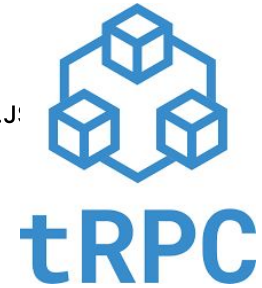


T3 + K8S = ❤️

lo stack perfetto per creare dashboard kubernetes

@ludusrusso

Ludovico Russo

Ph.D. in **Robotics** @Politecnico di Torino

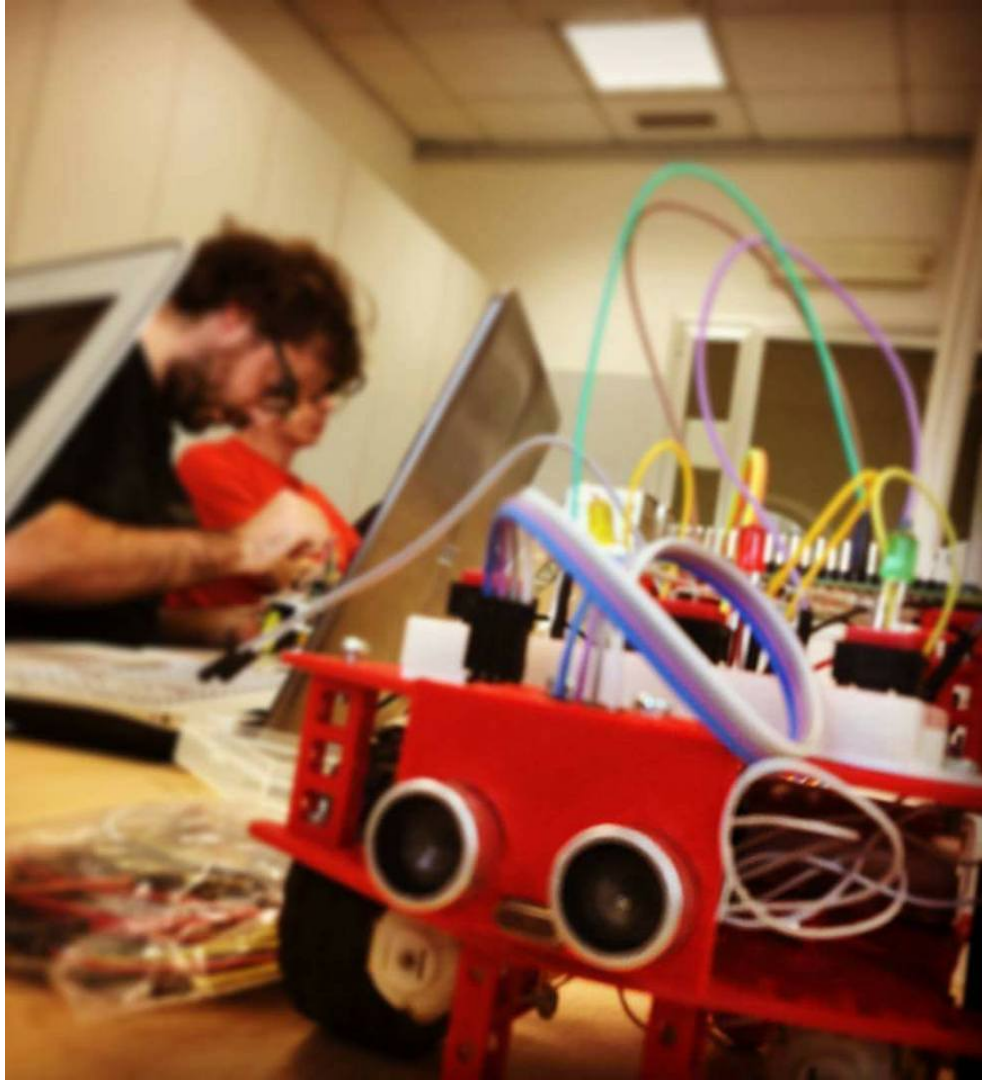
Attualmente **Responsabile Sviluppo** @RedCarbon

Stack: golang, NextJS, kubernetes, etc.

Passionate in **Cloud Computing, Web development** and **Robotics**

@ludusrusso

https://www.ludusrusso.dev/



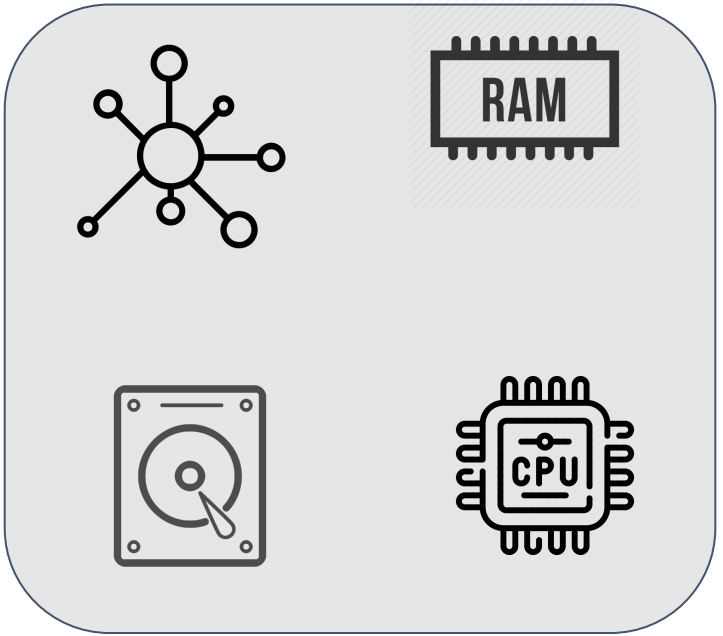
Agenda

- Kubernetes, questo sconosciuto
  - cosa è, architettura, Resources, Operators, CRDs
  - Esempio funzionante di Kubernetes
- Perché sviluppare Dashboard per kubernetes?
- T3 Stack - Typescript, tRPC, Tailwind e NextJS
- Come interagire con Kubernetes da NodeJS
- Live Coding
- Conclusioni

