OpenRun

OpenRun: Internal Tools Deployment Platform

Platform for securely deploying internal tools across your team. Deploy web apps declaratively, on a single machine or on Kubernetes.

```
➜ ~ curl -sSL https://openrun.dev/install.sh | sh
  # Installing OpenRun...
➜ ~ openrun server start &
```

AUDIENCE

Developers & DevOps Engineers

openrun.dev github.com/openrundev

INTRODUCTION

What is OpenRun?

A self-hosted platform that makes declarative web-app deployment simple. Built for teams to deploy internal tools.

Runs on **Docker/Podman** or **Kubernetes**.
Managed via **Git**.

Open Source

Self-hosted alternative to solutions like **Google Cloud Run** and **Heroku**. Run your internal tools on your own infrastructure.

Declarative GitOps

Zero "ClickOps". Define apps and configurations in Git. OpenRun reconciles state automatically.

Simplicity & Reliability

Single binary architecture with minimal dependencies. No third-party web servers or complex mesh required.

Focused Scope

Not a full PaaS. Focus is deploying your web apps while maintaining operational simplicity.

PLATFORM OVERVIEW

Key Features

Declarative GitOps

Define your desired state in Git: OpenRun reconciles automatically. Add or update apps purely through config changes—**no manual "ClickOps"** or complex deployment scripts required.

Operational Simplicity

Distributed as a **single binary** with flexible runtime support. Container orchestration using **Docker/Podman** or with **Kubernetes**.

Security & Governance

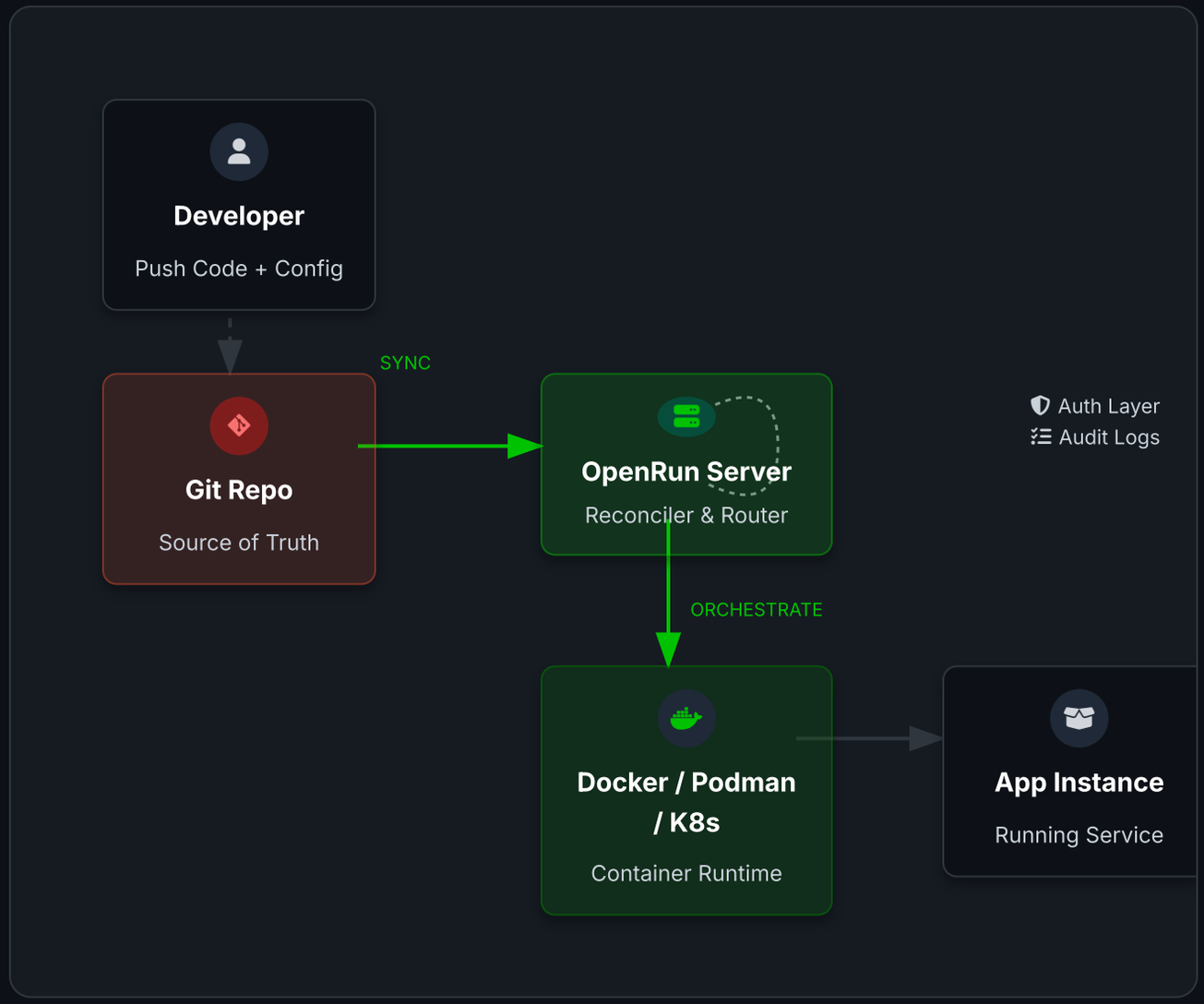
OAuth/OIDC/SAML authentication with **RBAC** without changing app source code. Includes comprehensive API audit logging for compliance, ensuring full traceability of actions.

