Introduction to Valkey

Valkey is an open source in-memory data structure store on SUSE Linux Enterprise Server for NVIDIA that functions as a high-performance database, cache, message broker and streaming engine. By delivering ultra-low-latency data access with enhanced multi-threading and full Redis 7.2 compatibility, Valkey accelerates application performance and enables seamless migration from existing Redis workloads without requiring code changes.

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1 About Valkey

Valkey is a fork of Redis version 7.2.4. It is an open source, in-memory data structure store, licensed under the BSD (Berkeley Software Distribution) license, that serves as a versatile platform for various applications. It excels as a database, providing fast and flexible data storage; as a cache, significantly improving application performance; as a message broker, enabling asynchronous communication; and even as a streaming engine for real-time data processing. Valkey builds upon the foundation of Redis OSS, incorporating multi-threading for enhanced performance and offering a robust solution for applications demanding speed, scalability, and diverse data handling capabilities.

Valkey has many benefits, which include the following:

- Delivers fast, low-latency access to data stored in memory, ideal for caching, real-time analytics, and message brokering.
- Supports powerful and versatile data structures like strings, hashes, lists, sets, sorted sets, streams, and geo-spatial indexes.
- Offers RDB (Redis Database Backup) snapshot and AOF (append-only file) persistence for recovering data after restarts.
- Enables horizontal scaling by partitioning data across multiple nodes.
- Maintains compatibility with Redis 7.2, making it easy to migrate without changing existing client libraries or application logic.
- Provides built-in publish/subscribe capabilities for building event-driven or messaging-based systems.

For more information on Valkey, refer to https://valkey.io/docs/.

2 Managing Valkey

Learn how to install Valkey, use the command-line tool and migrate from Redis to Valkey.

2.1 Setting up a Valkey service file

Valkey is an open-source and in-memory data store that functions as a database, cache, message broker and streaming engine.

PROCEDURE 1: CREATING A VALKEY `systemd` SERVICE FILE

1. Install Valkey:

```
> sudo  zypper -n in valkey
```

2. Create a Valkey `systemd` service file:

```
> sudo  vi /etc/systemd/system/valkey.service
```

3. Add the following to the file:

```
[Unit]
Description=Valkey In-Memory Data Store
After=network.target

[Service]
User=valkey
Group=valkey
ExecStart=/usr/bin/valkey-server /etc/valkey/valkey.conf
LimitNOFILE=10240
ExecStop=/usr/bin/valkey-cli shutdown
Restart=always

[Install]
WantedBy=multi-user.target
```

4. Copy the sample file to the specified config file:

```
> sudo  cp /etc/valkey/default.conf.example /etc/valkey/valkey.conf
```

5. Update file permissions:

```
> sudo  chown valkey:valkey /etc/valkey/valkey.conf
```

6. Start and enable the Valkey service:

```
> sudo  systemctl start valkey
```

```
> sudo  systemctl enable valkey
```

7. Verify the Valkey setup:

```
valkey-cli ping
```

Valkey is running on your system when you get the command print `PONG`.

2.2 The Valkey command-line interface

The Valkey command-line interface is used for managing, debugging and testing Valkey. By default, the **`valkey-cli`** command connects to the server at the address `127.0.0.1` with port `6379`.

Some of the **`valkey-cli`** command options include:

`-h`
: Server host name with default ip of 127.0.0.1.

`-p`
: Server port with a default vale of 6379.

`-t`
: Server connection timeout in seconds (decimals allowed). Default timeout is `0`, which means no limit and depends on the operating system.

`-s`
: Server socket overrides the host name and port.

`-a`
: Password to use when connecting to the server. You can also use the `VALKEYCLI_AUTH` environment variable to pass this password more safely. This argument takes precedence when both options are used.

`--user`
: User name that is used to send ACL (Access Control List) style, which is `AUTH username pass`. Needs the `-a` option.

`--pass`
: Password that is an alias of the `-a` option to align with the new `--user` option.

`--askpass`

Forces password input via STDIN with masking. If this argument is used, then `-a` and the `VALKEYCLI_AUTH` environment variable are ignored.

`-u`

Server URI in format `valkey://user:password@host:port/dbnum`. User, password and dbnum are optional. For authentication without a user name, use user name `default`. For TLS, use the scheme `valkeys`.

`--help`

Output help and exit.

