How-To Guides

Creating a Database

Valkey is a high-performance fork of Redis that emphasizes open governance and continued compatibility while introducing community-driven enhancements. Setting up Valkey correctly is essential for achieving low-latency performance and ensuring durability in modern applications. This guide walks through various methods to run and connect to Valkey: using the Valkey CLI, running inside Docker containers, and integrating with scripting workflows. It also outlines best practices to follow during configuration and operation.

Creating Using valkey-cli

Valkey provides a built-in command-line interface tool called **valkey-cli**. It allows direct interaction with a Valkey server and supports both local and remote connections. All standard Redis-compatible commands can be executed through this tool, along with any features supported by Valkey.

Connect to Valkey

If you have a local Valkey instance running, either from a package manager or inside Docker, you can start the CLI with no extra arguments:

```
valkey-cli
```

To connect to a remote Valkey instance, provide the host, port, and authentication details if configured:

```
valkey-cli -h <host> -p <port> -a <password>
```

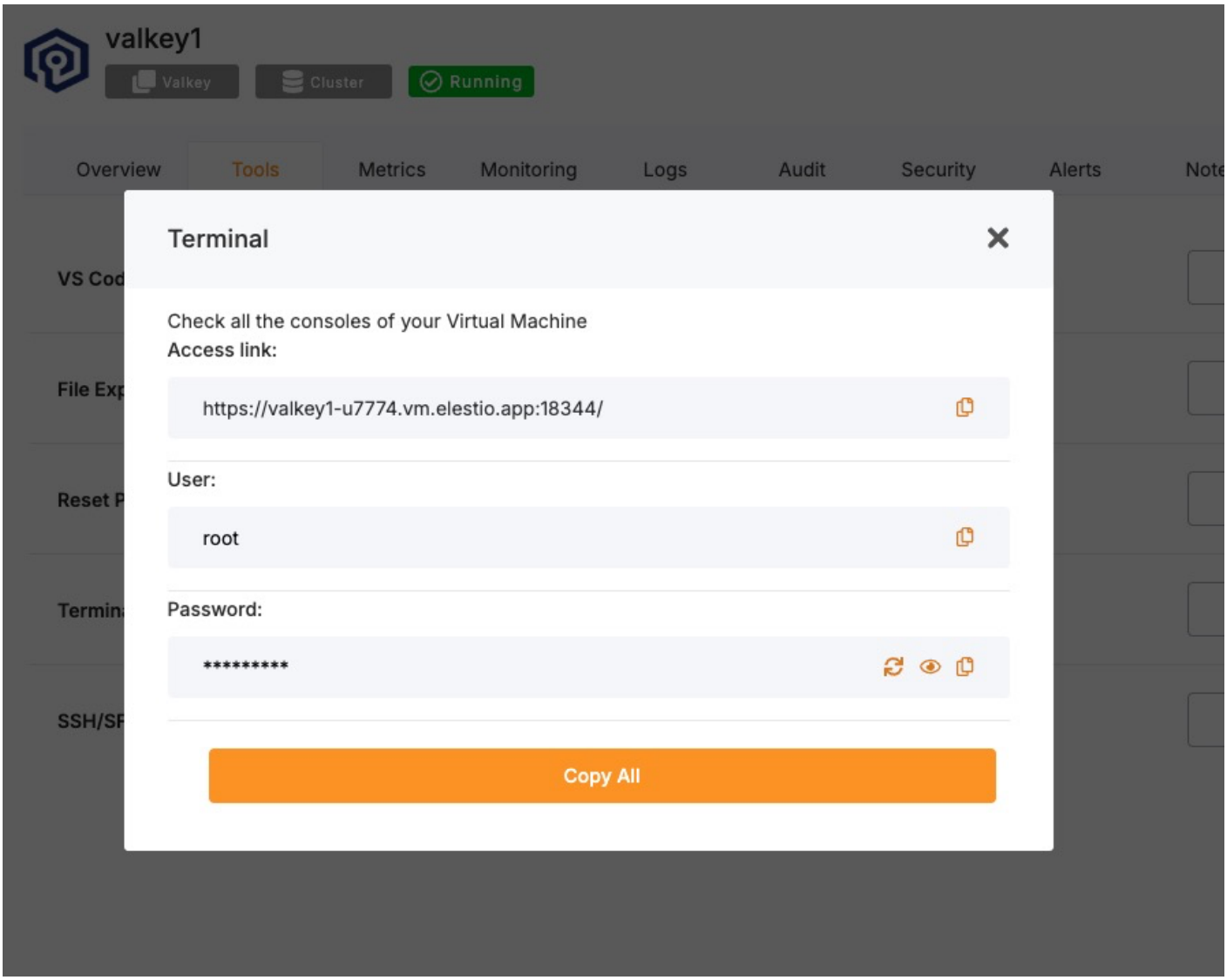
After executing the command, you will be placed in the Valkey shell, where you can interactively issue commands.

Running Valkey Using Docker

Valkey can be containerized using Docker to ensure consistent environments across local development, testing, and production systems. This is a convenient way to isolate dependencies and manage deployment configurations.

Access Elestio Terminal

If you are using Elestio to host your Valkey service, log in to the Elestio dashboard. Navigate to your Valkey instance, then open **Tools > Terminal**. This will provide a browser-based shell within the server environment that has access to your containerized services.



Once inside the terminal, switch to the application directory:

```
cd /opt/app/
```

Access the Valkey Container Shell

Elestio services use Docker Compose for container orchestration. To enter the Valkey container and interact with its runtime environment, use the following command:

```
docker-compose exec valkey bash
```

This starts a bash session inside the running Valkey container.

Access Valkey CLI from Within the Container

The **valkey-cli** tool is available within the container and can be used to run commands directly against the Valkey server. If authentication is required, supply the password using the -a flag:

```
valkey-cli -a <password>
```

You'll now be connected to the Valkey instance running inside the container.

Test Connectivity

To confirm the Valkey instance is functional, run a test by setting and retrieving a key:

```
set testkey "Hello Valkey"
get testkey
```

Expected output:

```
"Hello Valkey"
```

This confirms that read/write operations are working correctly inside the containerized Valkey environment.

Connecting Using valkey-cli in Scripts

The **valkey-cli** command can also be used non-interactively, which is useful for shell scripts, cron jobs, or CI/CD workflows that require interaction with the Valkey server.

To set a key via a script:

```
valkey-cli -h <host> -p <port> -a <password> SET example_key "example_value"
```

This will set the specified key in a single command without launching the interactive shell.

Best Practices for Setting Up Valkey

Use Meaningful Key Naming Conventions

To ensure readability and manageability, adopt consistent naming conventions. Use namespaces separated by colons to logically group related keys:

```
user:1001:profile
session:2025:token
```

This simplifies debugging, metric tracking, and migration efforts.