Kubernetes: Container Orchestrator

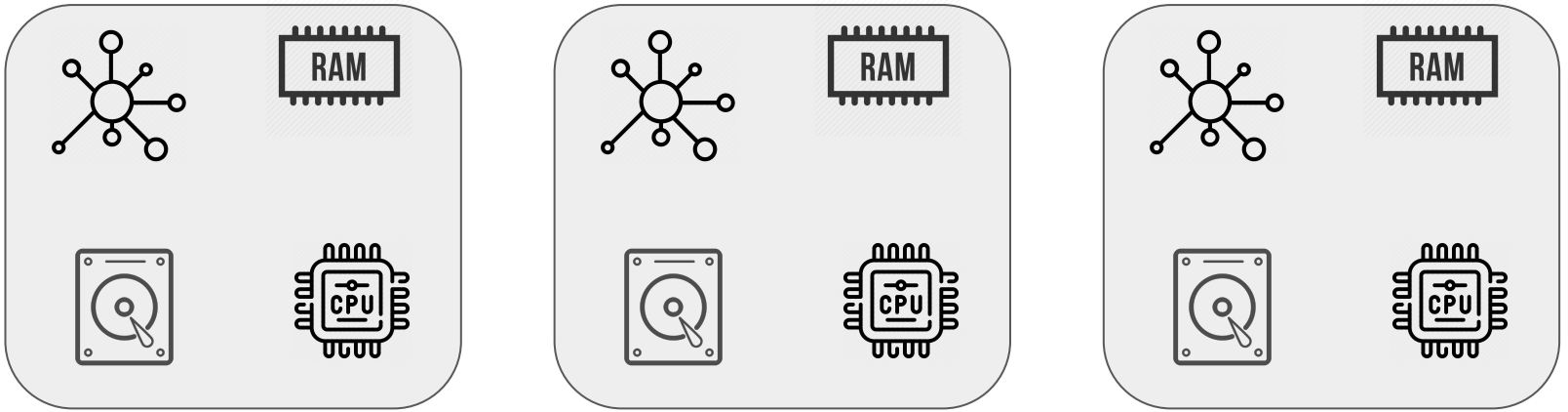
Kubernetes: Container Orchestrator

Kubernetes POD

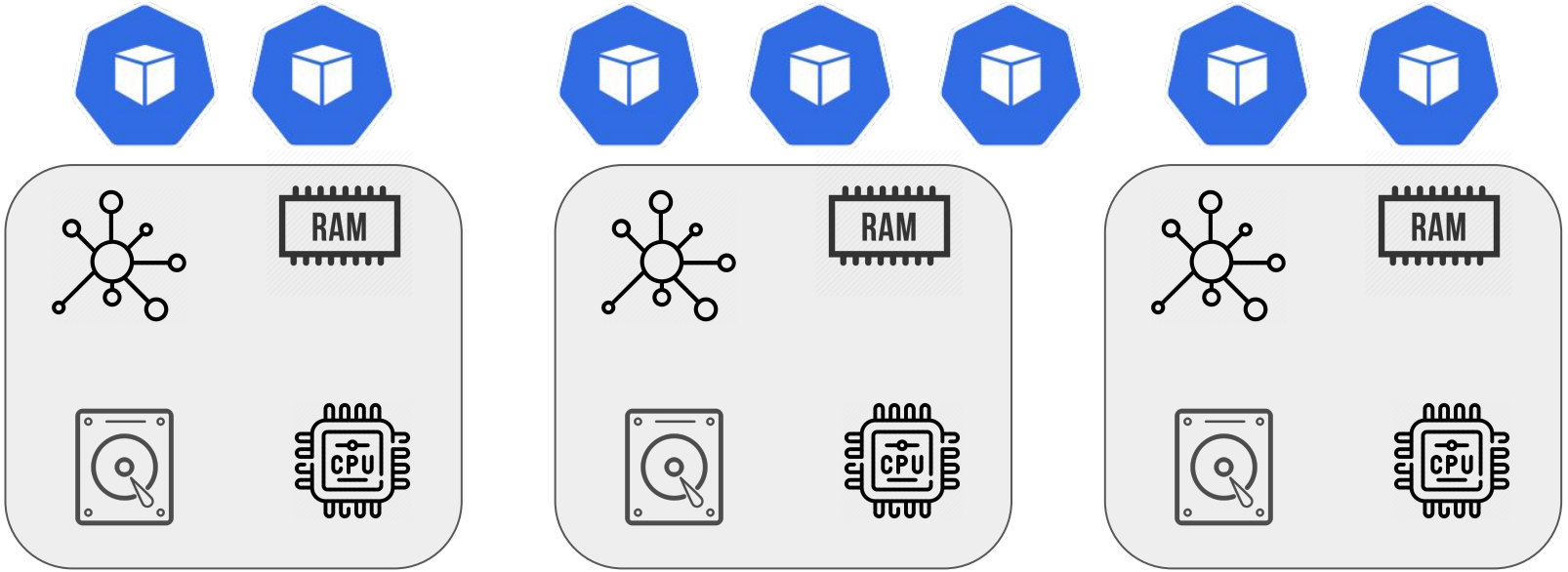


Kubernetes Node

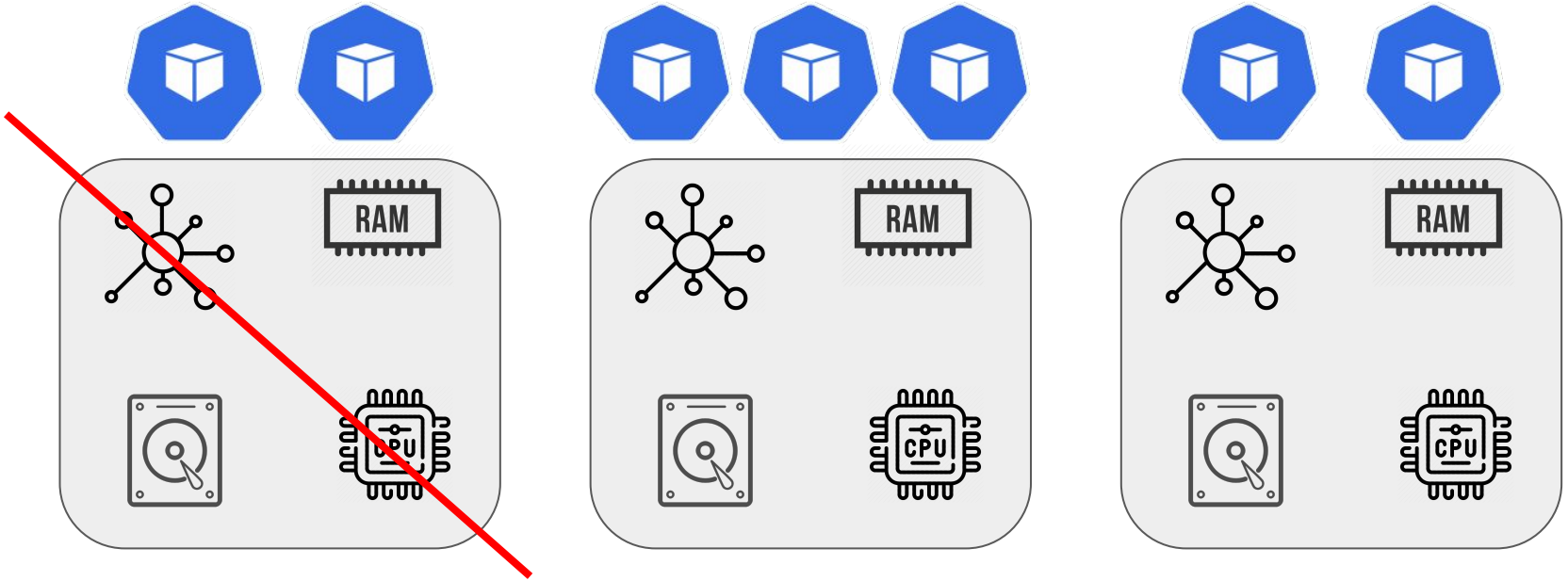
Kubernetes: Container Orchestrator



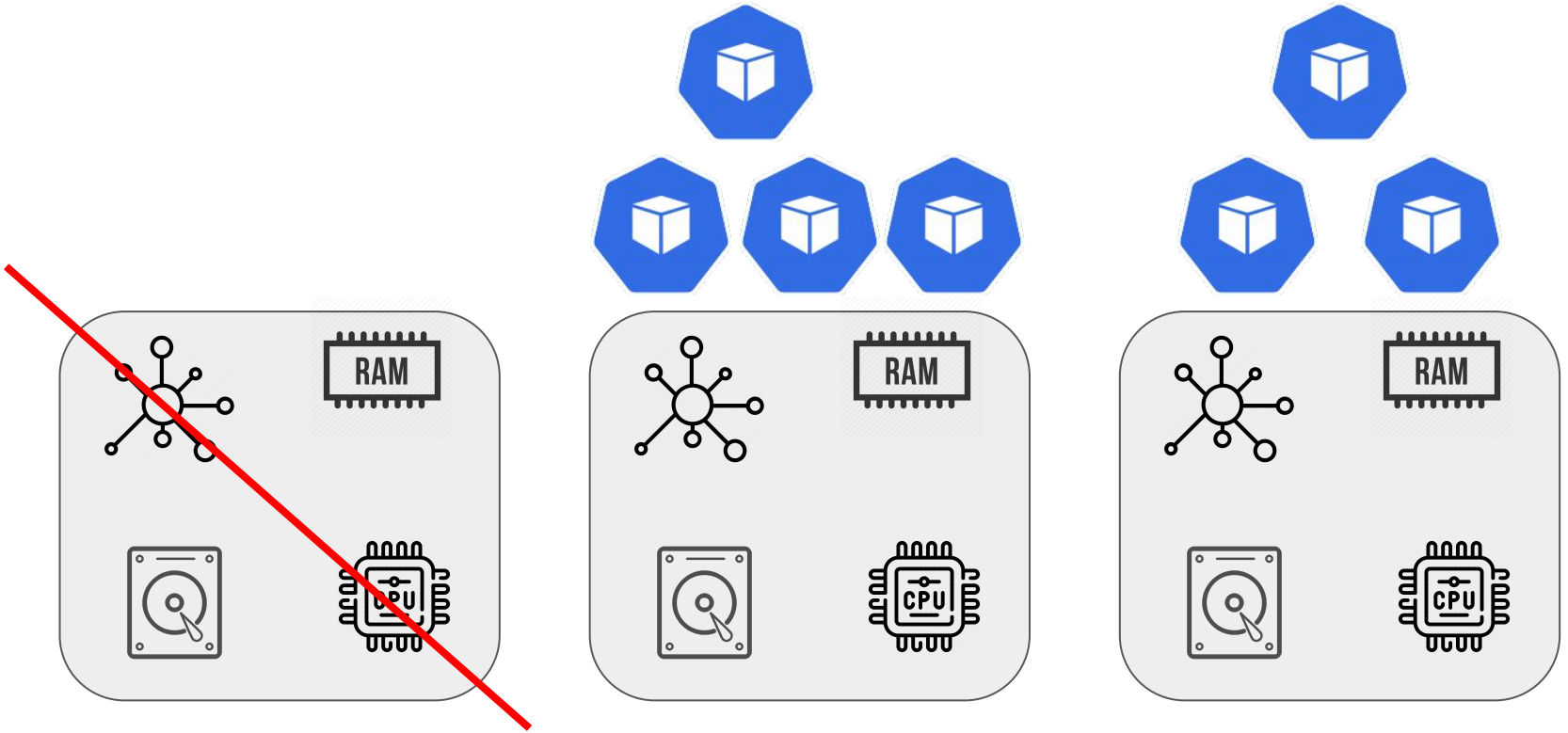
Kubernetes: Container Orchestrator



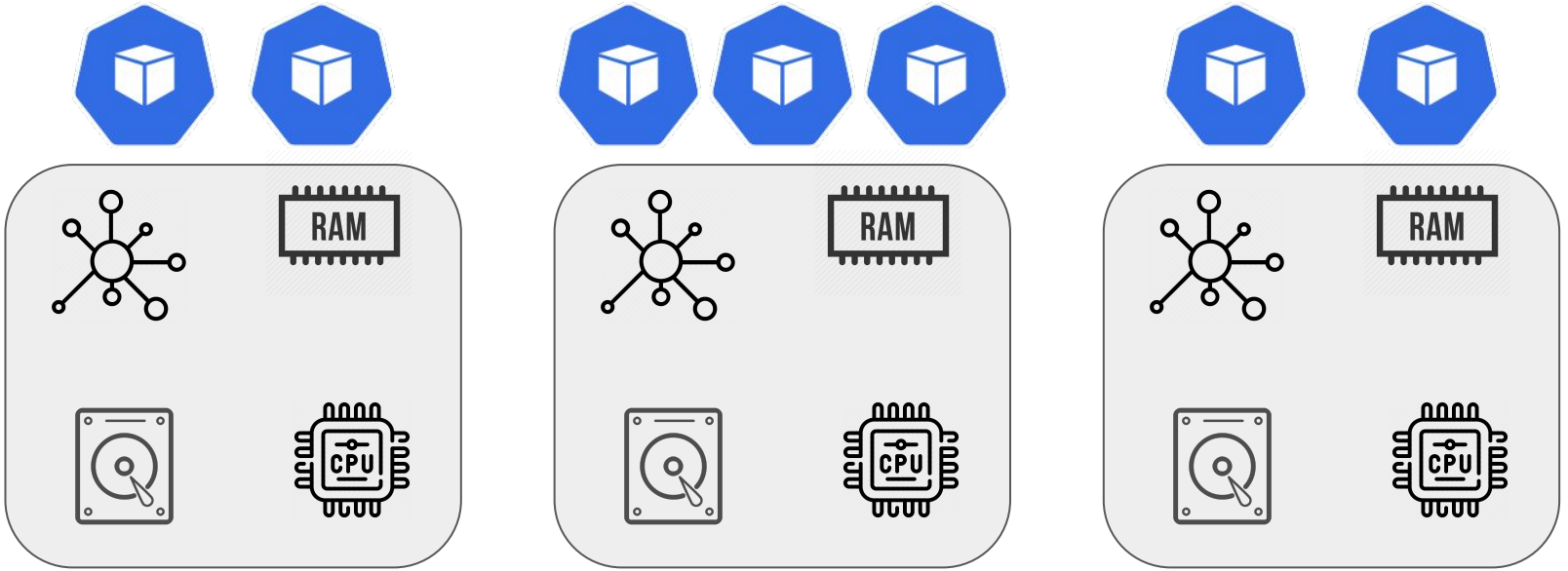
Kubernetes: Container Orchestrator

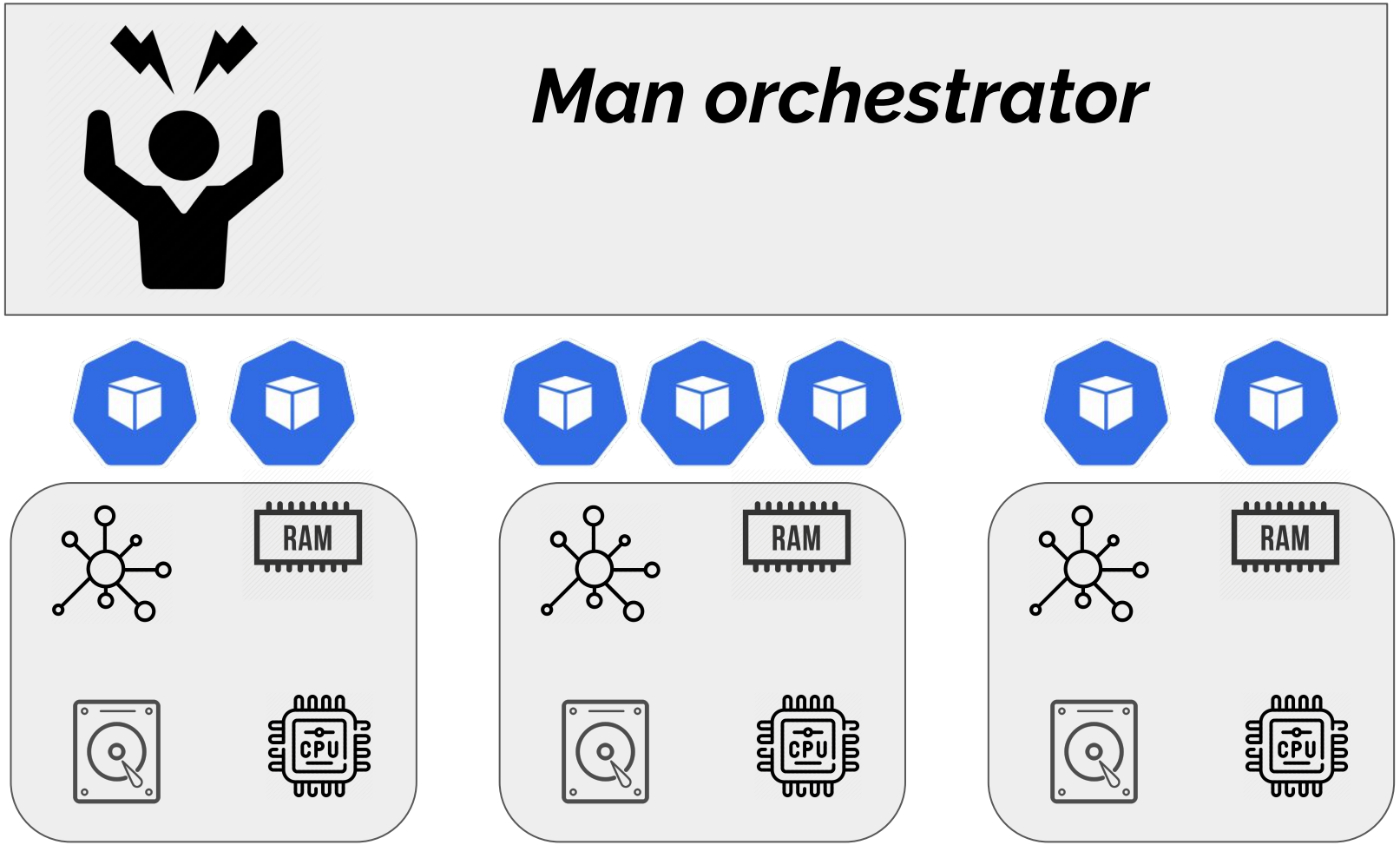


Kubernetes: Container Orchestrator

