BUOYANT

The creators of LINKERD

Writing Service Mesh Controllers in Rust

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Rust is fast and memory safe, all without garbage collection

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LINKERD

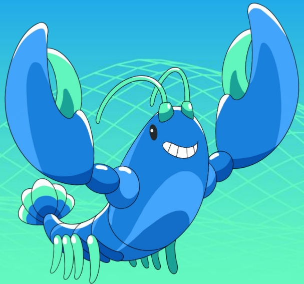
Ultralight, ultrafast, security-first **service mesh** for Kubernetes.

★ Created by **Buoyant**

★ **Goals:** secure, efficient, fast

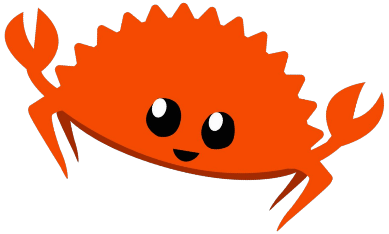
★ **Data plane:** proxies application traffic

★ **Control plane:** tells the proxies what to do



Linkerd + Rust

- **Pure Rust data plane** since the release of Linkerd 2
- First **Rust control plane component** released in Linkerd 2.11



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Rust was **the only choice** for the **proxy**.

We **didn't want GC pauses**…

…but we **didn't want C++ CVEs**, either.

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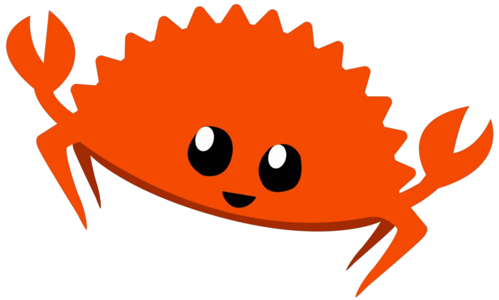
Rust isn't the only choice for the control plane, but it is a good one (and we like it).

Rust has great language features
dev tools
libraries



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Linkerd's control plane watches Kubernetes resources and serves gRPC APIs for the proxies

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The policy controller indexes policy resources and associates them with ports on pods.

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Writing controllers in Rust means talking to Kubernetes, which means bindings for the Kubernetes API.

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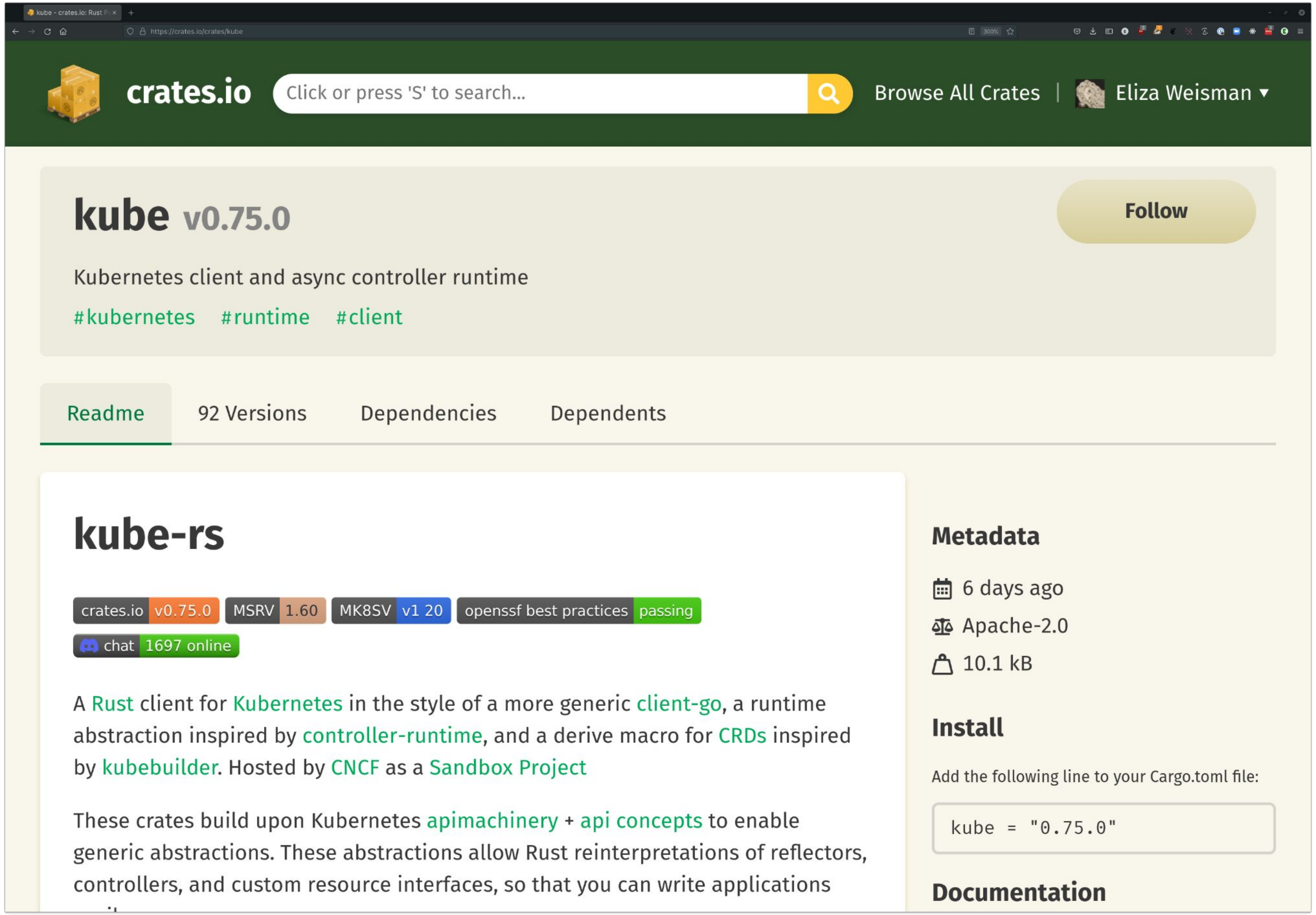