Follow Consistent Data Structures

Valkey supports Redis-compatible data structures including strings, hashes, sets, sorted sets, lists, and streams. Always choose the most efficient type based on access patterns and data lifecycle. For example, hashes are ideal for storing grouped attributes, while sets work well for unique lists.

Inconsistent structure usage can lead to inefficient memory use and unexpected command behavior.

Enable Authentication and TLS

Security should not be overlooked in production systems. Always configure a strong password using the requirepass directive in valkey.conf. Additionally, enable TLS for encrypted traffic if the database is accessible over the internet or across networks.

Example valkey.conf settings:

```
requirepass strong_secure_password
tls-port 6379
tls-cert-file /etc/ssl/certs/cert.pem
tls-key-file /etc/ssl/private/key.pem
```

These settings help secure both access and data transmission.

Configure Persistence Options

Valkey supports both Redis-style persistence mechanisms: RDB snapshots and AOF logging. These ensure data durability in the event of process restarts or hardware failure.

Recommended settings in valkey.conf:

```
save 900 1
appendonly yes
appendfsync everysec
```

Use AOF for greater durability, RDB for faster restarts, or both for a balanced setup.

Monitor and Tune Performance

Monitor performance using built-in Valkey commands like INFO, MONITOR, and SLOWLOG. These provide insights into memory usage, command execution times, and system health. You can also

integrate external monitoring tools like Prometheus, RedisInsight, or Grafana for real-time visualization.

Proper monitoring allows you to proactively tune memory limits, max clients, and replication settings.

Common Issues and Their Solutions

Issue	Cause	Solution
NOAUTH Authentication required	Connecting to an instance that requires a password without one	Use the -a flag or send the AUTH command before other commands
ERR Client sent AUTH, but no password is set	Authentication is attempted on a server that does not require it	Remove the -a option or check the requirepass directive
Cannot connect to Valkey on ‘localhost’	The server is not running or bound to another address/port	Check service status and inspect valkey.conf and Docker port mappings
Docker Valkey container refuses connections	Network misconfiguration or the container is still initializing	Use docker-compose logs valkey and verify exposed ports
Data not persisted after restart	Persistence settings are disabled	Enable RDB and/or AOF in the configuration file

Upgrading to Major Version

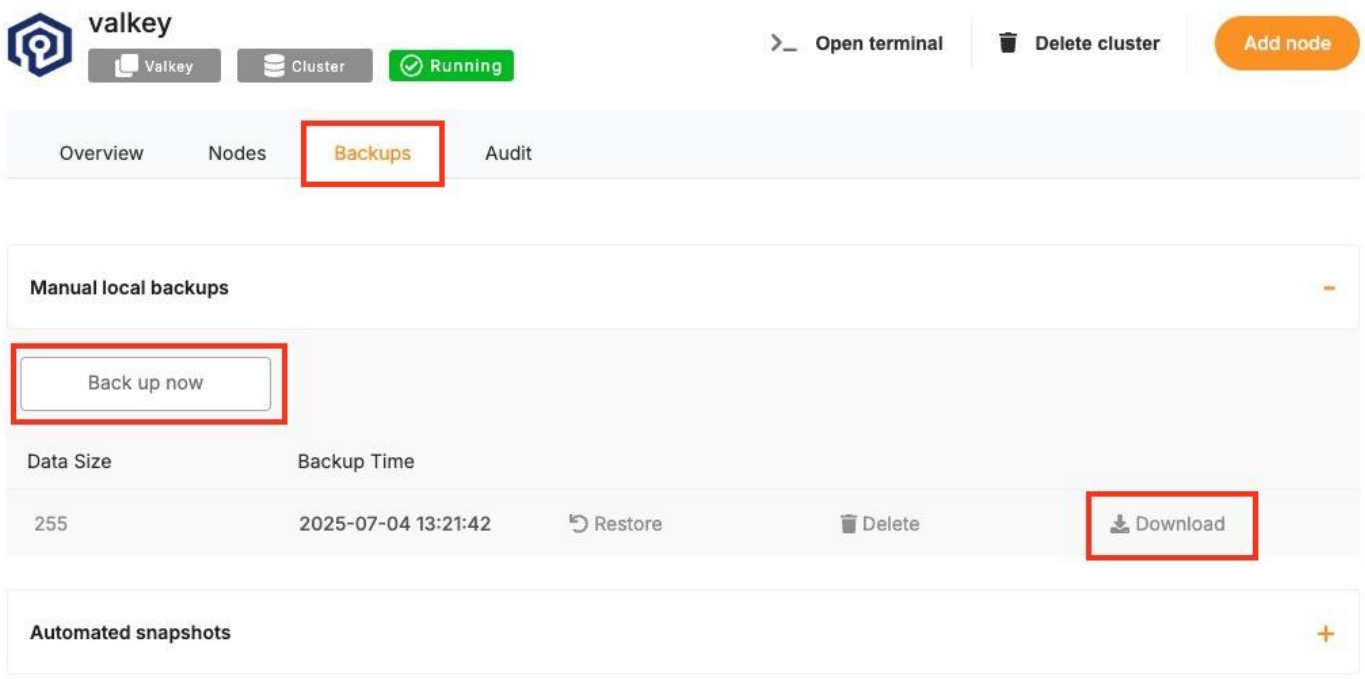
Upgrading a database service on Elestio can be done without creating a new instance or performing a full manual migration. Elestio provides a built-in option to change the database version directly from the dashboard. This is useful for cases where the upgrade does not involve breaking changes or when minimal manual involvement is preferred. The version upgrade process is handled by Elestio internally, including restarting the database service if required. This method reduces the number of steps involved and provides a way to keep services up to date with minimal configuration changes.

Log In and Locate Your Service

To begin the upgrade process, log in to your Elestio dashboard and navigate to the specific database service you want to upgrade. It is important to verify that the correct instance is selected, especially in environments where multiple databases are used for different purposes such as staging, testing, or production. The dashboard interface provides detailed information for each service, including version details, usage metrics, and current configuration. Ensure that you have access rights to perform upgrades on the selected service. Identifying the right instance helps avoid accidental changes to unrelated environments.