Efficient Resource Utilization

Save resources with **scale-to-zero** capabilities for idle apps. Run workloads on your own hardware, VMs, or **Kubernetes clusters** within your own network control.

SYSTEM DESIGN

Technical Architecture



Architecture Flow

Single Binary Orchestration

The core server is a single Go binary that manages the entire lifecycle. It acts as both the controller for reconciliation and the router for incoming requests.

Flexible Runtime Support

Deploys directly to Docker, Podman, or Kubernetes. Single node deployment uses an embedded SQLite database, Kubernetes deployment uses Postgres for metadata.

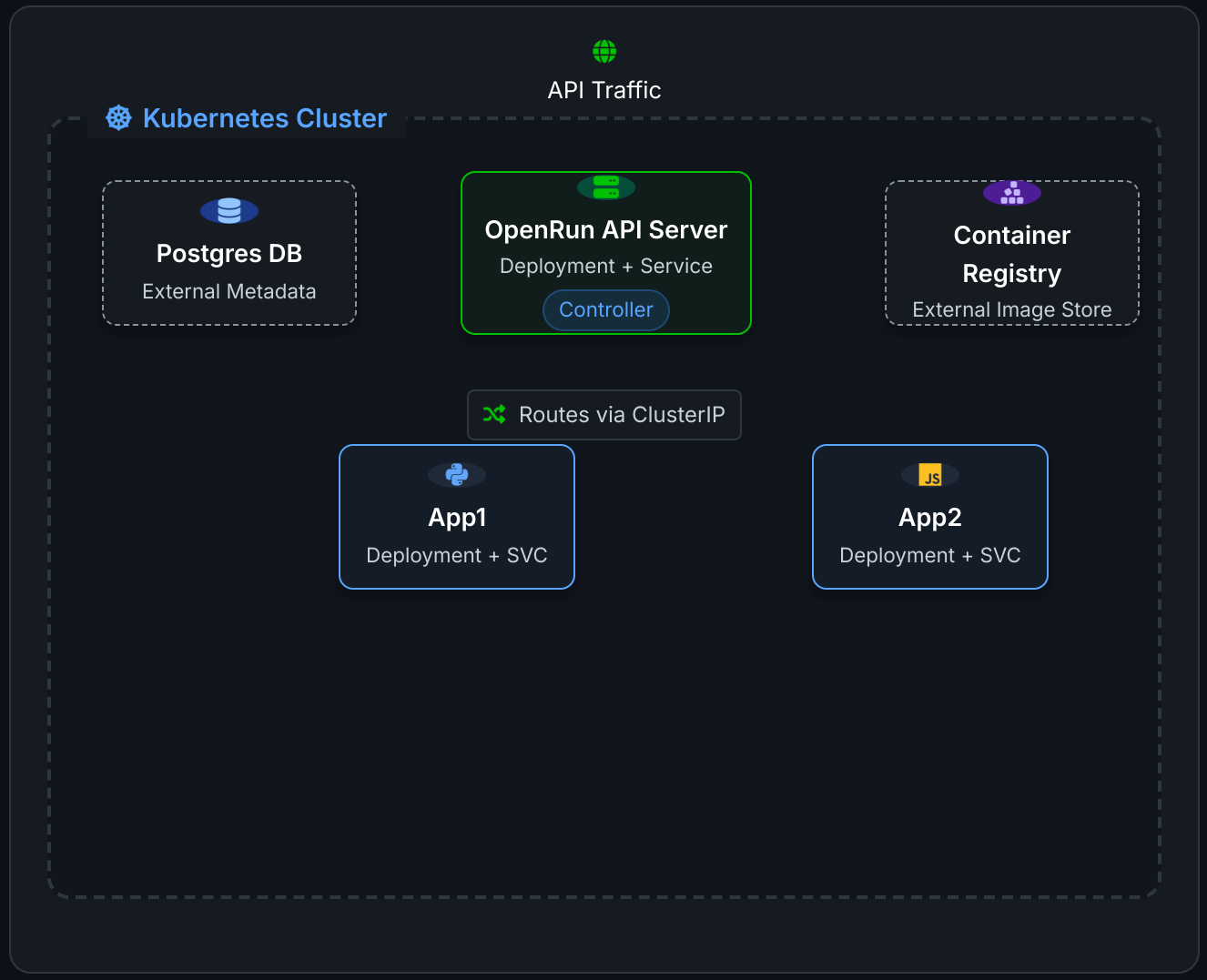
Git-Based State Reconciliation

Periodically pulls configuration from the specified Git repository, diffs the desired state against the running containers/pods and applies changes.

Built-in Governance Layer

Authentication (OAuth/OIDC/SAML) and auditing are handled at the platform layer, shielding applications from security complexity.

K8s Architecture



Architecture Details

OpenRun runs within your K8s cluster, managing app lifecycles.

Core Components

OpenRun installs as a standard **Deployment** with a Service. It connects to an external **Postgres** for state and a **Registry** for images (recommended for production).

Traffic Routing

API calls hit the OpenRun Server, which routes to specific apps via their **ClusterIP Services**. No complex Ingress configuration required for individual apps.

Lazy Creation & SSA

Resources are created **lazily on first request**. Updates use Kubernetes **Server Side Apply (SSA)** for robust reconciliation of Deployments and Services.