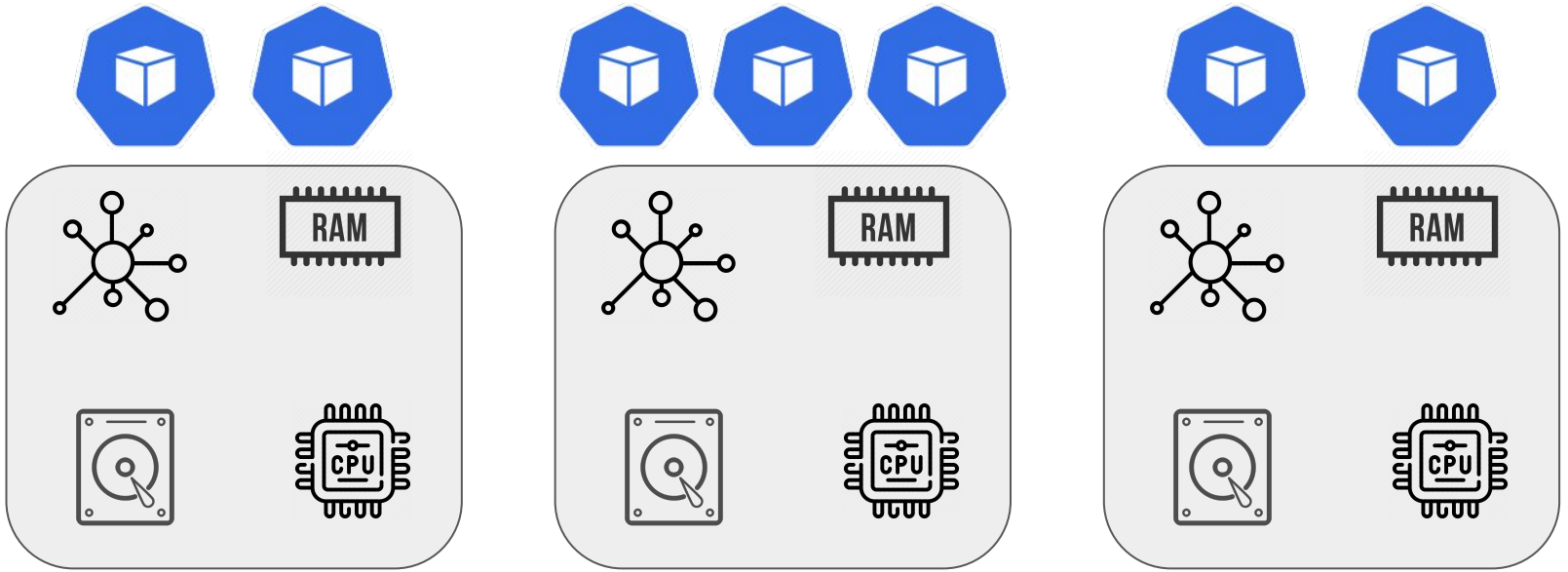


Kubernetes: Container Orchestrator

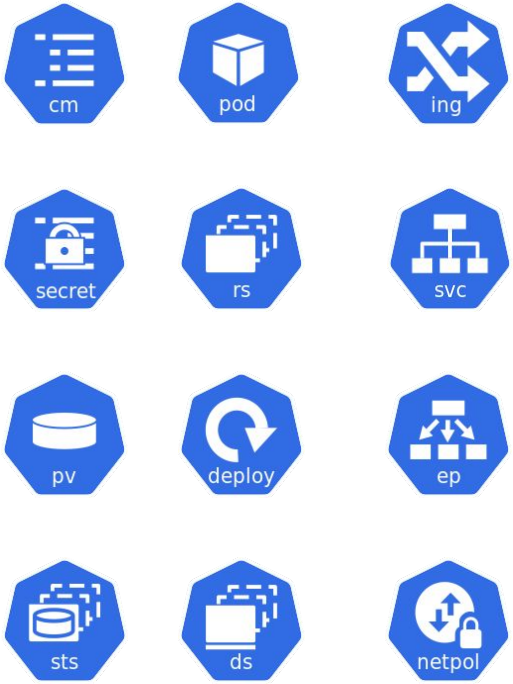


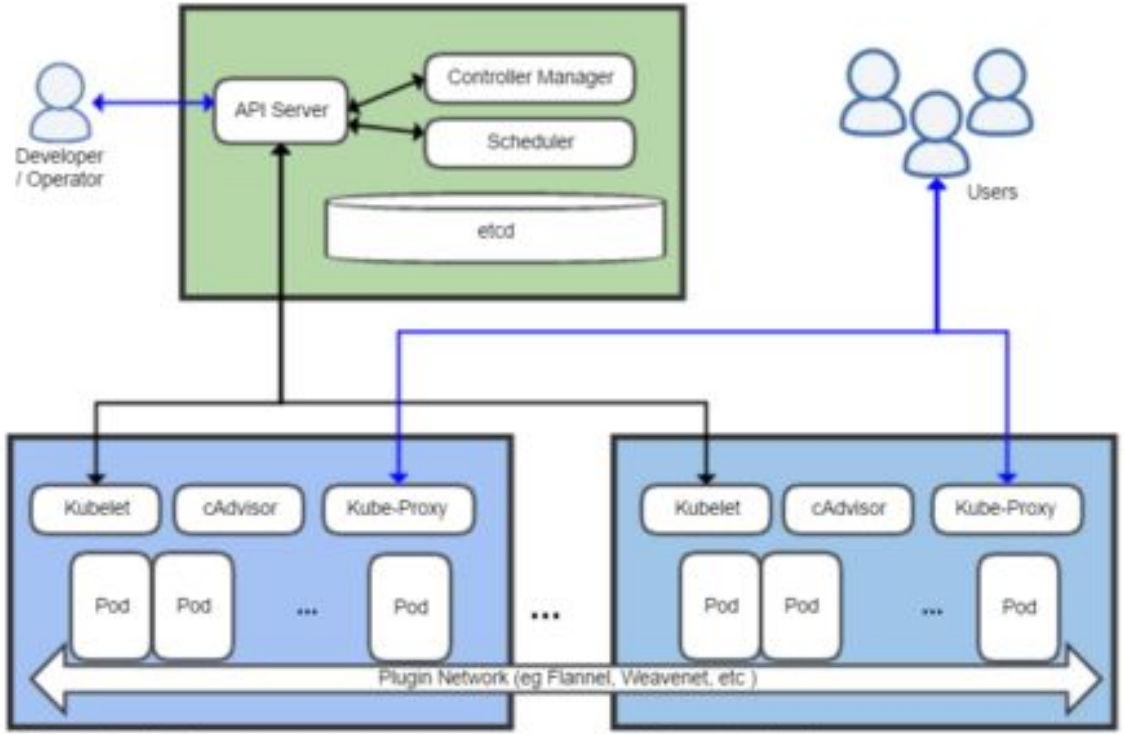

Man orchestrator
RAM
CPU
RAM
CPU
RAM
CPU

Kubernetes: un container orchestrator



Kubernetes Architecture

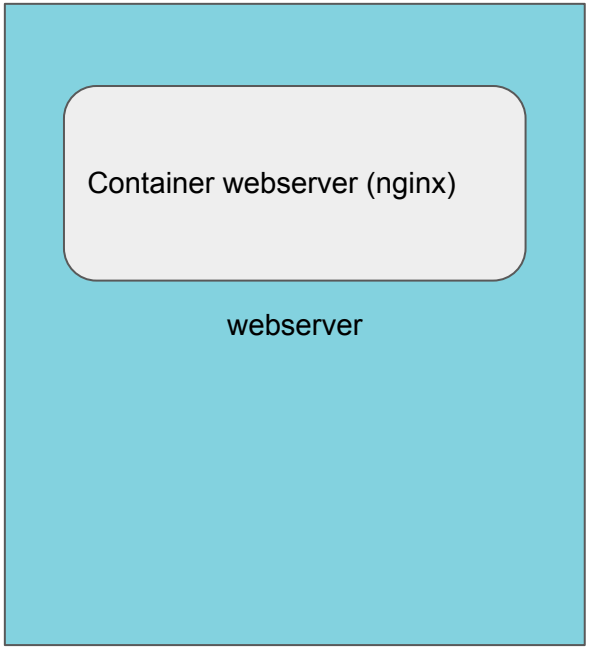




Interagiamo con kubernetes in modo dichiarativo

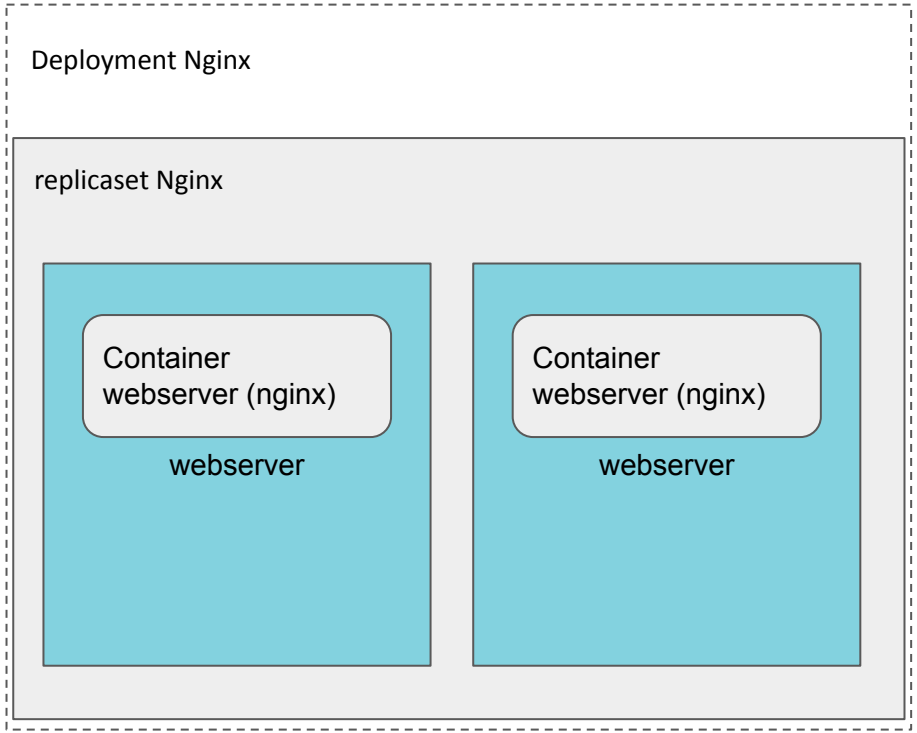
- Definiamo lo stato voluto del nostro cluster per mezzo di API