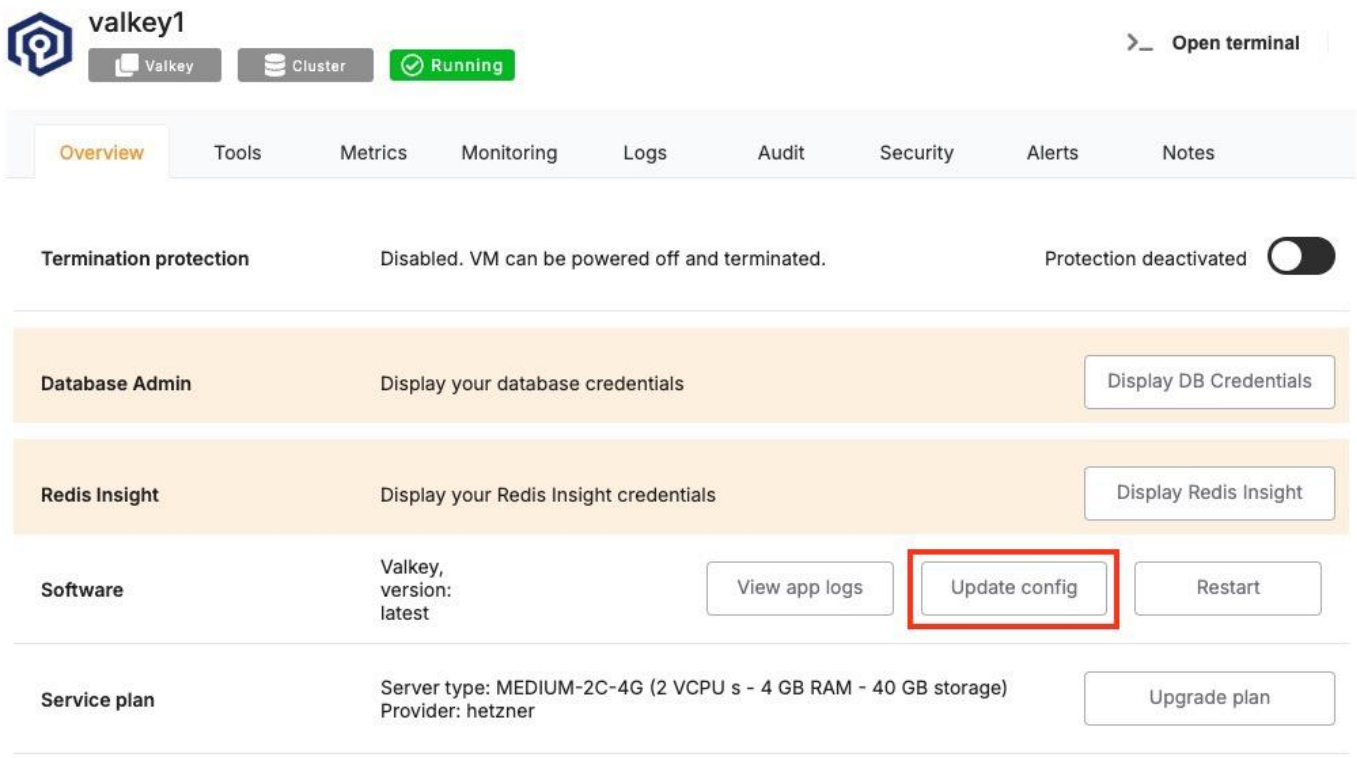
Back Up Your Data

Before starting the upgrade, create a backup of your database. A backup stores the current state of your data, schema, indexes, and configuration, which can be restored if something goes wrong during the upgrade. In Elestio, this can be done through the **Backups** tab by selecting **Back up now** under Manual local backups and **Download** the backup file. Scheduled backups may also be used, but it is recommended to create a manual one just before the upgrade. Keeping a recent backup allows quick recovery in case of errors or rollback needs. This is especially important in production environments where data consistency is critical.



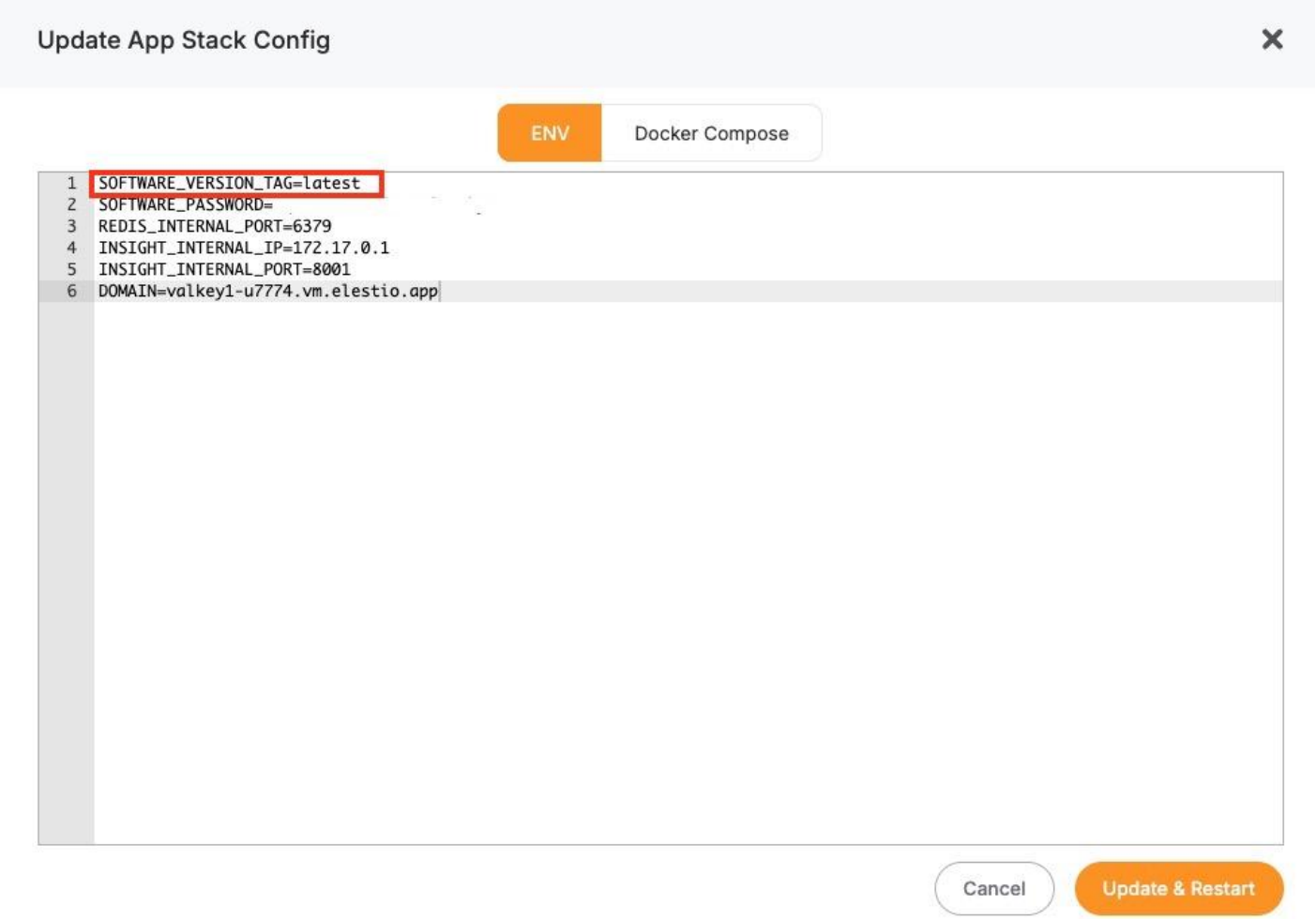
Select the New Version

Once your backup is secure, proceed to the **Overview** and then **Software > Update config** tab within your database service page.



