

# KSail

A Kubernetes SDK for  
local GitOps development  
and CI



**ENERGINET**

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**GitHub**

@devantler



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# Hello World!

A short biography...

- MSc in Software Engineering 

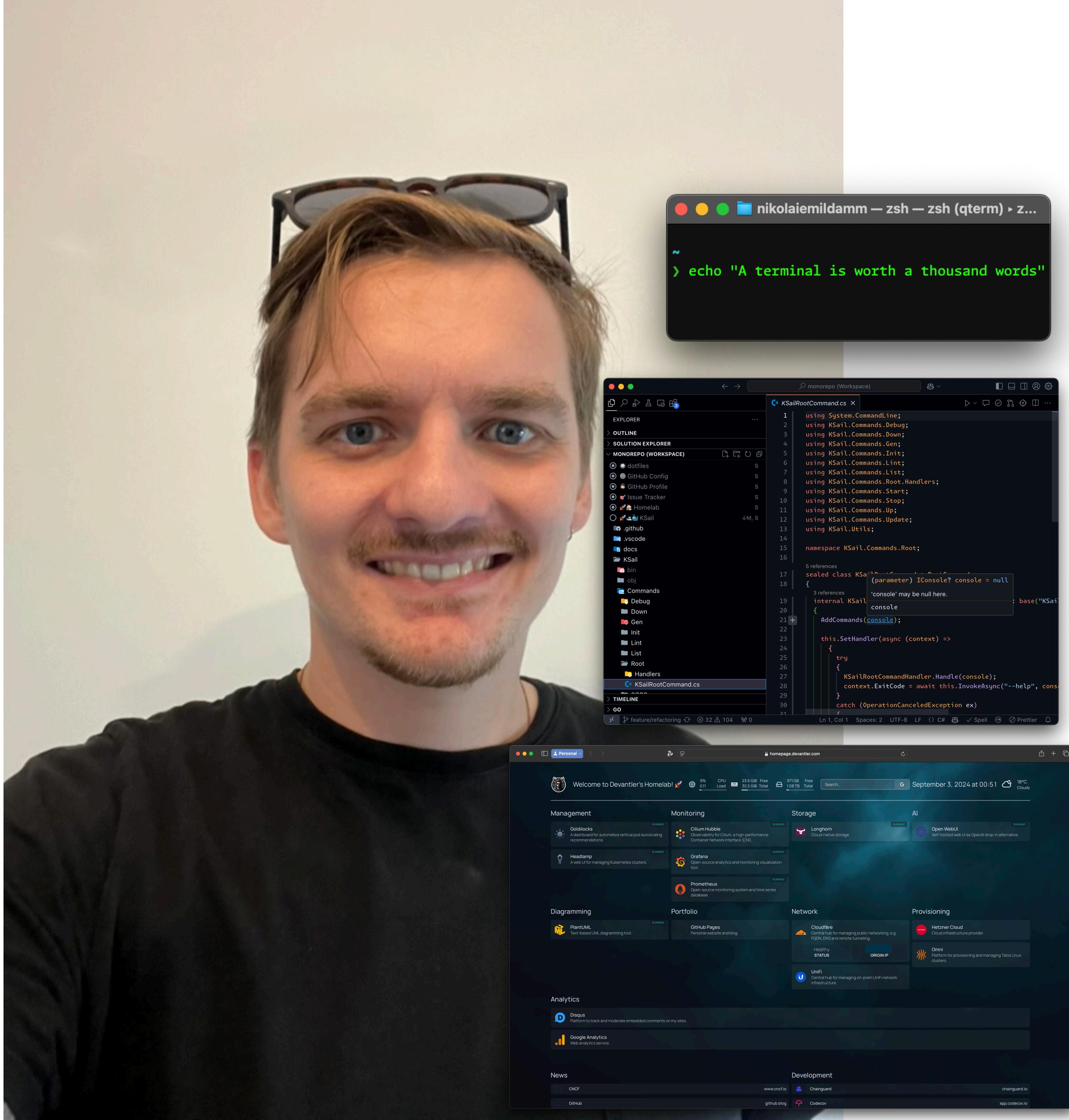
- Platform Engineer at Energinet



- Open Source Facilitator at Energinet 

- Open Source Enthusiast in my private time 

- Kubernetes nerd 





# My Problem

- learning kubernetes is hard
- the developer experience for kubernetes is bad
- development and testing of kubernetes lacks shift-left options
- installing and learning a trillion binaries to work with one technology is not cool
- options to test kubernetes in CI is lacking
- what works on my machine != what works in the cloud*
- kubernetes workflow != programming workflow*



>100%

Brain cells used when working with Kubernetes



# My Mission

- lower barrier of entry
- provide a great developer experience
- provide good practices
- make local kubernetes development fun and enjoyable
- make E2E testing kubernetes in CI easy
- keep up with trends