kube v0.75.0

Kubernetes client and async controller runtime

#kubernetes #runtime #client

kube-rs

A Rust client for Kubernetes in the style of a more generic client-go, a runtime abstraction inspired by controller-runtime, and a derive macro for CRDs inspired by kubebuilder. Hosted by CNCF as a Sandbox Project

These crates build upon Kubernetes apimachinery + api concepts to enable generic abstractions. These abstractions allow Rust reinterpretations of reflectors, controllers, and custom resource interfaces, so that you can write applications

Metadata

- 6 days ago
- Apache-2.0
- 10.1 kB

Install

Add the following line to your Cargo.toml file:

```
kube = "0.75.0"
```

Documentation

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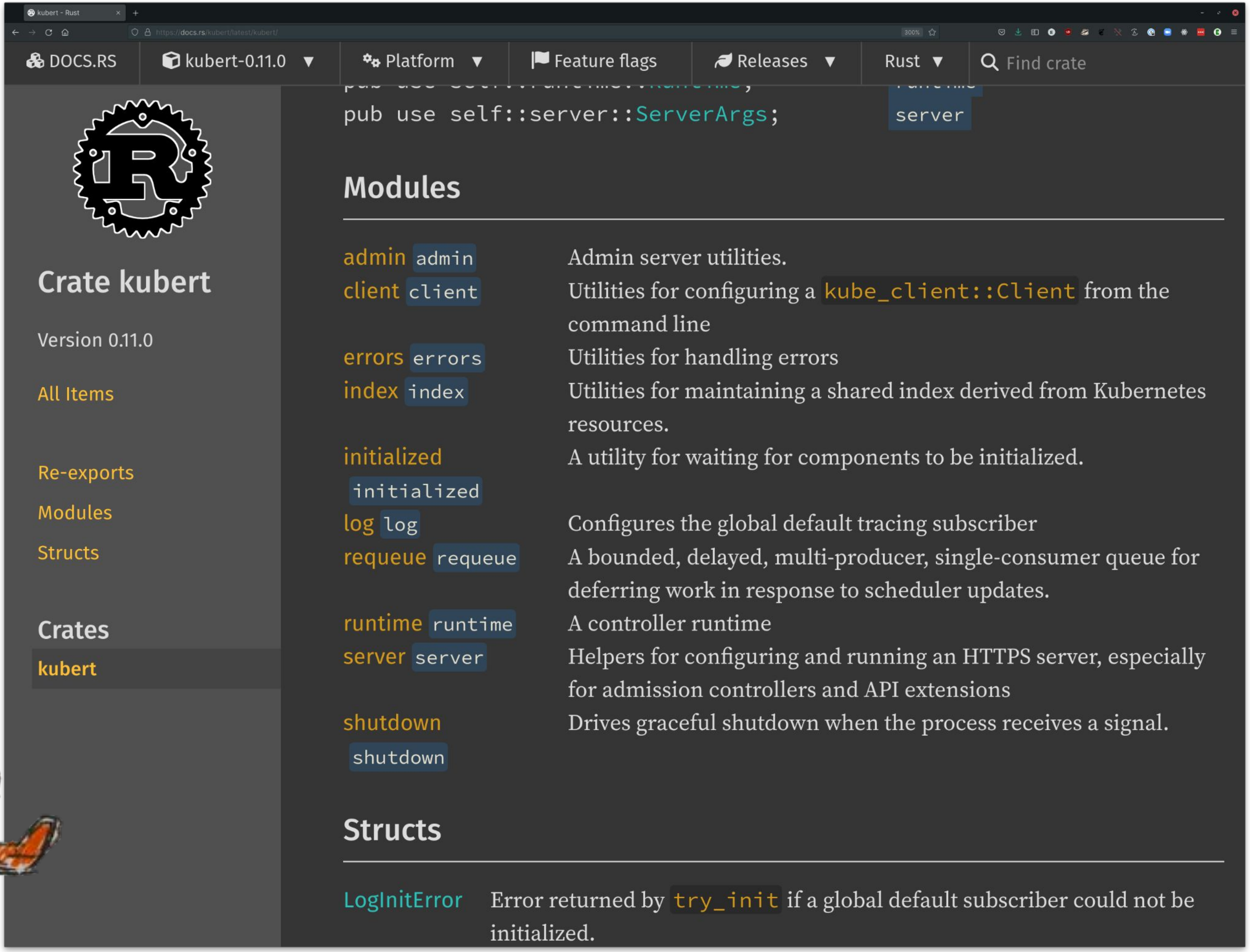
kube + rt = kubert