Here, you'll find an option labeled **ENV**. In the **ENV** menu, change the desired database version to `SOFTWARE_VERSION`. After confirming the version, Elestio will begin the upgrade process automatically. During this time, the platform takes care of the version change and restarts the

database if needed. No manual commands are required, and the system handles most of the operational aspects in the background



Monitor the Upgrade Process

The upgrade process may include a short downtime while the database restarts. Once it is completed, it is important to verify that the upgrade was successful and the service is operating as expected. Start by checking the logs available in the Elestio dashboard for any warnings or errors during the process. Then, review performance metrics to ensure the database is running normally and responding to queries. Finally, test the connection from your client applications to confirm that they can interact with the upgraded database without issues.

Installing and Updating an Extension

Valkey supports Redis-compatible modules to extend core database functionality with custom data types, specialized algorithms, and advanced operations. These modules are compiled as shared object (.so) files and must be loaded at server startup. Examples include RedisBloom, RedisJSON, and RedisTimeSeries all of which are supported in Valkey just as in Redis.

In Elestio-hosted Valkey instances or any Docker Compose based setup, modules can be mounted and loaded via configuration in **docker-compose.yml**. This guide outlines how to install, load, and manage Valkey modules using Docker Compose, including verification steps, update methods, and best practices.

Installing and Enabling Valkey Modules

Modules in Valkey must be loaded at server startup using the --loadmodule directive. These are .so binaries typically mounted into the container from the host file system. The process is nearly identical to Redis module integration.

Update docker-compose.yml

To use a module such as **RedisBloom** in a Valkey Docker setup, mount the module file and add the --loadmodule directive to the container command.

```
services:
  valkey:
    image: valkey/valkey:latest
    volumes:
      - ./modules/redisbloom.so:/data/redisbloom.so
    command: ["valkey-server", "--loadmodule", "/data/redisbloom.so"]
    ports:
      - "6379:6379"
```

Explanation:

- ./modules/redisbloom.so is the local path on your host machine.
- /data/redisbloom.so is the path where the module will be accessible inside the container.

Ensure that the .so file exists locally before running the container.

Restart the Valkey Service

After updating the Docker Compose configuration, apply changes by restarting the container:

```
docker-compose down
docker-compose up -d
```

This reloads Valkey and ensures the module is initialized during startup.

Verify the Module is Loaded

Once Valkey is running, connect to the containerized service:

```
docker-compose exec valkey valkey-cli -a <yourPassword>
```

Run the following command to check for loaded modules:

```
MODULE LIST
```

Expected output (for RedisBloom):

```
1) 1) "name"
   2) "bf"
   3) "ver"
   4) (integer) 20207
```

This confirms that the module (in this case, bf for Bloom filters) has been loaded successfully.

Checking Module Availability & Compatibility

Valkey modules must match the container’s runtime architecture and the Valkey version. Many Redis modules work out-of-the-box with Valkey, but always check official documentation or test in a controlled environment first.

To inspect module metadata and compatibility:

```
INFO MODULES
```

To confirm the current Valkey version and platform:

```
docker-compose exec valkey valkey-server --version
```

If a module fails to load, check container logs for detailed error output:

```
docker-compose logs valkey
```

Most load failures are caused by missing binaries, unsupported formats, or incorrect file paths.

Updating or Unloading Modules

Valkey does **not** support dynamic unloading of modules while the server is running. To update or remove a module, the server must be stopped and restarted with the revised configuration.

Stop the container:

```
docker-compose down
```

Edit **docker-compose.yml** as needed:

- Update the .so path to reference the new module version.
- Remove the --loadmodule line to disable the module entirely.

Start the container again:

```
docker-compose up -d
```

Always test updated modules in staging before deploying to production environments.

Troubleshooting Common Module Issues

Issue	Cause	Resolution
Valkey fails to start	Invalid module path or incompatible binary	Check docker-compose logs valkey and verify path and architecture
MODULE command not recognized	Image does not include module support	Use an image like valkey/valkey:latest or valkey/valkey:alpine

Issue	Cause	Resolution
“Can’t open .so file” error	Volume not mounted or file permission denied	Confirm that the .so file exists and has readable permissions
Module not listed in MODULE LIST	Silent module load failure	Review container logs and validate command syntax
Module commands not recognized	Module did not load correctly	Ensure Valkey version and module binary compatibility

Security Considerations

Modules execute **native code** within the Valkey process and inherit its permissions. As such, only load **trusted** .so files compiled from official or reviewed source code. Avoid uploading or using third-party binaries without auditing.

In Elestio-managed or containerized environments, use Docker’s file and user isolation to reduce risk:

- Set **read-only** permissions on mounted .so files.
- Use **non-root users** inside containers when possible.
- Monitor module behavior with **SLOWLOG**, **INFO**, and command auditing.

Improperly configured or malicious modules can cause crashes, memory leaks, or worse. Treat modules as **privileged extensions** and keep them versioned and tested across environments.