- Definiamo gli oggetti (risorse) all'interno del cluster
- Kubernetes si occupa di fare in modo che lo stato (status) del cluster coincida con le specifiche (spec) che gli forniamo
- Kubernetes è estendibile, possiamo implementare nuove risorse (CRD) e le relative loghiche.

Kubernetes Resources



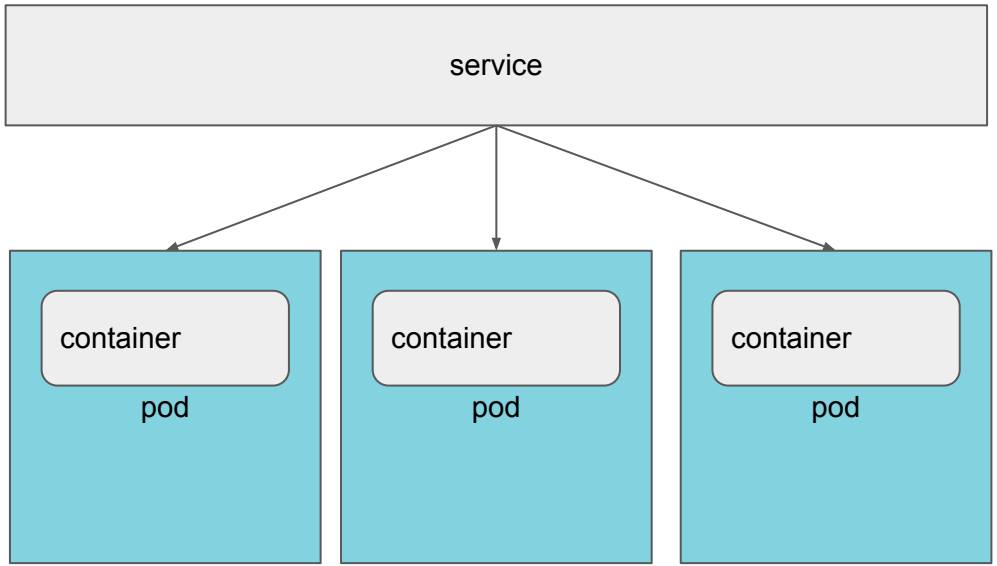

```yaml
apiVersion: v1
kind: Pod
metadata:
  labels:
    app: nginx
  name: webserver
  namespace: default
spec:
  containers:
    - image: nginx
      name: webserver