# DevEx

# ❗ Kubernetes VS Programming 😊

Kubectl Kustomize SOPS

SDK

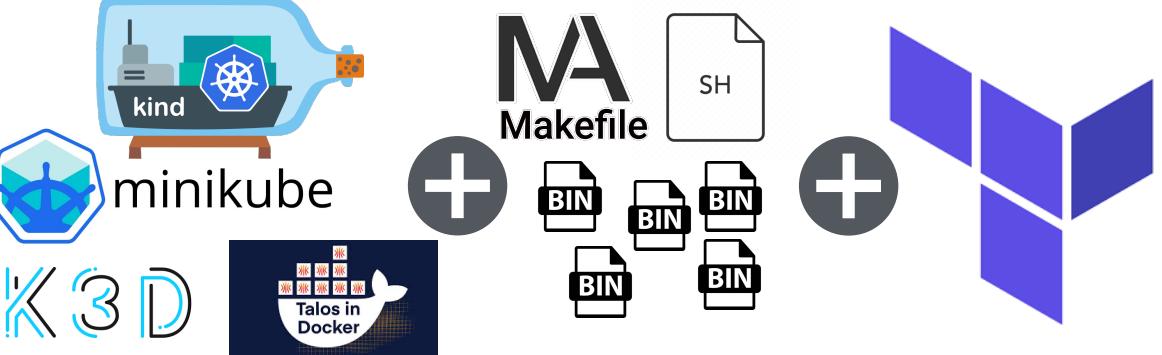
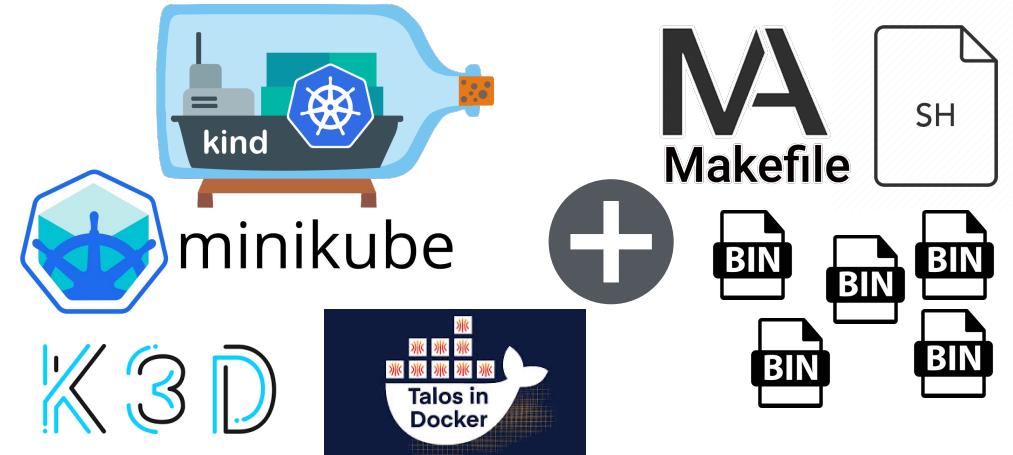
GitOps Kubeconform Docker