Creating Manual Backups

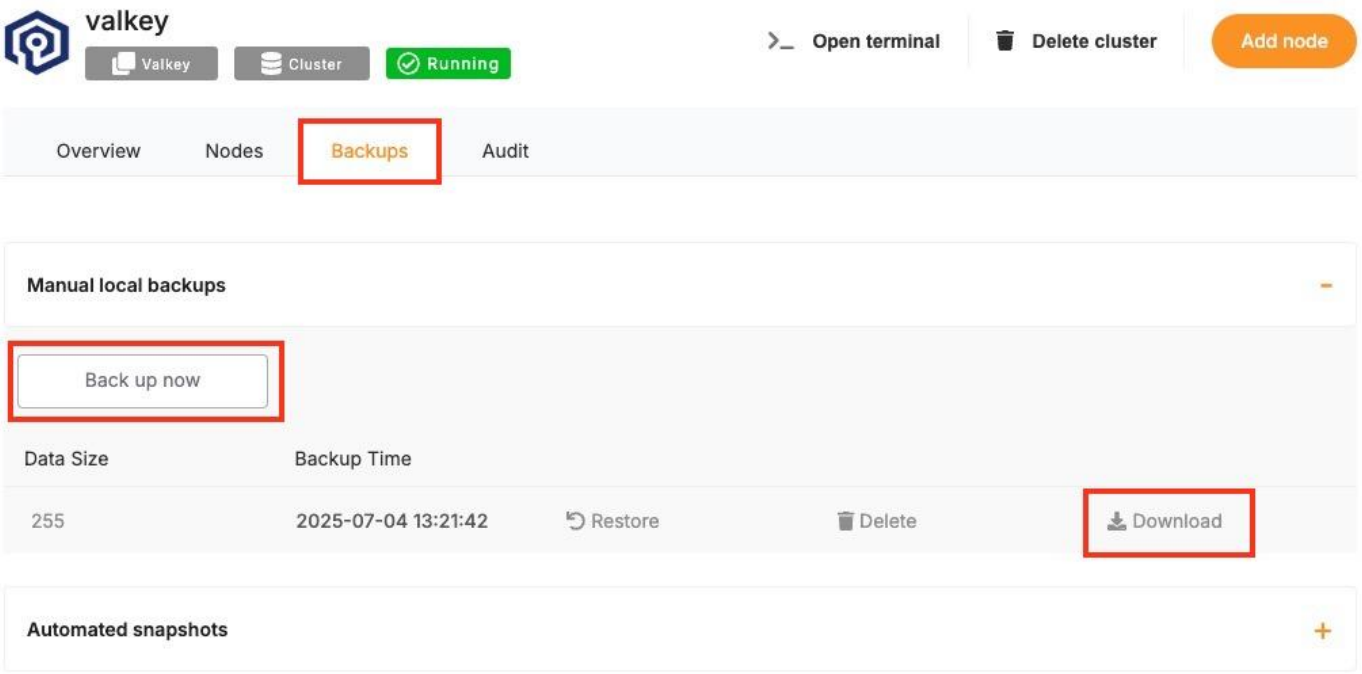
Regular backups are essential when running a Valkey deployment, especially if you're using it for persistent workloads. While Elestio provides automated backups for managed services by default, you may still want to create manual backups before major configuration changes, retain local archives, or test automation workflows. This guide covers several methods for creating Valkey backups on Elestio via the dashboard, CLI, or Docker Compose. It also explains retention strategies and automated backups using cron jobs.

Manual Service Backups on Elestio

If you're using Elestio's managed Valkey service, the simplest and most reliable way to perform a full backup is through the Elestio dashboard. This creates a snapshot of your current Valkey dataset and stores it in Elestio's infrastructure. These snapshots can later be restored directly from the dashboard, which is helpful when testing configuration changes or performing disaster recovery.

To trigger a manual Valkey backup on Elestio:

- Log in to the Elestio dashboard.
- Navigate to your Valkey service or cluster.
- Click the Backups tab in the service menu.
- Choose **Back up now** to generate a manual snapshot.



Manual Backups Using Docker Compose

For Valkey instances deployed using Docker Compose (e.g., in Elestio self-hosted environments), you can create manual backups by copying the internal persistence files RDB snapshots and optionally AOF logs.

Access Elestio Terminal

From the Elestio dashboard:

- Go to your deployed Valkey service.
- Navigate to **Tools > Terminal** and authenticate.

Locate the Valkey Container Directory

```
cd /opt/app/
```

This is the standard project directory on Elestio-managed hosts where your **docker-compose.yml** file resides.

Trigger an RDB Snapshot (Optional)

By default, Valkey creates periodic snapshots based on configuration. To force an immediate one:

```
docker-compose exec valkey valkey-cli SAVE
```

This generates a **dump.rdb** file in the container's **/data** directory.

Copy Backup Files from the Container

Use docker cp to extract the RDB snapshot file (and AOF if enabled) to your host machine:

```
docker cp $(docker-compose ps -q valkey):/data/dump.rdb ./backup_$(date +%F).rdb
```

If AOF persistence is enabled (appendonly yes in **valkey.conf**), back it up as well:

```
docker cp $(docker-compose ps -q valkey):/data/appendonly.aof ./appendonly_$(date +%F).aof
```

You now have point-in-time backups that can be restored later.

Backup Storage & Retention Best Practices

Valkey backup files can be small (RDB) or large (AOF), depending on data size and write frequency. It’s important to manage them properly.

Recommendations:

- Use clear, timestamped names like valkey_backup_2025_06_24.rdb.
- Store backups off-site or in the cloud (e.g., S3, Backblaze, or a secure remote server).
- Retention policy: Keep 7 daily, 4 weekly, and 3–6 monthly backups.
- Automate old backup cleanup with cron or shell scripts.
- Optionally compress with gzip, xz, or zstd.

Automating Valkey Backups (cron)

To automate Valkey backups, use cron to schedule daily backup tasks on Linux servers. This helps maintain consistency and reduces the chance of human error.

Example: Daily Backup at 3 AM

Edit your crontab:

```
crontab -e
```

Add the following entry:

```
0 3 * * * docker-compose -f /opt/app/docker-compose.yml exec valkey valkey-cli SAVE && \
docker cp $(docker-compose -f /opt/app/docker-compose.yml ps -q valkey):/data/dump.rdb
/backups/valkey_backup_$(date +\%F).rdb
```

Make sure /backups/ exists and has write permissions for the cron user.

Optional Compression + Upload

You can compress the file and upload it to cloud storage in the same cron job:

```
gzip /backups/valkey_backup_$(date +\%F).rdb
rclone copy /backups/ remote:daily-valkey-backups
```

Backup Format and Restore Notes

Format	Description	Restore Method
dump.rdb	Binary snapshot of full dataset	Stop Valkey, replace dump.rdb, and restart the container
appendonly.aof	Command log (if enabled)	Stop Valkey, replace AOF file, and restart the container

To Restore a Backup

See Elestio's Redis restore guide, which applies to Valkey as well:

- Stop Valkey:

```
docker-compose down
```

- Replace the backup file in your volume mount (e.g., /data/dump.rdb or appendonly.aof).
- Restart the service:

```
docker-compose up -d
```

Restoring a Backup

Restoring Valkey backups is critical for disaster recovery, staging environment replication, or rolling back to a known good state. Elestio supports restoration via its web dashboard and manual methods using Docker Compose and command-line tools. This guide covers how to restore Valkey backups from RDB or AOF files, for both full and partial restore scenarios, and includes fixes for common errors during the process.

Restoring from a Backup via Terminal

This method assumes you already have a backup file such as **dump.rdb** or **appendonly.aof**. Restoring involves stopping the container, replacing the data file(s), and restarting Valkey so it can load the new data at boot time.