Installation & Setup

Prerequisites

OPTION A: SINGLE BINARY

- ✓ Linux/Mac/Windows host with **Docker/Podman**

OPTION B: KUBERNETES

- ✓ K8s cluster + **Helm**

OPTION C: TERRAFORM

- ✓ **Terraform install**

Network access to GitHub

PRO TIP

For production setups, consider externalizing the Postgres database and container registry for better persistence, regardless of deployment method.

A Option A: Single Binary

RECOMMENDED START

```
➜ curl -sSL https://openrun.dev/install.sh | sh
➜ openrun server start &
```

B Option B: Kubernetes (Helm)

SCALABLE

```
➜ helm repo add openrun https://openrundev.github.io/charts/
➜ helm install openrun openrun/openrun -n openrun --create-namespace
```

C Option C: Terraform (IaC)

INFRA AS CODE

```
➜ terraform init && terraform apply

Spins up OpenRun with an EKS cluster, RDS database and ECR registry
```

DEPLOYMENT WORKFLOW

GitOps in Action

1. Schedule the Sync

bash

```
➜ openrun sync schedule --approve --promote \
  github.com/openrundev/openrun/examples/utils.star
```

2. Automated Reconciliation Pipeline

01

Watch Repo

OpenRun monitors the specified Git URL for any commits or configuration changes.

02

Read Config

Fetches the latest app configuration and application source code from the repository.

03

Provision

Builds images, creates new app instances, or updates existing ones to match desired state.

04

Secure

Automatically applies configured OAuth/OIDC policies and enables API audit logging.

05

Reconcile

Continuous loop ensures the live environment always matches the Git configuration.