Docker

Cilium K9s Polaris

Kind K3d Talos Docker

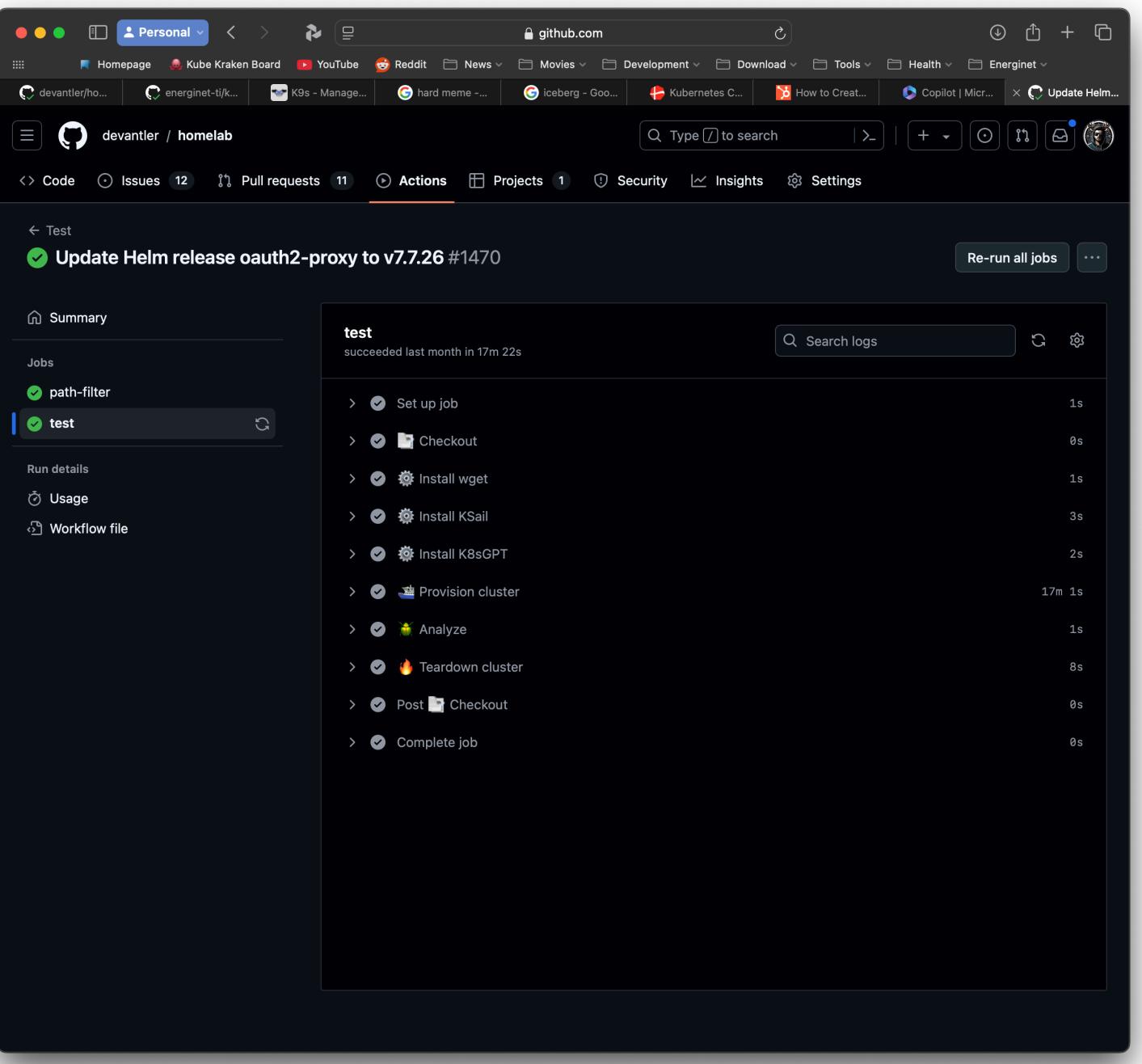
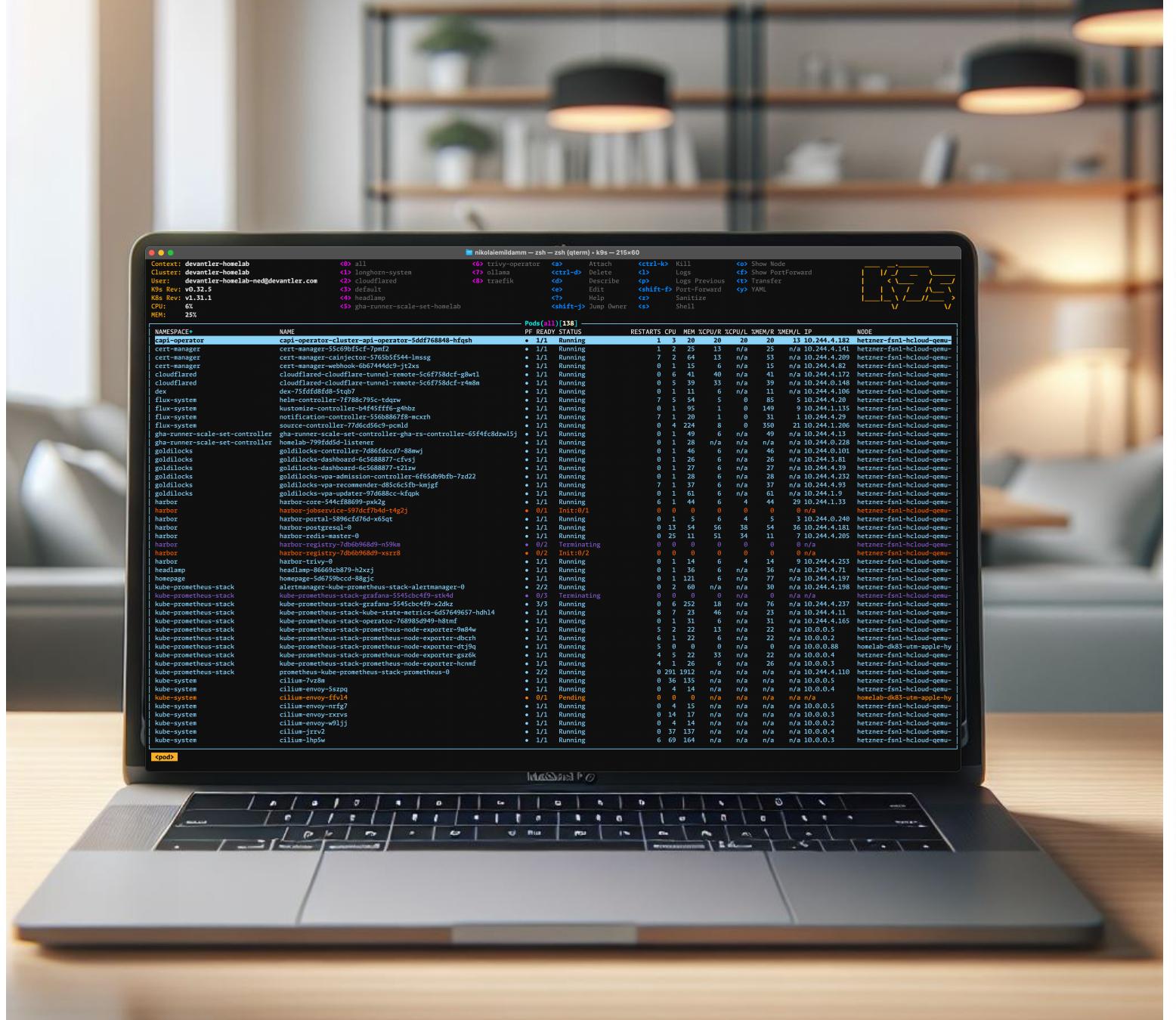
*And much much more...*