```

Kubernetes Resources



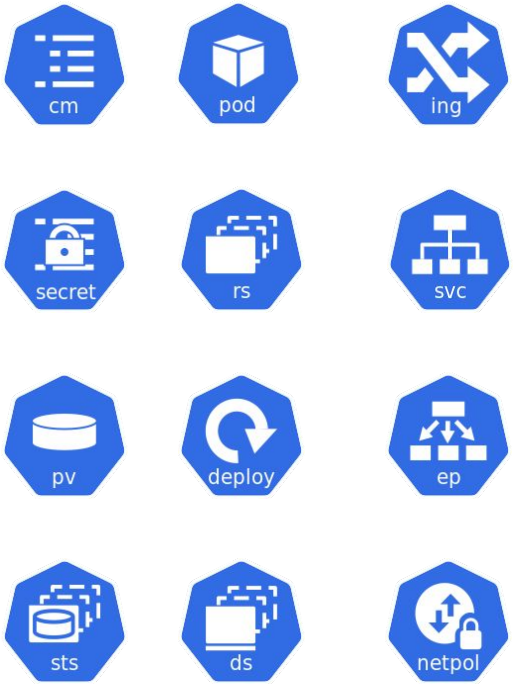

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  labels:
    app: nginx
  name: nginx
  namespace: default
spec:
  replicas: 2
  selector:
    matchLabels:
      app: nginx
  template:
    metadata:
      labels:
        app: nginx
    spec:
      containers:
        - image: nginx
          imagePullPolicy: Always
          name: nginx
```

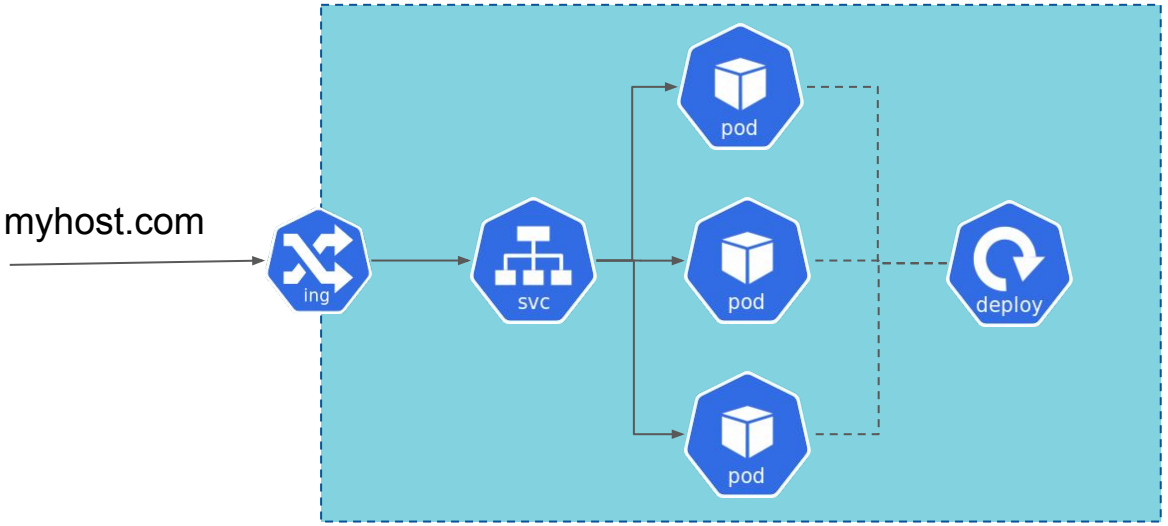
Kubernetes Resources