SIMPLICITY FIRST

Declarative Config Comparison

OpenRun Config

STARLARK

```
# Set resource limits (optional)
limits = {"cpus": "1", "memory": "512m"}

# Streamlit App Declaration
app("/misc/streamlit_example",
  "github.com/streamlit/streamlit-example",
  git_branch="master",
  spec="python-streamlit",
  container_opts=limits)

# FastHTML App Declaration
app("fasthtml.:",
  "github.com/AnswerDotAI/fasthtml/examples",
  spec="python-fasthtml",
  params={"APP_MODULE":"basic_ws:app"},
  container_opts=limits)

# Complete config for two apps. Defines where to get the source
code, how to build the image, how to route requests and what
resource limits to set
```

Lines: 12

Readability: High

VS

Kubernetes Manifests

YAML

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: streamlit-app
spec:
  replicas: 1
  selector:
    matchLabels:
      app: streamlit
  template:
    metadata:
      labels:
        app: streamlit
    spec:
      containers:
      - resources:
          limits:
            memory: "512Mi"
            cpu: "1"
#  Partial k8s config for one app. Jenkins (CI), ArgoCD,
CertManager, IDP etc require additional config.
```

Comparison: Cloud Services

COMPARED WITH Google Cloud Run AWS App Runner

OpenRun Advantages

Network Security & Control

Deploy on your own hardware within your private network (VPN). Achieve strict network-level security controls and data locality compliance.

Cost Efficiency

Better cost management for high-usage apps or custom hardware needs. Avoid per-request billing surprises and leverage existing infrastructure.

Easy Auth Integration

Add OAuth/OpenID/SAML access controls to any app without code changes, unlike cloud services requiring complex IAM setups or sidecars.

Considerations

Infrastructure Management

You manage the underlying hardware/VM availability and updates, whereas cloud services are fully managed and serverless.

Global Scale

Cloud services offer instant global CDN distribution and multi-region failover out of the box, which requires manual setup with OpenRun.

Managed Services Ecosystem

Lacks direct native integration with cloud-managed databases, queues, and AI services found in AWS/GCP ecosystems.

COMPETITIVE ANALYSIS

Comparison: Cloud Services

COMPARED WITH Google Cloud Run AWS App Runner

OpenRun Advantages

Network Control & Data Locality

Deploy on your own hardware in your private network. Full control over network security and data residency.

Cost Efficiency

Run high-performance or custom hardware workloads without the markup of managed cloud compute.

Seamless Access Control

Add OAuth/OIDC/SAML authentication instantly via configuration, without modifying the application code itself.

GitOps Native

Declarative configuration ensures your deployment pipeline is transparent and version-controlled, avoiding opaque cloud console settings.

Considerations

Infrastructure Management

You are responsible for the underlying hardware, OS updates, and uptime. There is no cloud provider SLA for the physical infrastructure.

No Global Edge Network

Unlike global cloud services, you don't automatically get a worldwide CDN or multi-region failover unless you build it yourself.

Integration Effort

Cloud-native conveniences (like managed DBs, SQS, Pub/Sub) are not built-in; you must integrate and host these auxiliary services separately.

COMPETITIVE ANALYSIS

OpenRun vs. DIY K8S Stacks

CONTEXT ✓ OpenRun On Kubernetes vs. Custom ArgoCD Stacks

Why Choose OpenRun?

Deployment Flexibility

Run standalone on Docker/Podman for simplicity, or deploy on Kubernetes for scale.

All-in-One Platform Layer

Replaces the need to glue together ArgoCD/Flux, IDP, Cert-Manager and OIDC providers. Get a PaaS experience.

Better Developer Experience

Developers use a clean declarative config, not complex Kubernetes YAML or Helm charts, even when the underlying runtime is K8s.

Instant Capabilities

Auth, Scale-to-Zero, and GitOps out of the box, rather than building a custom internal developer platform (IDP).

Trade-offs & Scope

Complex Orchestration

If you need advanced Service Mesh features (Istio/Linkerd) or complex multi-cluster networking, a custom K8s stack might be required.

Custom Operators

OpenRun abstracts the runtime. If you heavily rely on custom Kubernetes Operators and CRDs for app logic, raw K8s is better.

Granular Scheduling

Advanced node affinity, taints/tolerations, and custom pod anti-affinity rules are abstracted away in OpenRun's simplified config.

Common Use Cases

Rapid Web App Deployment

Empower data science and internal tool teams to deploy web apps with zero or low configuration. Removes the friction of infrastructure setup for framework-based applications.

Streamlit · Gradio · FastHTML · NiceGUI

Operations Automation

Modernize your operational tooling. Replace heavy Jenkins or Rundeck jobs with lightweight OpenRun Actions to automate scripts, maintenance tasks, and runbook jobs.

Runbook Automation · Maintenance Scripts · Provisioning

Secure Internal APIs

Expose REST APIs for internal consumption securely. Automatically layer OAuth/OIDC authentication and enforce audit logging without changing application code.

OAuth 2.0 · OIDC / SAML · Audit Logs

GitOps Standardization

Eliminate manual deployment toil and "ClickOps". Standardize all team deployments through a single Git repository, ensuring version history and peer review for all changes.

Git Flow · Version Control · Peer Review

Common Use Cases — Individuals

Zero-Config Local Dev

Replicate production environments locally instantly. Spin up dev environments that mirror your deployment target without wrestling with complex Docker Compose files or manual networking.

Localhost | Dev/Prod Parity | Rapid Iteration

Secure Personal Sharing

Host web apps for friends and family safely. Leverage built-in OAuth/OIDC integration to add secure login to your hobby projects without writing a single line of authentication code.

OAuth | Hobby/Vibe-Coded Apps | Secure Access

Efficient Homelab

Perfect for running lightweight services on Raspberry Pi or old hardware. The "scale-to-zero" feature puts inactive apps to sleep, saving power and freeing up system resources.

Scale-to-Zero | Raspberry Pi | Green IT

Master GitOps

The best way to learn modern DevOps patterns hands-on. Experience true GitOps workflows and declarative infrastructure management without the steep learning curve of Kubernetes.

Learning | GitOps | DevOps Skills

Quick Start

Demo Checkpoints

- ✓ Install platform
- ✓ Start server process
- ✓ Connect to Git repo
- ✓ Verify deployment

GitOps Workflow

By scheduling a sync, OpenRun automatically pulls config from the repo. No manual "build" or "deploy" commands are needed for individual apps—the state is reconciled from Git.

1 Install & Start