Local Development

CI/CD

Dev/Test/Production



production ready kubernetes distributions =

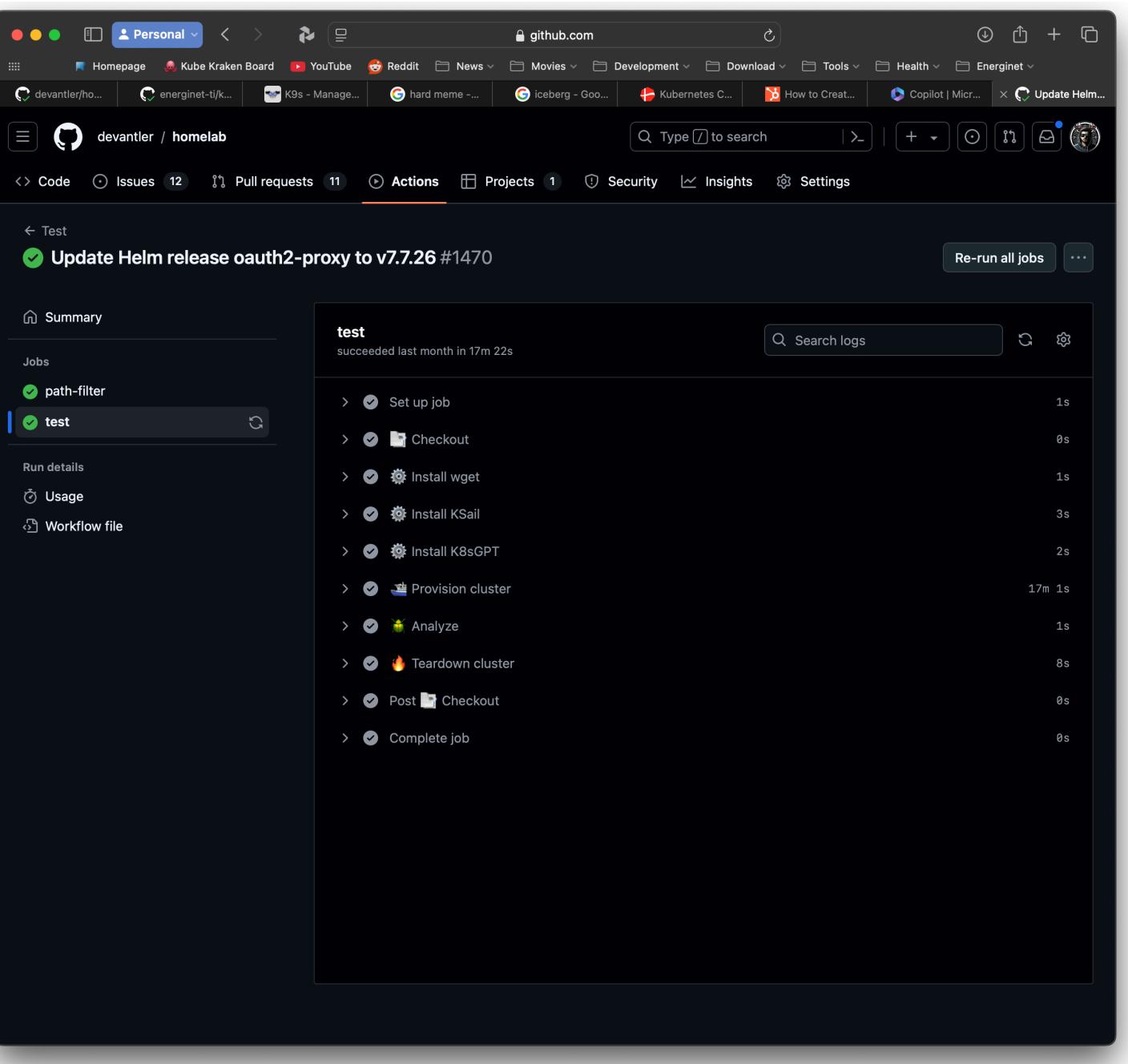
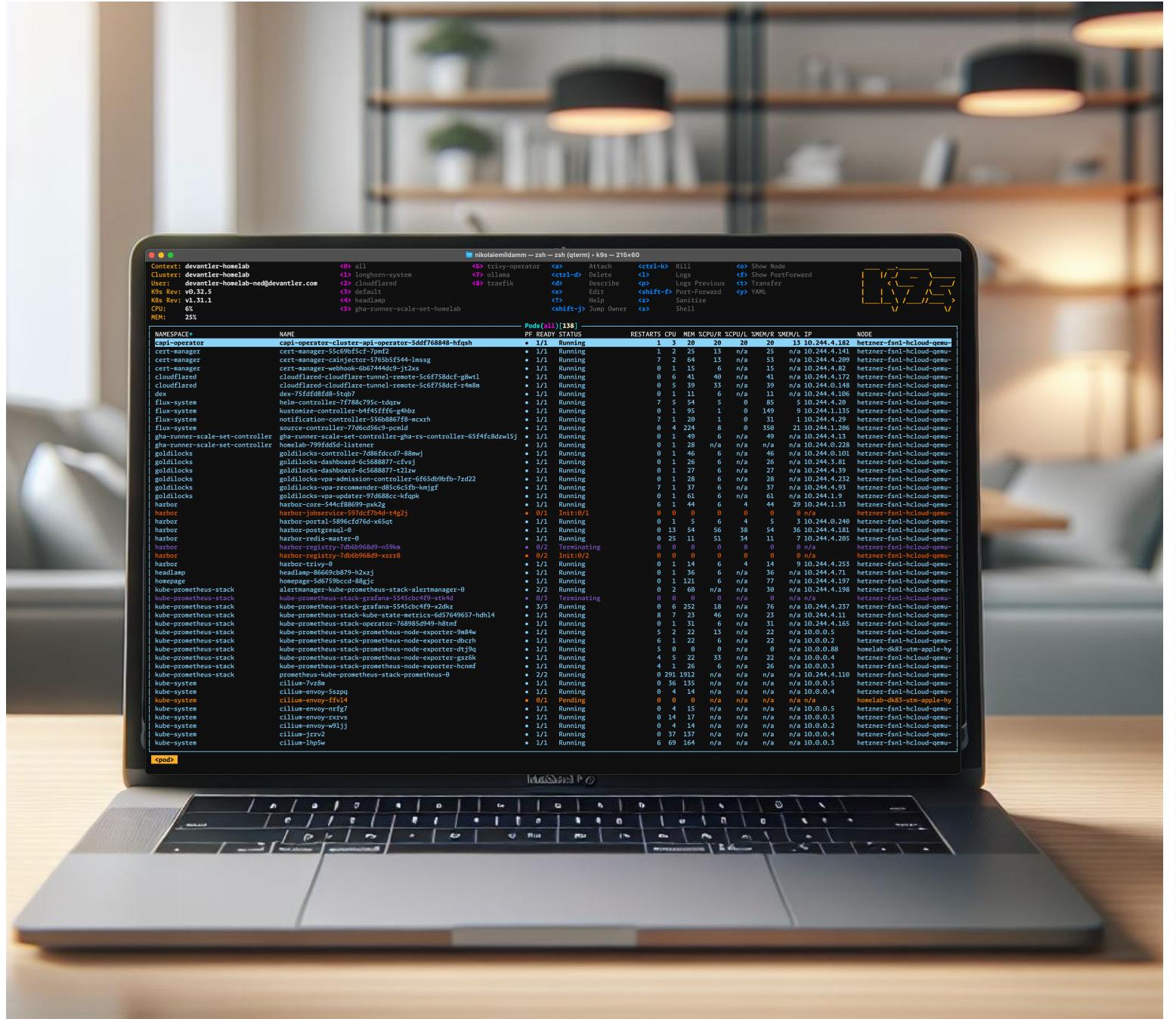