`--version`

Output version and exit.

`--cluster help`

List all available cluster manager commands.

EXAMPLE 1: BASIC `valkey-cli` COMMAND EXAMPLES INCLUDE:

- `SET`: Sets a key-value pair.

  ```
  >  valkey-cli SET KEY_NAME "Hello Valkey"
  ```

  For example:

  ```
  >  valkey-cli SET TESTKEY "Hello Valkey"
  ```

- `GET`: Retrieves the value associated with a key.

  ```
  >  valkey-cli GET TESTKEY
    "Hello Valkey"
  ```

- `DEL`: Deletes a key.

  ```
  >  valkey-cli DEL TESTKEY
    (integer) 1
  ```

  `1` if deleted and `0` if not found.

- `INFO`: Displays information and statistics about the Valkey server.

  ```
  >  valkey-cli INFO
    Server
  ```

```
  redis_version:7.2.4
  server_name:valkey
  valkey_version:8.0.2
  redis_git_sha1:00000000
  redis_git_dirty:0
  redis_build_id:e0cc1d08b1f9571a
  server_mode:standalone
  os:Linux 6.12.0-160000.9-default x86_64
  arch_bits:64
  monotonic_clock:POSIX clock_gettime
  multiplexing_api:epoll
  gcc_version:13.3.1
  process_id:974
  process_supervised:no
  run_id:32864c141804bcb17cae98145beee86ca251afd7
  tcp_port:6379
  server_time_usec:1750760734442451
  uptime_in_seconds:2780
  uptime_in_days:0
  hz:10
  configured_hz:10
  lru_clock:5930270
  executable:/usr/sbin/redis-server
  config_file:/etc/valkey/valkey.conf
  io_threads_active:0
  availability_zone:

[...]
```

- `MONITOR`: Streams all commands processed by the Valkey server in real time.

```
>  valkey-cli MONITOR
OK
```

- `KEYS`: Finds all keys matching a pattern.

```
>  valkey-cli KEYS "*" # All keys
"TESTKEY"
"TESTKEY1"
```

2.3 Migrating from Redis to Valkey

Valkey is designed to be a seamless replacement, maintaining compatibility with the Redis API, protocol, persistence data, ports and configuration files. The transition from Redis to Valkey is easy for many basic setups. The following procedure assumes Redis is installed, running and loaded with data.

PROCEDURE 2: HOW TO MIGRATE FROM REDIS TO VALKEY

1. Check the current Redis server version:

```
>  redis-cli info server
# Server
redis_version:7.2.4
redis_git_sha1:00000000
redis_git_dirty:0
redis_build_id:8c22b097984bd350
redis_mode:standalone
[...]
```

2. Install `valkey-compat-redis` package with the `--force-resolution` option:

```
> sudo  # zypper in --force-resolution valkey-compat-redis
Refreshing service 'NVIDIA'.
Refreshing service 'openSUSE'.
Loading repository data...
Reading installed packages...
Resolving package dependencies...

The following 2 NEW packages are going to be installed:
  valkey valkey-compat-redis

The following package is going to be REMOVED:
  redis

2 new packages to install, 1 to remove.

Package download size:     1.3 MiB

Package install size change:
              |       5.2 MiB  required by packages that will be installed
  -245.2 KiB  |  -    5.4 MiB  released by packages that will be removed

Backend:  classic_rpmtrans
Continue? [y/n/p/...? shows all options] (y):
```

The package takes your existing configuration files and persistence data and moves them to Valkey with no additional steps required. This migration is possible because Valkey is fully compatible with the Redis API, protocol, persistence data, ports and configuration files.

3. Start and enable Valkey:

```
> sudo  systemctl start valkey
```

```
> sudo  systemctl enable valkey
```

4. Check the server information:

```
>  redis-cli info server
# Server
redis_version:7.2.4
server_name:valkey
valkey_version:7.2.5
redis_git_sha1:00000000
redis_git_dirty:0
redis_build_id:b0d9f188ef999bd3
redis_mode:standalone
[...]
```

Valkey is responsive to both `redis_version:7.2.4` and `valkey_version:7.2.5`. Retaining the `redis_version` ensures maximum compatibility while still identifying the server with `valkey_version`. Valkey has a binary named `valkey-cli` but symbolically links `redis-cli`. Both CLIs have the same functionality.

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