Crate kubert

Version 0.11.0

All Items

Re-exports

Modules

Structs

Crates

kubert

```
pub use self::server::ServerArgs;
```

Modules

admin `admin`	Admin server utilities.
client `client`	Utilities for configuring a `kube_client::Client` from the command line
errors `errors`	Utilities for handling errors
index `index`	Utilities for maintaining a shared index derived from Kubernetes resources.
initialized `initialized`	A utility for waiting for components to be initialized.
log `log`	Configures the global default tracing subscriber
requeue `requeue`	A bounded, delayed, multi-producer, single-consumer queue for deferring work in response to scheduler updates.
runtime `runtime`	A controller runtime
server `server`	Helpers for configuring and running an HTTPS server, especially for admission controllers and API extensions
shutdown `shutdown`	Drives graceful shutdown when the process receives a signal.

Structs

LogInitError	Error returned by `try_init` if a global default subscriber could not be initialized.

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```rust
pub trait IndexNamespacedResource<T> {
    fn apply(&mut self, resource: T);
    fn delete(&mut self, namespace: String, name: String);
    fn reset(
        &mut self,
        resources: Vec<T>,
        removed: HashMap<String, HashSet<String>>,
    );
}
```

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```yaml
apiVersion: policy.linkerd.io/v1beta1
kind: Server
metadata:
  namespace: linkerd-viz
  name: admin
spec:
  podSelector:
    matchLabels:
      linkerd.io/extension: viz
  port: admin-http
  proxyProtocol: HTTP/1
```

```rust
#[derive(Clone, Debug, PartialEq, Eq)]
#[derive(kube::CustomResource)]
#[derive(Deserialize, Serialize, JsonSchema)]
#[kube(
    group = "policy.linkerd.io",
    version = "v1beta1",
    kind = "Server",
    namespaced
)]
#[serde(rename_all = "camelCase")]
pub struct ServerSpec {
    pub pod_selector: labels::Selector,
    pub port: Port,
    pub proxy_protocol: Option<ProxyProtocol>,
}
```

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```rust
#[tokio::main]
async fn main() -> Result<(), Box<dyn Error>> {
    // Build the Kubert runtime (Kubert also has arg-parsing helpers)
    let Args { client } = Args::parse();
    let runtime = kubert::Runtime::builder()
        .with_client(client)
        .build()
        .await?;

    // Start indexing the Server CRD
    let index = Index::default();
    let servers = runtime.watch_all::<Server>(ListParams::default());
    tokio::spawn(kubert::index::namespaced(index.clone(), servers));

    // Do more stuff, like spawning gRPC servers…

    runtime.run().await.map_err(Into::into)
}
```

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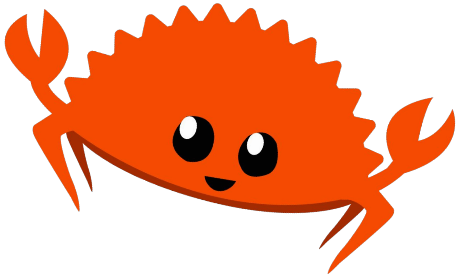
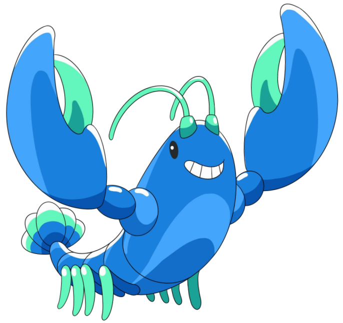
https://github.com/linkerd/linkerd2/tree/main/policy-controller





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Thanks so much!

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