Let's cleanup that tool-hell



Local Development → CI/CD → Dev/Test/Production



= dind based kubernetes distributions  
+ tools to validate and test clusters

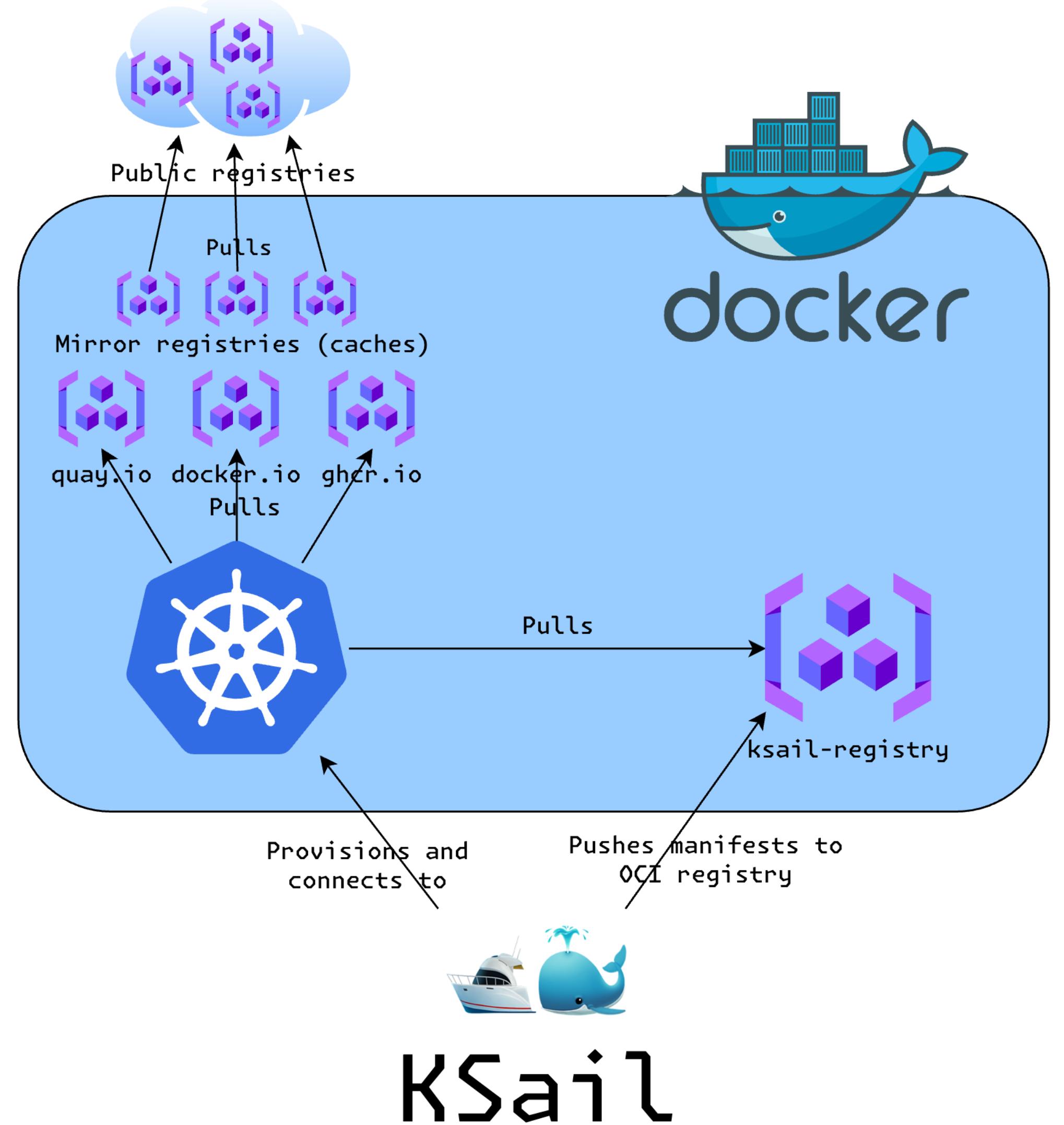
production ready kubernetes distributions =



