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KEYSPACE

Amsterdam

Customizing Valkey with Rust: Building High-Performance Modules

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Valkey

Background The Horsehead Nebula and its surroundings. The reflection nebula NGC 2023 in the bottom left corner. / Stephanh / License: CC BY 4.0.

About me

- Used Valkey/Redis for many years
- Oracle Cloud Cache Tech Lead
- Valkey Modules Rust SDK

Quick survey

1. Cache
2. Background job queue
3. Leaderboard
4. Session store
5. Autocomplete
6. Feature flags
7. Real time analytics
8. API throttling
9. Distributed Lock Management
10. ...

How many people have built modules?

1. C
2. C++
3. Rust

- Why build modules in Rust?
- Valley Module Rust SDK
- Valkey as a job queue

Why build modules in Rust?

Files

- valkeymodule.h
- module.c
- src/modules/*
- tests/modules/*
- runtest-moduleapi

New module

- ValkeyModule_OnLoad
- ValkeyModule_Init
- ValkeyModule_CreateCommand
- VALKEYMODULE_NOT_USED
- VALKEYMODULE_OK
- VALKEYMODULE_ERR

- Safety
- Ecosystem
- Valkey Modules SDK integrates with C

Questions

Valkey Modules Rust SDK

Valkey Modules Rust SDK

- valkeymodule.h
- valkey_module! macro
- Context
- Examples
- valkey-module-macros-internals
- valkey-module-macros

examples/*.rs

Client

- ctx.get_client_id
- ctx.set_client_username_by_id
- …

Event Handlers

- examples/server_events.rs
- client_changed_event_handler
- shutdown_event_handler
- key_event_handler
- persistence_event_handler

Filters

Preload module validation

Validating / rejecting CONFIG SET

- Optional custom config validation

Configuration

- init
- deinit
- module load path_to_file arg1 arg2 …

crontab

enable-system-alloc feature

- Useful for testing

Redis compatibility

- use-redismodule-api

Rust modules

- valkey-bloom
- valkey-ldap

Future of Valkey Module Rust SDK

- Callbacks
- Mock Context for unit testing
- Context in Filter
- …

Contributors (in alphabetical order)

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- Mkmkme
- sachinvmurthy
- YueTang-Vanessa
- zackcam

Questions

Valq module

Q requirements

- **at least once delivery**
  - visibility timeout
  - consumer ack or extend message
  - max delivery attempts
- **dead letter queue (DLQ)**
  - retention period
- **delayed queue**

Structs

Commands

Persistence

- free
- rdb_load
- rdb_save
- aux_load
- aux_save

Replication

Background thread

Testing

- valkey-cli

- Unit

- Integration

- Code coverage

Benchmark

Questions

References

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