```yaml
apiVersion: v1
kind: Service
metadata:
  labels:
    app: webserver
  name: webserver
spec:
  ports:
    - port: 80
      protocol: TCP
      targetPort: 80
  selector:
    app: webserver
  type: ClusterIP

```

Kubernetes e le architetture a Microservizi





Kubernetes Operator

- Un programma che opera sulle risorse di kubernetes
  - Guarda le spec delle risorse monitorate
  - Agisce sul cluster in modo che lo stato del cluster sia === le specifiche della risorsa

EG: Deployment Operator

Kubernetes Extensions

- CRD + Custom Operator

CertManager
Knative
Istio
…

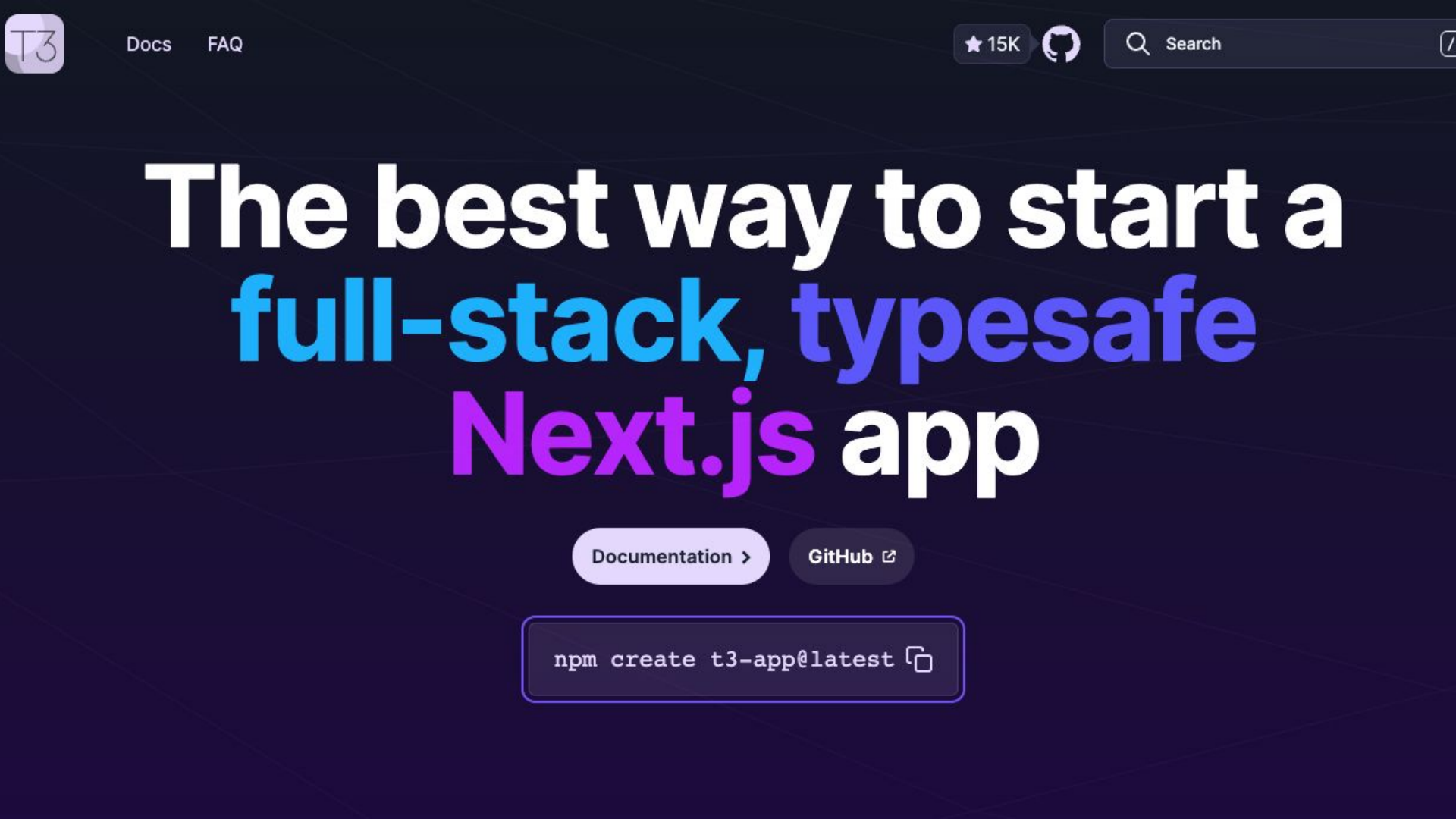
Kubernetes Extensions

- CRD + Custom Operator

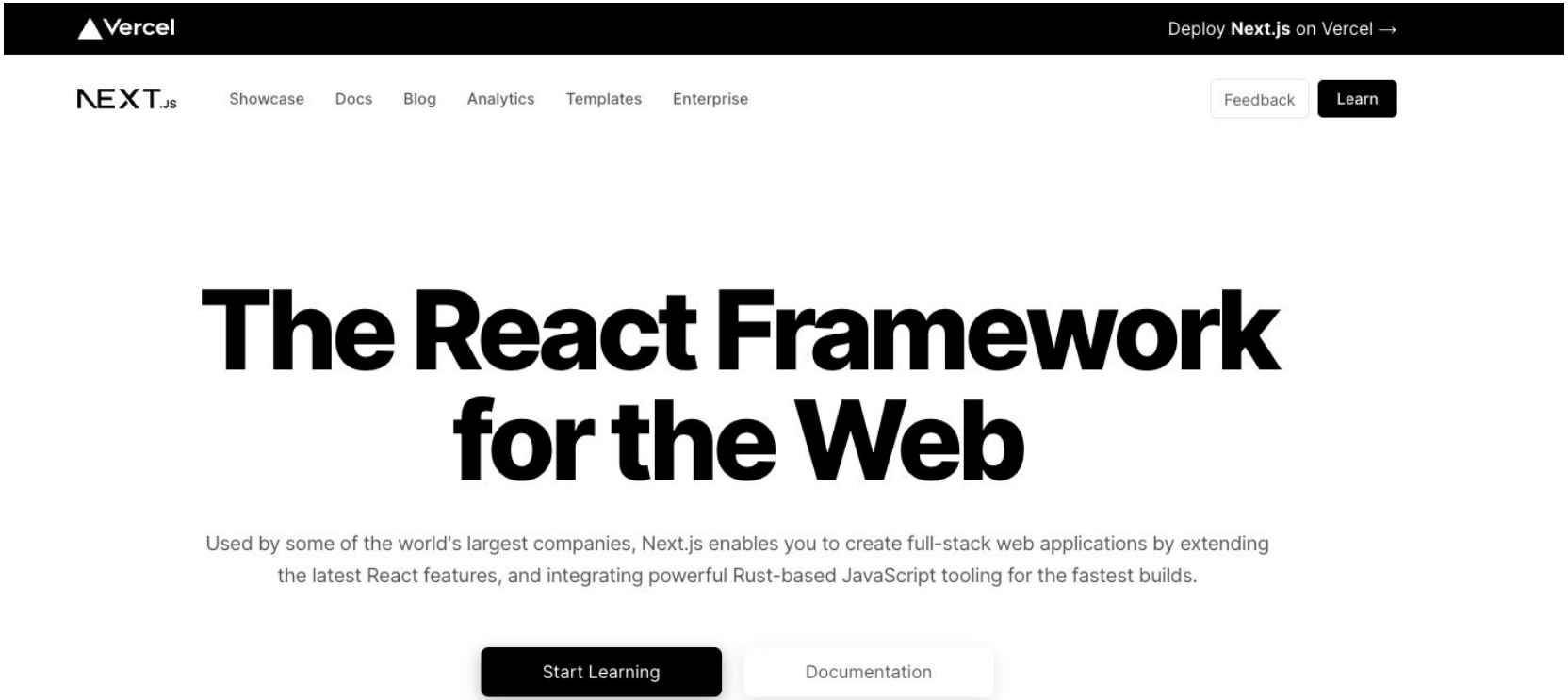
CertManager
Knative
Istio
…

Perchè una Dashboard Kubernetes

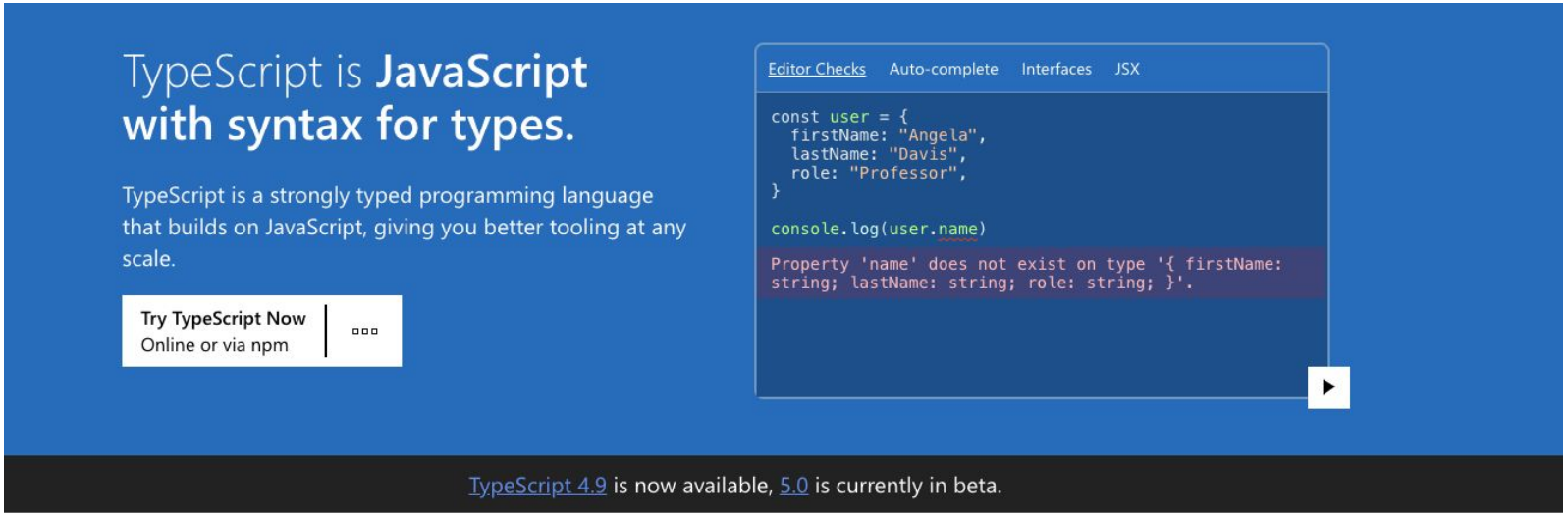
- Le modalità che kubernetes mette a disposizioni per interagire con il cluster sono generiche e poco user friendly