Stop the Valkey Container

Cleanly stop the container to prevent data corruption:

```
docker-compose down
```

Replace the Backup File

Move the desired backup file into the volume directory that maps to the Valkey container's **/data**.

Example for RDB:

```
cp ./backup_2025_06_24.rdb /opt/app/data/dump.rdb
```

Ensure your **docker-compose.yml** contains the correct volume mapping:

```
volumes:
  - ./data:/data
```

For AOF-based persistence:

```
cp ./appendonly_2025_06_24.aof /opt/app/data/appendonly.aof
```

Restart Valkey

Bring the container back up:

```
docker-compose up -d
```

Valkey will automatically load **dump.rdb** or **appendonly.aof** depending on its configuration in **valkey.conf** or Docker entrypoint.

Restoring via Docker Compose Terminal

If you prefer working inside the container environment, you can directly inject the backup file into the Valkey container using Docker commands.

Copy the Backup File into the Container

For RDB:

```
docker cp ./backup_2025_06_24.rdb $(docker-compose ps -q valkey):/data/dump.rdb
```

For AOF:

```
docker cp ./appendonly_2025_06_24.aof $(docker-compose ps -q valkey):/data/appendonly.aof
```

Restart the Valkey Container

```
docker-compose restart valkey
```

Valkey will now reload the updated data file(s) during startup.

Partial Restores in Valkey

Valkey, like Redis, does not support partial data restoration out of the box. However, workarounds exist to selectively restore key-value pairs or subsets of data.

Restore Selected Keys via CLI

If you've exported a list of keys and their values, you can restore them using a script with **valkey-cli**:

```
cat keys_to_restore.txt | while read key; do
  value=$(cat dump.json | jq -r ".\"$key\"")
```

```
  valkey-cli SET "$key" "$value"
done
```

This method is useful when working with pre-filtered exports in JSON, CSV, or key dumps.

Restore from a Partial AOF

If your backup is a trimmed-down AOF file (for example, created by filtering certain operations), Valkey will replay it entirely at startup:

- Replace the existing **appendonly.aof** file.
- Restart the container.

Valkey will process only the included operations, effectively performing a partial restore.

Common Errors & How to Fix Them

Restoring Valkey may occasionally fail due to configuration mismatches, permission issues, or corrupted backup files. Below are common errors and their solutions.

1. NOAUTH Authentication Required

Error:

```
(error) NOAUTH Authentication required.
```

Cause: The Valkey instance requires authentication for any CLI interaction.

Fix:

```
valkey-cli -a yourpassword
```

In scripts:

```
valkey-cli -a "$VALKEY_PASSWORD" < restore_script.txt
```

2. Valkey Fails to Start After Restore

Error:

```
Fatal error loading the DB: Invalid RDB format
```

Cause: The backup file is corrupted or incompatible with the Valkey version.

Fix:

- Make sure the backup was created with the same or a compatible Valkey version.
- If necessary, downgrade or upgrade the container image to match the backup version.

3. Data Not Restored

Cause: Valkey is configured to use a different persistence method than the one you restored.

Fix:

Check your persistence mode in **valkey.conf** or Docker entry:

```
appendonly yes    # for AOF
appendonly no     # for RDB
```

Ensure the right file (**dump.rdb** or **appendonly.aof**) exists at **/data**.

4. Permission Denied When Copying Files

Error:

```
cp: cannot create regular file ‘/opt/app/data/dump.rdb’: Permission denied
```

Fix:

Use sudo if your shell user doesn’t have write access:

```
sudo cp ./backup_2025_06_24.rdb /opt/app/data/dump.rdb
```

Or adjust directory permissions as needed.

```
sudo chown $USER:$USER /opt/app/data
```

Identifying Slow Queries

Slow commands can impact Valkey performance, especially under high concurrency or when inefficient data access patterns are used. Whether you're running Valkey on Elestio via the dashboard, inside a Docker Compose setup, or accessing it through the CLI, Valkey includes powerful introspection tools like the slow log and latency tracking.

This guide shows how to detect slow operations using Valkey's built-in slowlog, analyze latency issues, and optimize performance through configuration tuning and query best practices.

Inspecting Slow Commands from the Terminal

Valkey supports the Redis-compatible SLOWLOG feature to record commands that exceed a configured execution time threshold. These logs are useful to spot expensive operations and server stalls.

Connect to Your Valkey Instance via Terminal

Use valkey-cli or redis-cli to connect to your Valkey instance:

```
valkey-cli -h <host> -p <port> -a <password>
```

Replace <host>, <port>, and <password> with the credentials available in your Elestio dashboard.

View the Slowlog Threshold

Check what execution time (in microseconds) is considered "slow":

```
CONFIG GET slowlog-log-slower-than
```

The default is 10000 (10 milliseconds). Commands slower than this will be logged.

View the Slow Query Logs

To retrieve recent slow operations:

```
SLOWLOG GET 10
```

This shows the 10 most recent slowlog entries, each with:

- The command that was executed
- The timestamp
- Execution duration in microseconds
- Any arguments passed to the command

Analyzing Inside Docker Compose

If you’re running Valkey via Docker Compose, you can inspect slow queries from within the container environment.

Access the Valkey Container

Launch a shell in your container:

```
docker-compose exec valkey bash
```

Connect to Valkey using:

```
valkey-cli -a $VALKEY_PASSWORD
```

Ensure that VALKEY_PASSWORD is defined in your .env file or Compose environment variables.

Adjust Slowlog Settings

You can view or modify the slowlog threshold dynamically:

```
CONFIG SET slowlog-log-slower-than 5000
```

This temporarily changes the threshold to 5 milliseconds, which is useful for debugging under lower latency conditions.

Increase the Number of Stored Entries

Check how many slowlog entries are retained:

```
CONFIG GET slowlog-max-len
```

To store more slowlog entries:

```
CONFIG SET slowlog-max-len 256
```

This helps in long-running investigations or during load testing.

Using the Latency Monitoring Feature

Valkey inherits Redis's latency monitoring tools, providing additional insights beyond command duration such as fork stalls, I/O blocks, or memory pressure.

Enable Latency Monitoring

Latency tracking is often enabled by default. Run:

```
LATENCY DOCTOR
```

This provides a high-level diagnostic report of system latency spikes and potential root causes, including slow commands, AOF rewrites, and blocking operations.

View Latency History for Specific Events

Track the latency of specific operations like:

```
LATENCY HISTORY command
```

Other event categories include:

- fork – Background save or AOF rewrite delays
- aof-write – Append-only file sync lag
- command – General command execution delays

Understanding and Resolving Common Bottlenecks

Valkey performance can degrade due to specific patterns of usage, large keys, blocking commands, or non-optimized pipelines.