```
➜ ~ curl -sSL https://openrun.dev/install.sh | sh
➜ ~ openrun server start &
```

2 Schedule Git Sync

```
➜ ~ openrun sync schedule --approve --promote github.com/openrundev/openrun/
examples/utils.star

[INFO] Sync scheduled successfully
[INFO] Fetching config from github.com...
[SUCCESS] 2 apps created, 1 updated.
```

3 Verify & Access

- Check running apps: `openrun app list`
- Apps are now live at configured domains (e.g., app.localhost)
- Updates to Git repo will automatically trigger new deploys

Benefits Summary

Developer Velocity

Accelerate delivery with GitOps-driven deployments. Push to Git and let OpenRun handle the rest, eliminating manual build steps and context switching.

Operational Simplicity

A single binary architecture with minimal dependencies. No complex orchestration layers, no third-party webservers.

Security & Compliance

Built-in OAuth/OIDC/SAML support and comprehensive API audit logging ensure your apps are secure and compliant by default, with zero code changes.

Cost Efficiency

Run on your own commodity hardware and leverage "scale-to-zero" to minimize resource consumption when apps are idle. No per-request cloud billing.

Portability

Standard Docker/Podman container runtime ensures your apps run anywhere. Migrate easily between on-prem servers and cloud VMs without lock-in.

Focused Scope

Purpose-built for web apps and internal tools. Avoids the complexity of full PaaS solutions by doing one thing well.

SUMMARY

Conclusion & Resources

WHEN TO CHOOSE OPENRUN

Cloud-like Simplicity

You want the "Cloud Run" experience—stateless containers, auto-scaling—but on your own hardware or cheaper VPS.

GitOps Preference

You prefer defining infrastructure as code in Git over manual "ClickOps" UI interactions or complex CLI scripting.

Focused Scope

You don't need the platform to manage stateful databases (RDS/Postgres) or complex Docker Compose stacks.

Install Now

Get started with a single command on any Linux host with Docker/Podman.

```
curl -sSL https://openrun.dev/install.sh | sh
```

Website | GitHub

Next Steps

1. **Run the Quick Start**
   Follow the install guide and verify the server is running.
2. **Star the OpenRun Repo**
   Star `openrundev/openrun`
3. **Deploy Your First App**
   Schedule a sync pointing to your repo and watch it go live!