- Spesso è necessario sviluppare funzionalità ad hoc per un’estensione kubernetes
- Gli sviluppatori kubernetes, che lavorano principalmente con golang e con tecnologie backend, trovano un po’ ostico imparare e usare tecnologie frontend, molti progetti non hanno una GUI dedicata
- Kubernetes è uno standard di fatto, le estensioni di kubernetes crescono in modo esponenziale
- c’è mercato


Docs
FAQ
15K
Search
The best way to start a full-stack, typesafe Next.js app
Documentation
GitHub
npm create t3-app@latest

T3 Stack: NextJS



T3 Stack: Typescript



What is TypeScript?

JavaScript and More

TypeScript adds additional syntax to JavaScript to support a **tighter integration with your editor**. Catch errors early in your editor.

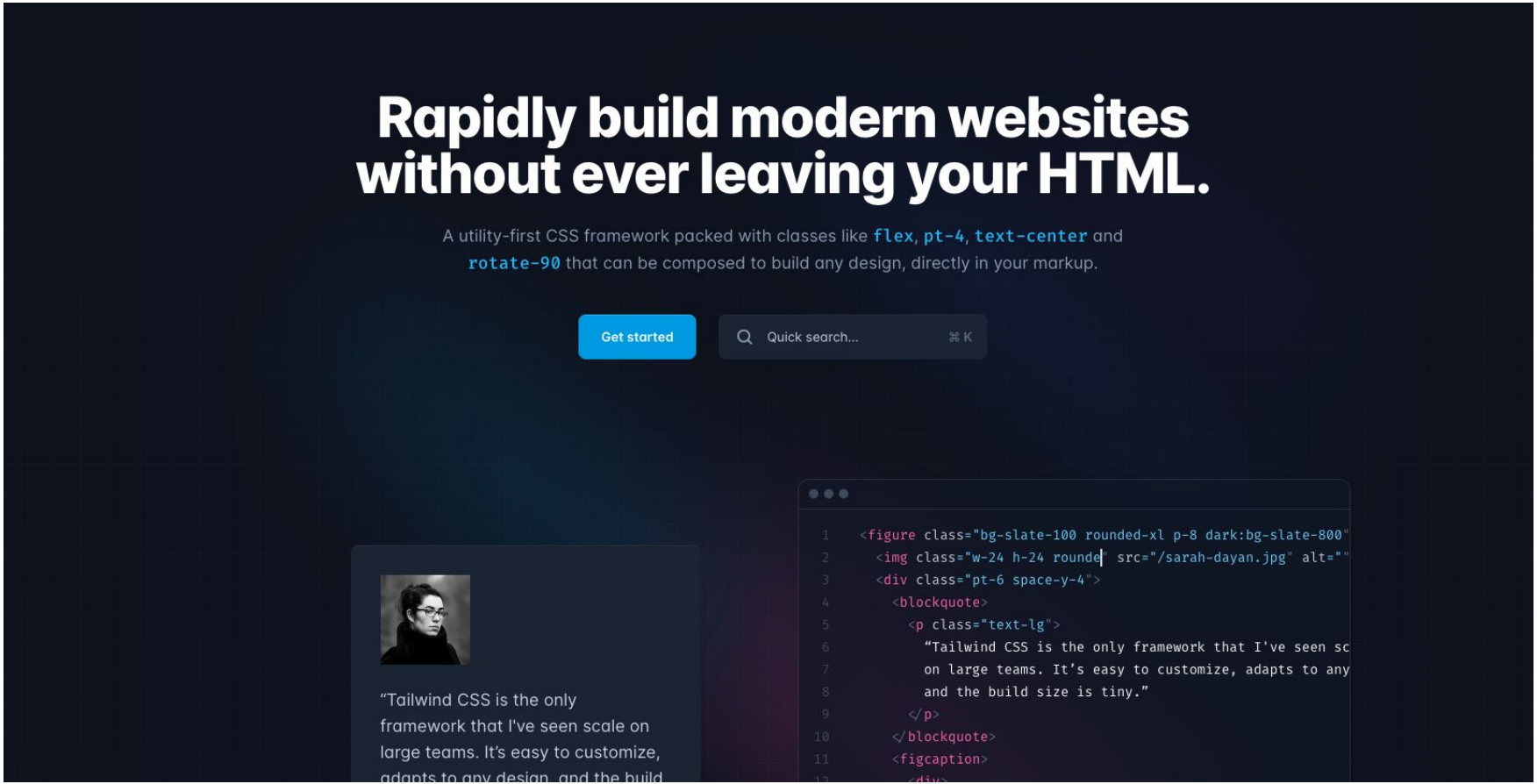
A Result You Can Trust