Common Causes of Slowness

- Large keys: Commands like LRANGE, SMEMBERS, or HGETALL on large datasets.
- Blocking commands: Such as BLPOP, BRPOP, or long-running Lua scripts.
- Forking delays: Caused by SAVE or AOF background rewriting.

Best Practices for Performance

- Use SCAN instead of KEYS to iterate large keyspaces safely.
- Limit range queries: Use LRANGE 0 99 instead of fetching full lists.
- Enable pipelining: Reduce round trips by batching commands.
- Avoid multi-key ops: Especially in clustered deployments, where they can cause performance issues or fail.

Optimizing with Configuration Changes

Valkey performance can be significantly tuned by adjusting memory and persistence-related settings.

Common Tuning Examples

```
CONFIG SET maxmemory-policy allkeys-lru
CONFIG SET save ""
```

These adjust eviction and persistence behaviours. Use these with caution:

- Disabling RDB/AOF improves speed but removes durability.
- LRU/TTL policies control memory usage under load.

Detect and terminate long-running queries

Optimizing memory usage in Valkey is essential for maintaining performance, especially in production environments like Elestio. Without proper memory control, large datasets, long-lived keys, or inefficient operations can lead to high memory pressure, slowdowns, or even server crashes. This guide explains how to optimize memory usage, monitor for memory-related issues, and configure automatic cleanup using Docker Compose environments.

Understanding Valkey Memory Behaviour

Valkey allocates memory based on data structure usage and background operations like persistence or replication. It is important to monitor key memory indicators such as used memory, memory fragmentation, peak memory, and memory policy to understand how your instance behaves under load.

Monitoring Valkey Memory in Real Time

To inspect memory statistics from the command line, use the INFO MEMORY command:

```
valkey-cli -a <password> INFO MEMORY
```

This command returns a detailed report including used_memory, used_memory_rss, mem_fragmentation_ratio, and maxmemory. A high fragmentation ratio may indicate inefficient memory usage or a need to tune your allocator.

If you are running Valkey in a Docker Compose environment, connect to the container first:

```
docker-compose exec valkey bash
```

Once inside, run:

```
valkey-cli -a $VALKEY_PASSWORD
```

This gives you full access to execute monitoring and configuration commands.

Setting Maximum Memory and Eviction Policy

To avoid out-of-memory errors, it is crucial to set a memory cap and enable eviction. Edit your valkey.conf or set these at runtime:

```
CONFIG SET maxmemory 512mb
CONFIG SET maxmemory-policy allkeys-lru
```

The maxmemory setting defines the upper limit of memory usage. The maxmemory-policy determines how keys are evicted when that limit is reached. Recommended policies include:

- allkeys-lru: Evicts the least recently used keys across all keys
- volatile-lru: Evicts LRU keys with expiration set
- noeviction: Rejects writes when memory is full (not recommended in production)

Analyzing Memory Usage with MEMORY STATS

Use the built-in MEMORY STATS command for a high-level breakdown of memory usage by component:

```
MEMORY STATS
```

This provides statistics on memory overhead, allocator efficiency, and usage by data structure types.

Cleaning Up Expired or Unused Keys

Expired keys in Valkey are removed passively upon access or through background expiration cycles. To force cleanup manually or test expiration behavior:

```
MEMORY PURGE
```

This clears internal allocator caches and triggers background memory cleanup without deleting live keys. Use this cautiously in production environments.

Listing Keys Consuming the Most Memory

You can use the MEMORY USAGE command to inspect which keys consume the most memory. For example:

```
MEMORY USAGE mykey
```

To automate finding the top memory-consuming keys, use a loop with SCAN and MEMORY USAGE:

```
SCAN 0 COUNT 100
```

Then evaluate MEMORY USAGE per key manually or using a script.

Best Practices for Valkey Memory Management

Minimize memory pressure by following these recommendations:

- **Avoid large keys:** Break large values into smaller hashes or lists to reduce memory footprint and allow efficient partial retrieval.
- **Expire non-essential keys:** Always set TTLs on cache data or temporary states using `EXPIRE` or `SETEX`.
- **Avoid full dataset scans:** Replace commands like `KEYS *` with `SCAN` to prevent memory spikes.
- **Limit big lists or sets:** Use commands like LRANGE mylist 0 99 instead of fetching entire datasets with `LRANGE mylist 0 -1`.
- **Use lazy data loading:** Design applications to load only required data in batches.

Monitoring Memory Growth Over Time

Track historical memory usage using the INFO MEMORY and LATENCY DOCTOR commands periodically, and export metrics to Prometheus or another monitoring system if needed.

Consider integrating Valkey with monitoring tools like:

- Grafana with Prometheus Exporter
- Elestio’s built-in monitoring agent

These help you visualize and react to memory growth trends in real time.

Optimizing Valkey’s memory usage is essential to running reliable, responsive services. By configuring `maxmemory`, choosing an appropriate eviction policy, monitoring key memory metrics, and cleaning up expired data, you can ensure predictable performance under load. Combine these strategies with external monitoring for long-term stability in Docker Compose environments like Elestio.

Preventing Full Disk

Running out of disk space in a Valkey environment can result in failed writes, background save errors, and degraded availability. Valkey, like Redis, uses disk storage for persistence (RDB and AOF), temporary files, and logs especially when persistence is enabled. On managed hosting platforms like Elestio, while infrastructure maintenance is handled, it is up to the user to monitor disk space, configure retention settings, and perform regular cleanups. This guide walks through how to monitor disk usage, configure alerts, remove unnecessary data, and apply best practices for avoiding full disk issues in a Valkey setup under Docker Compose

Monitoring Disk Usage

Disk usage monitoring helps identify abnormal growth patterns and prevents outages due to insufficient storage. In Docker Compose environments, both host-level and container-level monitoring are essential.

Inspect the host system storage

Run the following command on the host to check overall disk usage and determine which mount point is filling up:

```
df -h
```

This displays disk usage statistics across volumes. Locate the mount point corresponding to your Valkey data volume—typically something like /var/lib/docker/volumes/valkey_data/_data.

Check disk usage from inside the container

To get insight into the container’s internal disk usage, first enter the container shell:

```
docker-compose exec valkey sh
```

Once inside the container, assess the size of the data directory with:

```
du -sh /data
```

This reveals the total size used by Valkey data files, such as appendonly.aof, dump.rdb, and temporary files. You can also list file-level details with:

```
ls -lh /data
```

This helps identify which files are occupying the most space.

Configuring Alerts and Cleaning Up Storage

Monitoring disk usage is not enough; you must also set up alerts and take action to reclaim space. On the host system, analyze Docker resource usage with:

```
docker system df
```

This provides insights into how much space is consumed by images, volumes, and containers.