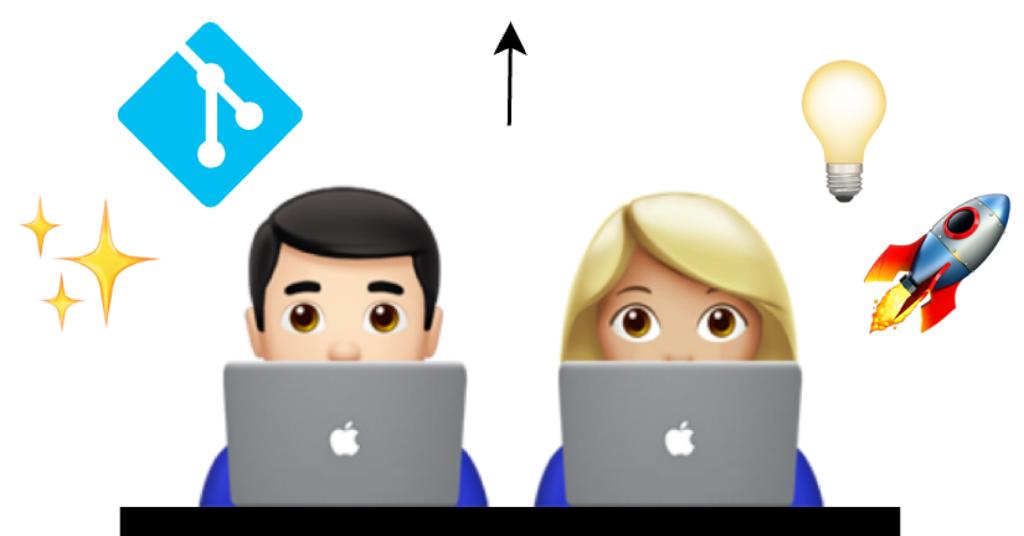


# What is KSail?

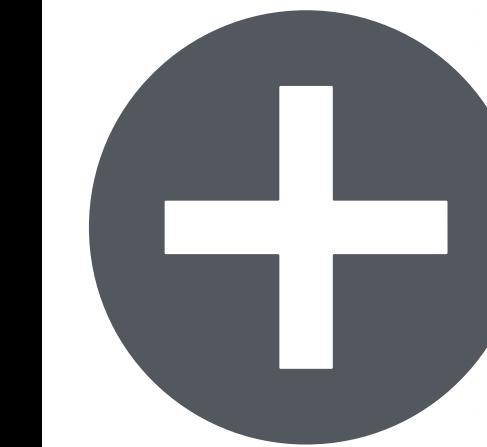
- a single-binary cli tool
- a provisioner
- a linter
- a client-side validation tool
- a testing tool
- 100% declarative configuration



🥳 a GitOps-based Kubernetes SDK 🥳



# CLI with commands and options



# Declarative configurations

The screenshot shows a monorepo workspace with two code editors open. The top editor displays the file `ksail-config.yaml`, which defines a cluster configuration for Ksail. The bottom editor displays the file `kind-config.yaml`, which defines a cluster configuration for Kind. Both files use YAML syntax and include annotations like `apiVersion` and `kind`.

```
apiVersion: ksail.io/v1alpha1
kind: Cluster
metadata:
  name: ksail-default
spec:
  kubeconfig: ~/.kube/config
  context: kind-ksail-default
  timeout: 5m
  manifestsDirectory: ./k8s
  kustomizationDirectory: ./k8s/clusters/ksail-default/flux-system
  configPath: kind-config.yaml
  distribution: kind
  gitOpsTool: flux
  containerEngine: docker
  sops: false
  registries:
    - name: ksail-registry
      hostPort: 5555
      isGitOpsOCISource: true
      provider: docker
    - name: registry.k8s.io
      hostPort: 5556
      isGitOpsOCISource: false
      proxy:
        url: https://registry.k8s.io/
        insecure: false
      provider: docker
    - name: docker.io
      hostPort: 5557
      isGitOpsOCISource: false
      proxy:
        url: https://registry-1.docker.io/
        insecure: false
      provider: docker
    - name: ghcr.io
      hostPort: 5558
      isGitOpsOCISource: false
      proxy:
        url: https://ghcr.io/
        insecure: false
      provider: docker
    - name: gcr.io
      hostPort: 5559
      isGitOpsOCISource: false
      proxy:
        url: https://gcr.io/
        insecure: false
      provider: docker
    - name: mcr.microsoft.com
      hostPort: 5560
```

```
kind: Cluster
apiVersion: kind.x-k8s.io/v1alpha4
name: ksail-default
containerdConfigPatches:
  - >-
    [plugins."io.containerd.grpc.v1.cri".registry]
      config_path = "/etc/containerd/certs.d"
```

