Using Rust for your network management tools

Let the crabs control the packets!

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What we'll discuss today

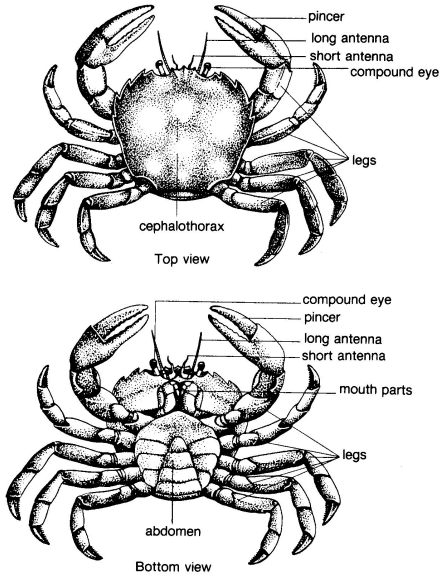
- Network management
- Library and binary
- Serde
- Zbus
- Nispor & Netlink
- Sockets
- Bindings everywhere!

Network Management

Done easy with NetworkManager and Nmstate

Network management is a process that requires userspace and kernelspace coordination to configure the desired network state.

- NetworkManager is the standard Linux network configuration tool suite
- Nmstate is a library with an accompanying command line tool that manages host networking settings in a declarative manner.



Source:
https://networkmanager.dev/
https://nmstate.io/

Library and binary

Programming your networking configuration tools give you flexibility.

- We developed our own nmstate library
- Nmstatectl is built using nmstate

Serde

JSON and YAML are your friends

Serde is a framework for serializing and deserializing Rust data structures efficiently and generically.

- Serde allow our users to define their declarative network state
- Allow us to implement our own Serializer and Deserializer
- There are plenty of serde decorators

Source:
https://serde.rs/

Serde

JSON and YAML are your friends

```yaml
interfaces:
- name: bond99
  type: bond
  state: up
  ipv4:
    address:
    - ip: 192.0.2.0
      prefix-length: 24
    enabled: true
  link-aggregation:
    mode: balance-rr
    options:
      miimon: '140'
    port:
    - eth3
    - eth2
```

```
#[serde(try_from = "NumberAsString")]
```

```
#[serde(
    skip_serializing_if = "Option::is_none",
    rename = "port",
    alias = "ports"
)]
```

```
#[serde(
    skip_serializing_if = "Option::is_none",
    default,
    deserialize_with = "crate::deserializer::option_u64_or_string"
)]
```

```
pub enum BondMode {
    #[serde(rename = "balance-rr")]
    /// Deserialize and serialize from/to `balance-rr`.
    /// You can use integer 0 for deserializing to this mode.
    RoundRobin,
```

Source:
https://nmstate.io/examples.html#interfaces-bond

Zbus

Hello NetworkManager, how are you doing?

Zbus is a Rust API for D-Bus communication. Safe, high- and low-level.

- NetworkManager provides D-Bus API
- Zbus + zvariant will allow us to communicate with NetworkManager
- Configuring and retrieving NetworkManager profiles and devices

Source:
https://gitlab.freedesktop.org/dbus/zbus/-/blob/main/README.md

Nispor & Netlink

Providing an unified interface for Linux network state querying

Nispor allow us to query real-time Linux network information using rust-netlink crate.

- Real-time Linux network information is used to perform verification and partial editing.
- Contributed to rust-netlink to extend the supported interfaces

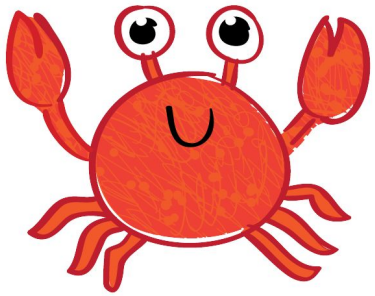
Source:
https://github.com/nispor/nispor
https://github.com/rust-netlink

Sockets

Communicating with ovsdb

NetworkManager does not support global ovsdb configuration.

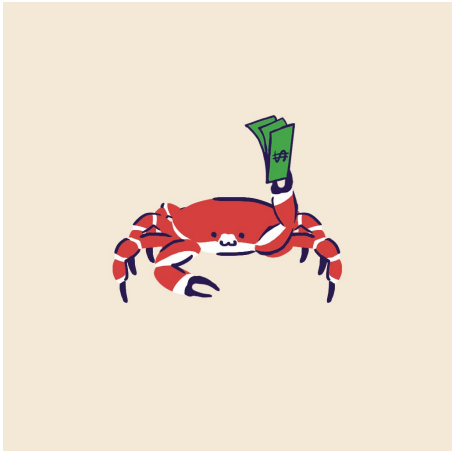
- Nmstate use the Rust std library for Unix stream sockets.
- We use serde and serde_json libraries to create our own json_rpc library



Source:
https://doc.rust-lang.org/std/os/unix/net/struct.UnixStream.html
https://github.com/nmstate/nmstate/blob/base/rust/src/lib/ovsdb/json_rpc.rs

Bindings everywhere

Let's distribute the project everywhere!



Bindings boost adoption from other projects/organizations.

- We create C bindings from our Rust library
- Then Python and Golang bindings from the C one
- And now we can still using our integration tests written in Python with our Rust library!

Source:

Questions?

Feel free to ask questions! There are not dumb questions :-)

Contact me at ffmancera@riseup.net or ffmancera@mastodon.social

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