Identify unused Docker volumes

To list all volumes on the host, run:

```
docker volume ls
```

If you find a volume that is unused and safe to delete, remove it with:

```
docker volume rm <volume-name>
```

Make sure you do not delete the volume mapped to your Valkey data directory unless it is backed up and verified to be unused.

Trigger AOF file compaction

When using AOF persistence, the append-only file may grow large over time. You can reduce its size by triggering a background rewrite:

```
docker-compose exec valkey valkey-cli BGREWRITEAOF
```

This creates a compacted version of the AOF file with the same dataset.

Clean up old snapshots

RDB snapshots accumulate over time if not managed. They are stored in the /data directory inside the container. To list them, run:

```
docker-compose exec valkey ls -lh /data
```

Remove old .rdb files with:

```
docker-compose exec valkey rm /data/dump-<timestamp>.rdb
```

Ensure that any snapshot you remove is not needed for recovery.

Managing and Optimizing Temporary Files

Valkey creates temporary files during fork operations, such as when saving snapshots or rewriting AOF files. These are typically stored in /tmp inside the container.

Monitor temporary file usage

You can inspect the size of the temporary directory with:

```
docker-compose exec valkey du -sh /tmp
```

If this directory becomes full, forked operations like BGSAVE or BGREWRITEAOF may fail. To mitigate this, you can change the temporary directory path in valkey.conf to use a volume-backed location like /data:

```
dir /data
```

Restart the container after making this configuration change.

Best Practices for Disk Space Management

Effective disk space management in Valkey depends on adopting a forward-looking configuration and consistent housekeeping.

- Avoid storing large binary blobs directly in Valkey. Instead, keep files like PDFs, images, and other large media in external object storage and only store metadata or keys in Valkey.
- If persistence is not required, disable it entirely to reduce disk usage. This is useful for cache-only workloads:

```
appendonly no
save ""
```

- To avoid uncontrolled AOF file growth, configure rewrite thresholds in valkey.conf:

```
auto-aof-rewrite-percentage 100
auto-aof-rewrite-min-size 64mb
```

- Set up log rotation if your container logs to files such as /var/log/valkey/valkey-server.log. This can be managed using logrotate on the host system, or via Docker logging options in docker-compose.yml:

```
logging:
  driver: "json-file"
  options:
    max-size: "10m"
    max-file: "3"
```

- Always use TTLs for cache or session keys to avoid indefinite storage growth. For example:

```
SET session:<id> "data" EX 3600
```

- Track memory and persistence statistics with:

```
docker-compose exec valkey valkey-cli INFO memory
docker-compose exec valkey valkey-cli INFO persistence
```

Backup files stored in /data should be offloaded to a remote location. Use Elestio’s built-in backup options or mount a dedicated remote volume using your docker-compose.yml to ensure backups do not consume host disk space indefinitely.

Checking Database Size and Related Issues

As your Valkey data grows especially when using persistence modes like RDB or AOF it’s essential to monitor how disk and memory resources are consumed. Uncontrolled growth can result in full disks, write failures, longer restarts, and issues with snapshot backups. While Elestio handles infrastructure hosting, managing storage cleanup and optimization is the user’s responsibility. This guide shows how to inspect keyspace usage, analyze persistence files, detect memory bloat, and tune your Valkey deployment under Docker Compose.

Checking Keyspace Usage and Persistence File Size

Like Redis, Valkey doesn’t have schemas or tables but provides insights through built-in commands and memory metrics.

Check total memory used by Valkey

Connect to the container:

```
docker-compose exec valkey valkey-cli INFO memory
```

Look at used_memory_human and maxmemory to understand current usage and configured limits.

Inspect key count and TTL stats

```
docker-compose exec valkey valkey-cli INFO keyspace
```

You’ll see entries like:

```
db0:keys=2400,expires=2100,avg_ttl=36000000
```

This helps identify how many keys are temporary and whether the dataset will grow indefinitely.

View on-disk file sizes

Valkey writes persistence files to /data inside the container:

```
docker-compose exec valkey sh -c "ls -lh /data"
```

Check the size of dump.rdb, appendonly.aof, and any temporary files.

Detecting Bloat and Unused Space

Valkey supports Redis commands and adds community-focused improvements, but it can still suffer from memory inefficiencies if not monitored properly.

Estimate memory usage by key pattern

```
docker-compose exec valkey valkey-cli --bigkeys
```

This reveals large keys by data type, helping you spot high-memory structures like oversized lists or sets.

Analyze memory per key (manual sample)

```
docker-compose exec valkey valkey-cli MEMORY USAGE some:key
```

This helps profile storage-heavy keys by prefix or type.

Check memory fragmentation

```
docker-compose exec valkey valkey-cli INFO memory | grep fragmentation
```

If mem_fragmentation_ratio is over 1.2, it may indicate inefficient memory allocation.

Optimizing and Reclaiming Valkey Storage

Once you've identified bloated memory areas or oversized persistence files, you can apply optimizations.

Compact the AOF file

```
docker-compose exec valkey valkey-cli BGREWRITEAOF
```

This rewrites and reduces the size of appendonly.aof.

Delete unused keys or apply TTLs

```
docker-compose exec valkey valkey-cli DEL obsolete:key
docker-compose exec valkey valkey-cli EXPIRE session:1234 3600
```

To bulk-delete keys by pattern (use with caution):

```
docker-compose exec valkey valkey-cli --scan --pattern "temp:*" | xargs -n 100 valkey-cli DEL
```

Configure eviction policies

In your mounted valkey.conf:

```
maxmemory 1gb
maxmemory-policy allkeys-lru
```

Restart the container to apply these changes. This ensures automatic cleanup when memory thresholds are exceeded.

Best Practices for Valkey Storage Management

- Use TTLs on non-permanent keys: Set expiration on cache/session data to avoid unbounded key growth.
- Avoid storing binary files in Valkey: Keep large files (images, documents, etc.) in object storage. Use Valkey only for metadata.
- Rotate container logs: In your docker-compose.yml:

```
logging:
  driver: "json-file"
  options:
    max-size: "10m"
    max-file: "3"
```

- Use compact data structures: Favor HASH, SET, or ZSET over storing entire JSON blobs as STRING.
- Monitor and control AOF size: Configure AOF rewrite frequency in valkey.conf:

```
auto-aof-rewrite-percentage 100
auto-aof-rewrite-min-size 64mb
```

- Archive old analytical data: Periodically move old metrics, logs, or time-series entries to cold storage.
- Externalize backups: Use Elestio’s backup features or configure external volumes/cloud storage to avoid accumulating snapshots on the same disk used for live data.