# Feature Overview

## OSes

- Linux
- MacOS
- Windows (not tested well)

## Container Engines

- Docker
- Podman (in consideration)

## Kubernetes Distributions

- Kind (Native Kubernetes)
- K3d (K3s)
- Talos in Docker (Talos Linux) (planned)
- Cluster API (in consideration)
- VCluster (in consideration)

## GitOps Tooling

- Flux GitOps
- ArgoCD (in consideration)

## CNI

- Distribution default
- Cilium (planned)

## UIs

- K9s

## Client-side validation

- YAML Syntax
- Schema validation
- Polaris (planned)

## Server-side validation (in consideration)

- Polaris (in consideration)
- Kyverno (in consideration)

## Secret Management

- SOPS + Age locally
- SOPS + Azure Key Vault / GCP KMS / Hashicorp Vault (in consideration)

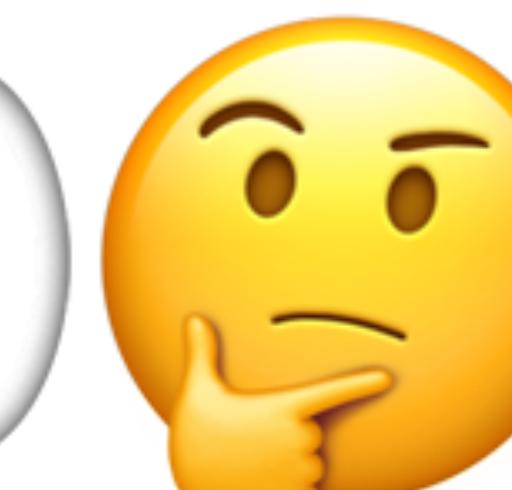
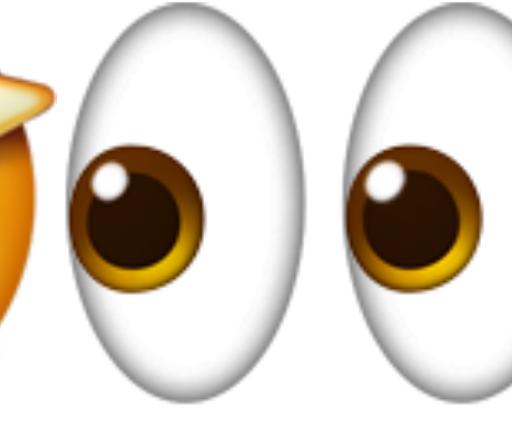
## Code Generation

- Template-based project initialization
- KSail config
- Kind config
- K3d config
- Native Kubernetes resources
- Kustomize resources (WIP)
- CertManager CRs (WIP)
- Flux CRs (WIP)



Live Demo

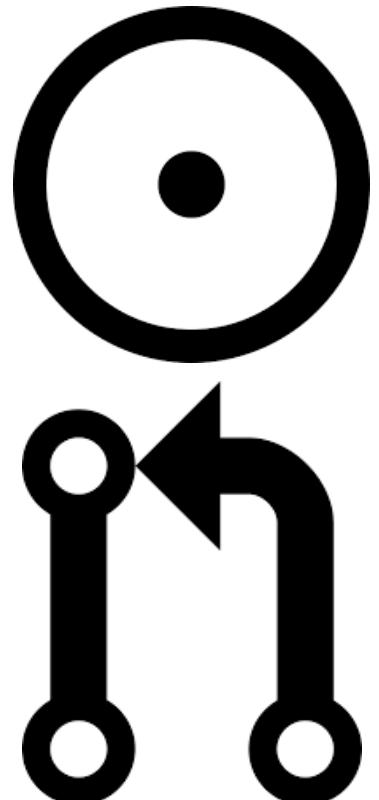
!?



!?



Ask me anything!



