

OpenTelemetry



An observability framework for cloud-native software.

OpenTelemetry is a collection of tools, APIs, and SDKs. You can use it to instrument, generate, collect, and export telemetry data (metrics, logs, and traces) for analysis in order to understand your software's performance and behavior.



Cloud Native

The CNCF (Cloud Native Computing Foundation) Cloud Native [Definition v1.0](#) says:

Cloud native technologies empower organizations to build and run scalable applications :

These techniques enable loosely coupled systems that are resilient, manageable, and obse

CLOUD NATIVE TRAIL MAP

The Cloud Native Landscape cloudnativelandscape.org has a large number of options. This Cloud Native Trail Map is a recommended process for leveraging open source, cloud native technologies. At each step, you can choose a vendor-supported offering or do it yourself, and everything after step #3 is optional based on your circumstances.

HELP ALONG THE WAY

A. Training and Certification

Consider training offerings from CNCF and then take the exam to become a Certified Kubernetes Administrator or a Certified Kubernetes Application Developer cncf.io/training

B. Consulting Help

If you want assistance with Kubernetes and the surrounding ecosystem, consider leveraging a Kubernetes Certified Service Provider

cncf.io/kcsp

C. Join CNCF's End User Community

For companies that don't offer cloud native services externally
cncf.io/enduser

WHAT IS CLOUD NATIVE?

Cloud native technologies empower organizations to build and run scalable applications in modern, dynamic environments such as public, private, and hybrid clouds. Containers, service meshes, microservices, immutable infrastructure, and declarative APIs exemplify this approach.

These techniques enable loosely coupled systems that are resilient, manageable, and observable. Combined with robust automation, they allow engineers to make high-impact changes frequently and predictably with minimal toil.

The Cloud Native Computing Foundation seeks to drive adoption of this paradigm by fostering and sustaining an ecosystem of open source, vendor-neutral projects. We democratize state-of-the-art patterns to make these innovations accessible for everyone.

l.cncf.io

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1. CONTAINERIZATION

- Commonly done with Docker containers
- Any size application and dependencies (even PDP-11 code running on an emulator) can be containerized
- Over time, you should aspire towards splitting suitable applications and writing future functionality as microservices



3. ORCHESTRATION & APPLICATION DEFINITION

- Kubernetes is the market-leading orchestration solution
- You should select a Certified Kubernetes Distribution, Hosted Platform, or Installer: cncf.io/ck
- Helm Charts help you define, install, and upgrade even the most complex Kubernetes application



5. SERVICE PROXY, DISCOVERY, & MESH

- CoreDNS is a fast and flexible tool that is useful for service discovery
- Envoy and Linkerd each enable service mesh architectures
- They offer health checking, routing, and load balancing



7. DISTRIBUTED DATABASE & STORAGE

When you need more resiliency and scalability than you can get from a single database, Vitess is a good option for running MySQL at scale through sharding. Rook is a storage orchestrator that integrates a diverse set of storage solutions into Kubernetes. Serving as the 'brain' of Kubernetes, etcd provides a reliable way to store data across a cluster of machines. TiKV is a high performance distributed transactional key-value store written in Rust.



9. CONTAINER REGISTRY & RUNTIME

Harbor is a registry that stores, signs, and scans content. You can use alternative container runtimes. The most common, both of which are OCI-compliant, are containerd and CRI-O.



2. CI/CD

- Setup Continuous Integration/Continuous Delivery (CI/CD) so that changes to your source code automatically result in a new container being built, tested, and deployed to staging and eventually, perhaps, to production
- Set up automated rollouts, roll backs and testing
- Argo is a set of Kubernetes-native tools for deploying and running jobs, applications, workflows, and events using GitOps paradigms such as continuous and progressive delivery and MLops



4. OBSERVABILITY & ANALYSIS

- Pick solutions for monitoring, logging and tracing
- Consider CNCF projects Prometheus for monitoring, Fluentd for logging and Jaeger for Tracing
- For tracing, look for an OpenTracing-compatible implementation like Jaeger



6. NETWORKING, POLICY, & SECURITY

To enable more flexible networking, use a CNI-compliant network project like Calico, Flannel, or Weave Net. Open Policy Agent (OPA) is a general-purpose policy engine with uses ranging from authorization and admission control to data filtering. Falco is an anomaly detection engine for cloud native.



8. STREAMING & MESSAGING

When you need higher performance than JSON-REST, consider using gRPC or NATS. gRPC is a universal RPC framework. NATS is a multi-modal messaging system that includes request/reply, pub/sub and load balanced queues. CloudEvents is a specification for describing event data in common ways.



10. SOFTWARE DISTRIBUTION

If you need to do secure software distribution, evaluate Notary, an implementation of The Update Framework.



Observability

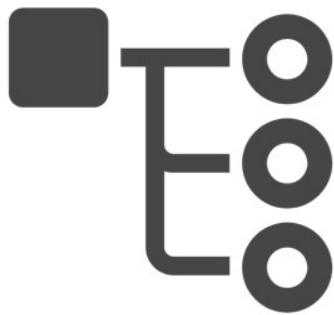
The concept of observability was introduced by Hungarian-American engineer Rudolf E. Kálmán for linear dynamic systems.

Observability is a measure of how well internal states of a system can be inferred from

Three pillars of observability



Metrics



Traces



Logs