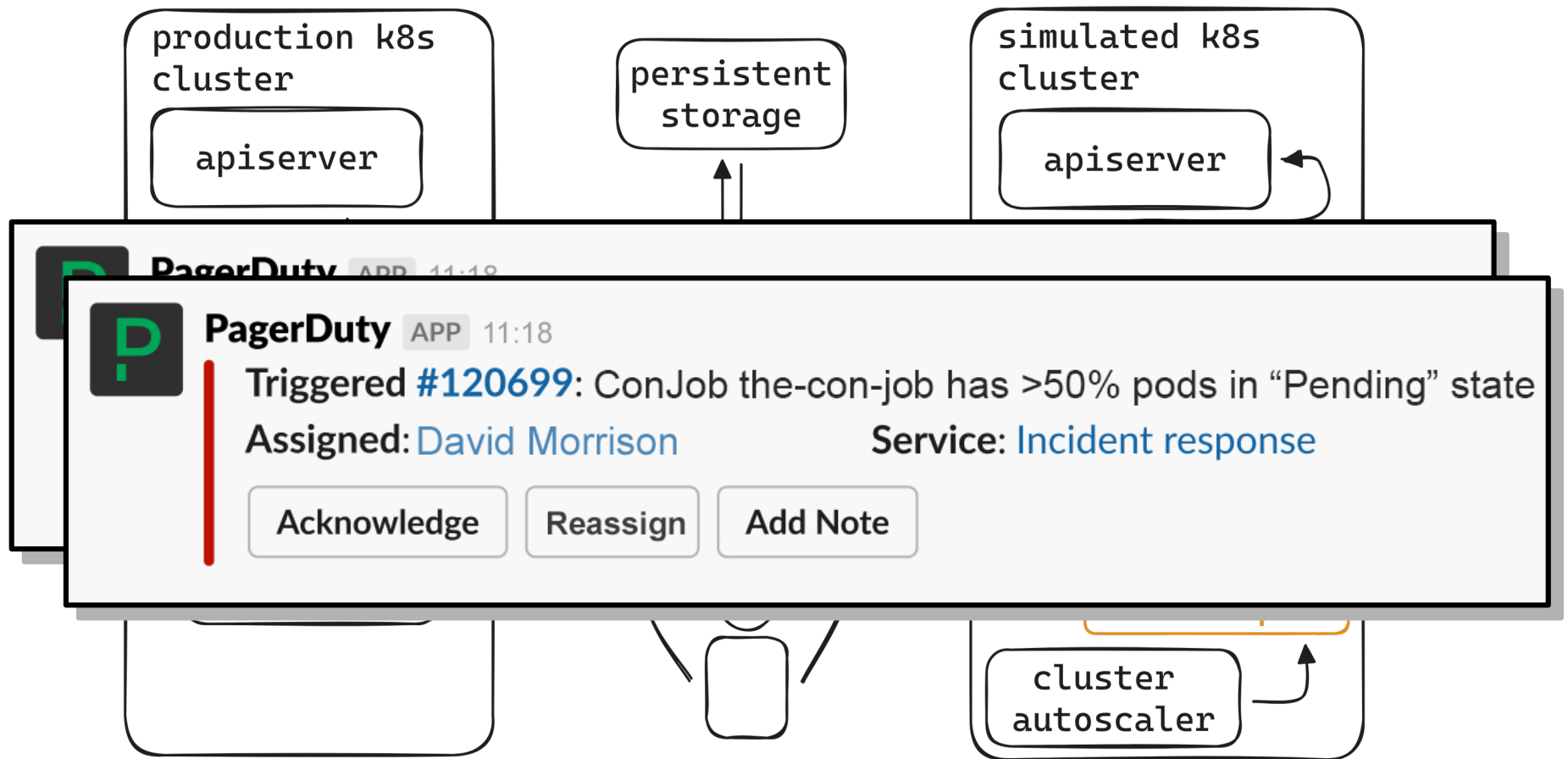


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Future directions for SimKube

- Garbage collection
- Trace generation and modification
- Integrate with KWOK or similar
 - (two KWOK talks at KubeCon! [1](#), [2](#))
- Golang rewrite?

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Are you interested in contributing to, using, or sponsoring SimKube? Come talk to me!

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Thank you! Any questions?

<https://github.com/acrlabs/simkube>

<https://github.com/acrlabs/kubecon-na2023>

<https://docs.appliedcomputing.io>

<https://blog.appliedcomputing.io>

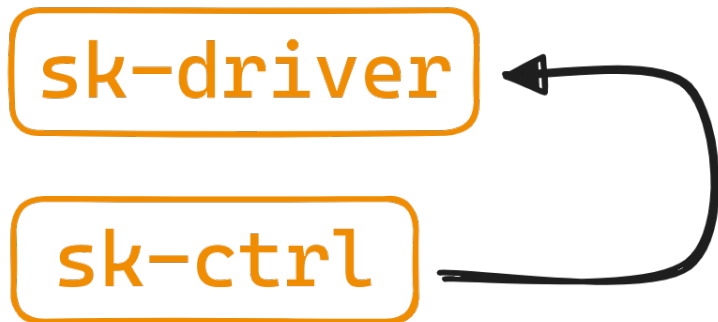
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- sk-ctrl: watches for simulation CR, creates driver
- sk-driver
 - Runner: replays recorded trace
 - Mutator: watches incoming pod objects, applies appropriate labels, annotations, and node-selectors