# Contributions

- its just me and my boties 😢

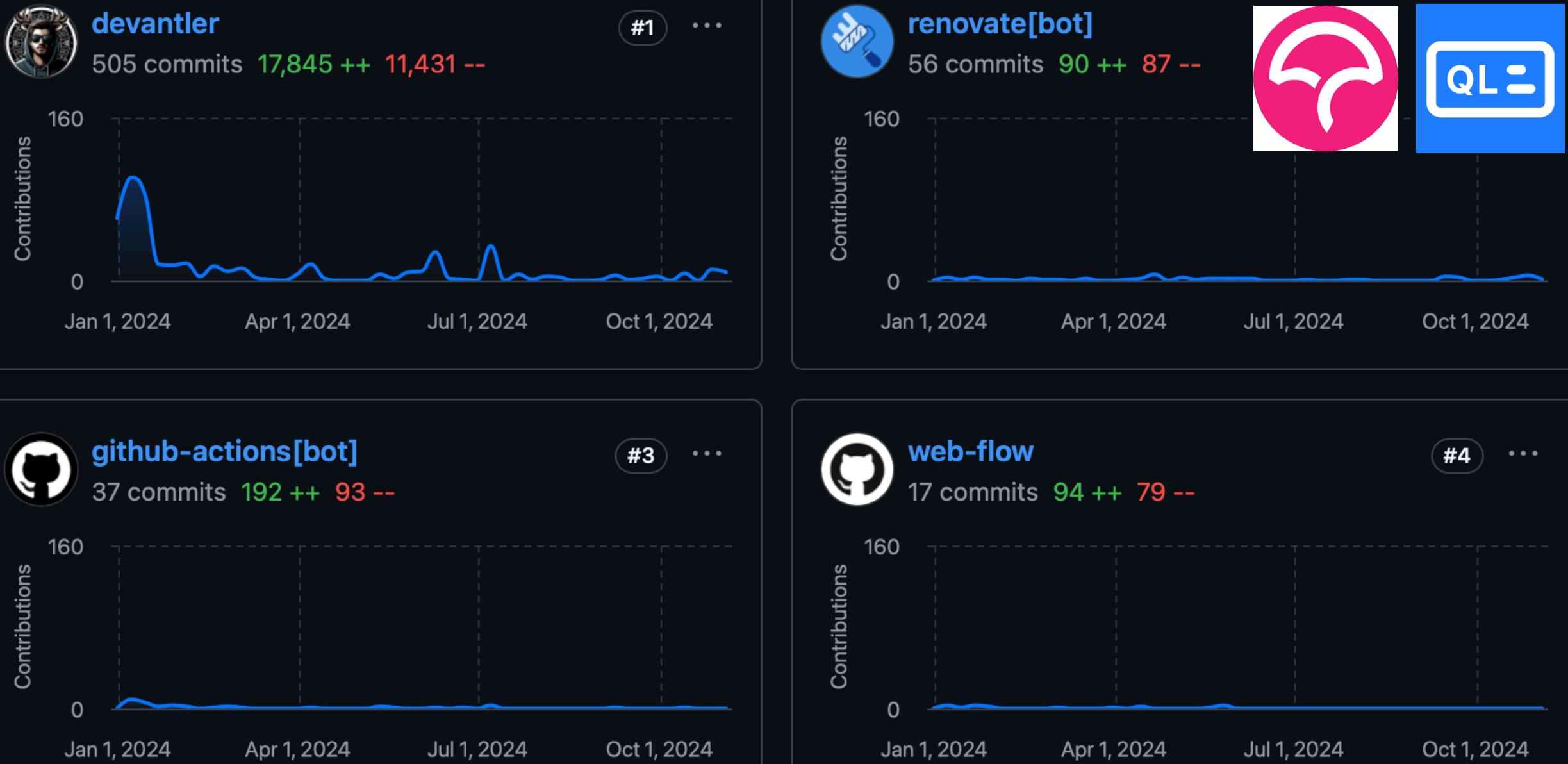
- .NET / C# 💻

- simple sub-projects 😌👌

- lots of automation 😎

- high code-coverage 🧪✓

<https://github.com/sponsors/devantler> ☕



- [devantler/dotnet-age-cli](#) - A library that embeds and provides an API for the Age CLI.
- [devantler/dotnet-cli-runner](#) - An implementation atop CLI Wrap to support running different binaries from C# code.
- [devantler/dotnet-container-engine-provisioner](#) - Provisioners to provision resources in container engines like Docker or Podman.
- [devantler/dotnet-flux-cli](#) - A library that embeds and provides an API for the Flux CLI.
- [devantler/dotnet-k3d-cli](#) - A library that embeds and provides an API for the K3d CLI.
- [devantler/dotnet-k9s-cli](#) - A library that embeds and provides an API for the K9s CLI.
- [devantler/dotnet-key-manager](#) - A key manager to guard your local Age keys.
- [devantler/dotnet-keys](#) - A library with key models, like the Age key model.
- [devantler/dotnet-kind-cli](#) - A library that embeds and provides an API for the Kind CLI.
- [devantler/dotnet-kubeconform-cli](#) - A library that embeds and provides an API for the Kubeconform CLI.
- [devantler/dotnet-kubernetes-generator](#) - Generators to create Kubernetes resources with `ksail init` and `ksail gen .`
- [devantler/dotnet-kubernetes-provisioner](#) - Provisioners to provision Kubernetes clusters and resources.
- [devantler/dotnet-kubernetes-validator](#) - A library that validates Kubernetes resources client-side or at runtime.
- [devantler/dotnet-kustomize-cli](#) - A library that embeds and provides an API for the Kustomize CLI.
- [devantler/dotnet-sops-cli](#) - A library that embeds and provides an API for the SOPS CLI.
- [devantler/dotnet-template-engine](#) - A template engine to support code generation of non-serializable content.