TypeScript code converts to JavaScript, which **runs anywhere JavaScript runs**: In a browser, on Node.js or Deno and in your apps.

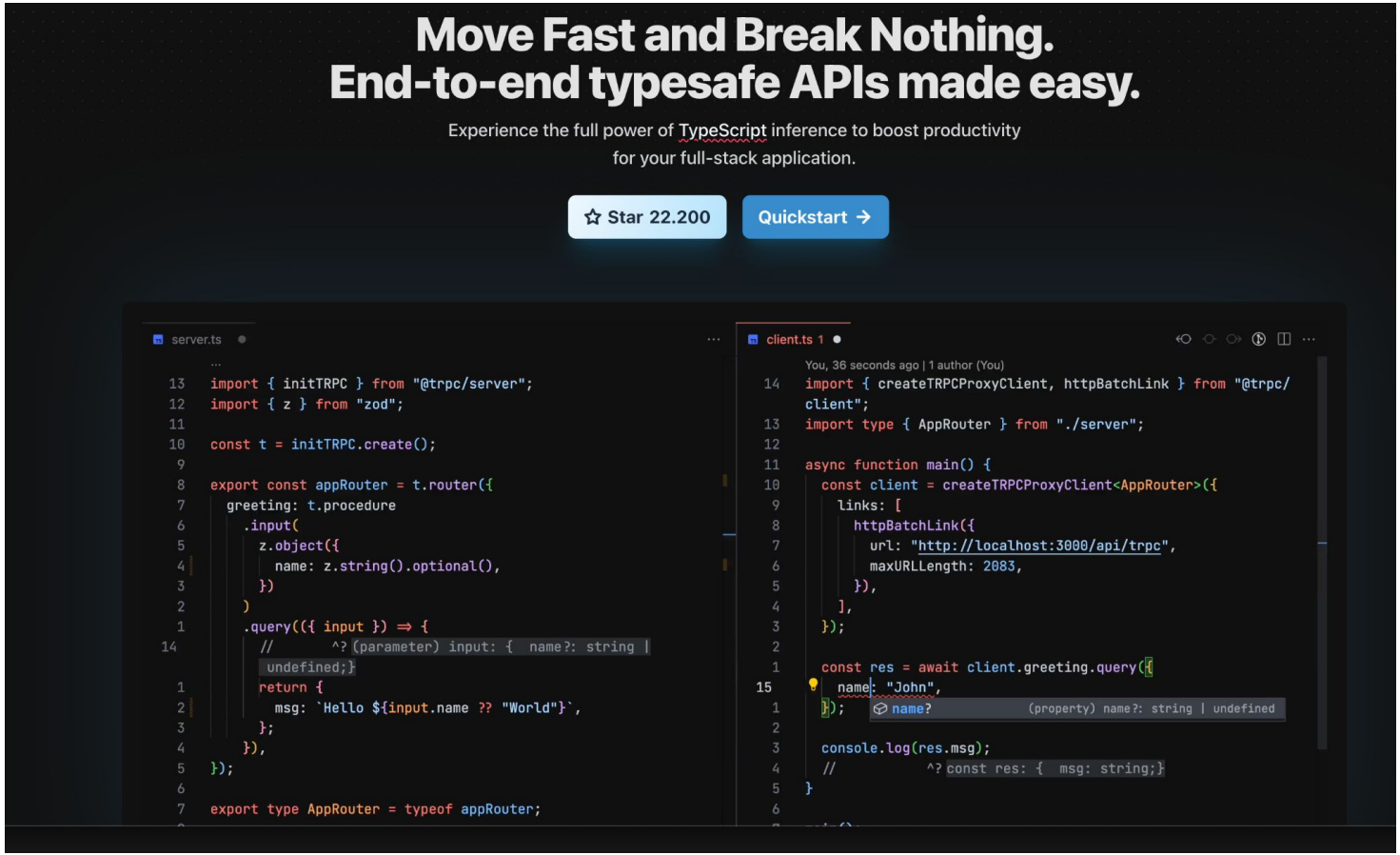
Safety at Scale

TypeScript understands JavaScript and uses **type inference to give you great tooling** without additional code.

T3 Stack: Tailwind



T3 Stack: tRPC



T3 Stack

- Tailwind
- Typescript
- NextJS
- tRPC
- NextAuth
- Prisma
- zod
- …

Tailwind CSS

NEXT.JS

NextAuth.js

Authentication for Next.js

Prisma

tRPC

@kubernetes/client-node

- Connessione con Kubernetes Cluster
- Kubernetes official Resources embedded
- Come gestire le CRDs?

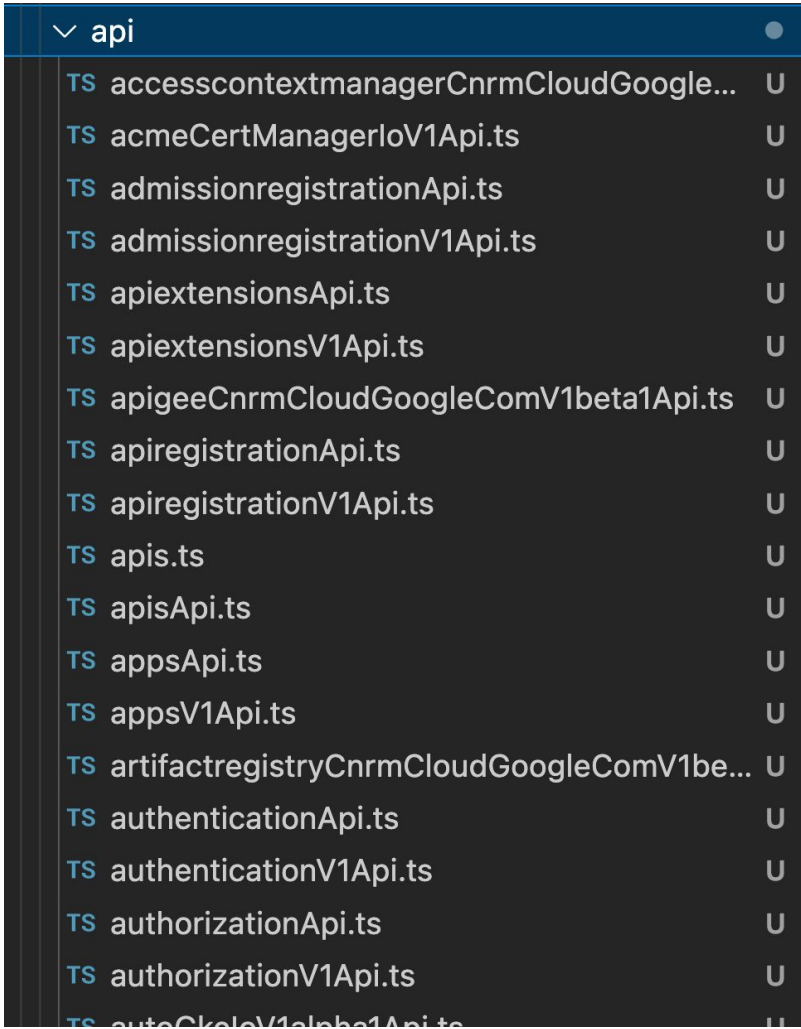
Generare Kubernetes Client

1. Expose kubernetes api definition with openapi

kubectl proxy --port=8080

2. Generate api code with openapi-generator

openapi-generator generate -g typescript-node -i http://localhost:8080/openapi/v2 -o src/gen



Grazie per l’attenzione