PERCONA

Server for MongoDB 6.0.24-19

Documentation

6.0.24-19 (June 12, 2025)

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Percona Server for MongoDB 6.0 Documentation

Percona Server for MongoDB is an enhanced, fully compatible, source available, drop-in replacement for MongoDB 6.0 Community Edition with enterprise-grade features. To migrate to Percona Server for MongoDB requires no changes to MongoDB applications or code.

What's new in Percona Server for MongoDB 6.0.24-19

Important

Changes to Chunk Management and Balancing

Several changes have been incrementally introduced within 6.0.x releases.

- The name of a subset of data has changed from a `chunk` to a `range`.
- The data size has changed from 64 MB for a chunk to 128 MB for a range.
- The balancer now distributes ranges based on the actual data size of collections. Formerly the balancer migrated and balanced data across shards based strictly on the number of chunks of data that exist for a collection across each shard. This, combined with the auto-splitter process could cause quite a heavy performance impact to heavy write environments.
- Ranges (formerly chunks) are no longer auto-split. They are split only when they move across shards for distribution purposes. The auto-splitter process is currently still available but it serves no purpose and does nothing active to the data. This also means that the Enable/Disable AutoSplit helpers should no longer be used.

The above changes are expected to lead to better performance overall going forward.

Installation guides

Control database access

Ready to try out Percona Server for MongoDB? Get started quickly with the step-by-step installation instructions.

Quickstart guides →

Define who has access to the database and manage their permissions in a single place like LDAP server, ensuring only authorized users have access to resources and operations.

Authentication →

Backup and restore

Make enterprise-level backups and restores with guaranteed data consistency using Percona Backup for MongoDB (PBM). Or, create physical backups on a running server using the built-in **hot backup** functionality.

Get started with PBM →

Secure access to data

Keep your sensitive data safe, ensuring users only see the data they are authorized to access.

Data-at-rest encryption →

Percona Server for MongoDB Pro

Percona Server for MongoDB Pro is a build of Percona Server for MongoDB that contains purpose-built enterprise features. It is wrapped in packages created and tested by Percona and is available exclusively for Percona customers.

Percona Server for MongoDB Pro is available starting with version 6.0.9-7.

Become a Percona Customer

Non-paying Percona software users can also benefit from Percona Pro Builds, but they'll have to build them from the source code provided by Percona and available to everyone.

Features

Find the list of features available in Percona Server for MongoDB Pro:

Name	Version added	Description
FIPS support	6.0.9-7	FIPS mode provides a way to use FIPS-compliant encryption and run the Percona Server for MongoDB with the FIPS-140 certified library for OpenSSL. This helps customers meet minimum security requirements for cryptographic modules and testing in both hardware and software
Binaries with debug symbols	6.0.21-18	By including debug symbols in the binary, Percona Server for MongoDB enables deeper integration with monitoring agent-based solutions. These agents can instrument the binary at runtime, providing more detailed telemetry data, such as performance metrics, error tracking, and function-level diagnostics. This enhanced observability allows for better monitoring of system health, faster identification of issues, and more granular insights into how the application performs in production environments. Including this information empowers teams to respond proactively to performance bottlenecks, optimize resource allocation, and improve the overall stability of the application with real-time insights.
Ubuntu 20.04	6.0.21-18	Percona Server for MongoDB Pro remains available on Ubuntu 20.04 (Focal Fossa) enabling customers to continue using this operating system version for their deployments while receiving updates and support from Percona.

Benefits

- Save on deploying and maintaining build infrastructure as we do the build and testing for you
- Longer support for older versions of operating systems.

Install Percona Server for MongoDB Pro

Get help from Percona

Our documentation guides are packed with information, but they can't cover everything you need to know about Percona Server for MongoDB. They also won't cover every scenario you might come across. Don't be afraid to try things out and ask questions when you get stuck.

Percona's Community Forum

Be a part of a space where you can tap into a wealth of knowledge from other database enthusiasts and experts who work with Percona's software every day. While our service is entirely free, keep in mind that response times can vary depending on the complexity of the question. You are engaging with people who genuinely love solving database challenges.

We recommend visiting our Community Forum. It's an excellent place for discussions, technical insights, and support around Percona database software. If you're new and feeling a bit unsure, our FAQ and Guide for New Users ease you in.

If you have thoughts, feedback, or ideas, the community team would like to hear from you at Any ideas on how to make the forum better?. We're always excited to connect and improve everyone's experience.

Percona experts

Percona experts bring years of experience in tackling tough database performance issues and design challenges.

We understand your challenges when managing complex database environments. That's why we offer various services to help you simplify your operations and achieve your goals.

Service	Description
24/7 Expert Support	Our dedicated team of database experts is available 24/7 to assist you with any database issues. We provide flexible support plans tailored to your specific needs.
Hands-On Database Management	Our managed services team can take over the day-to-day management of your database infrastructure, freeing up your time to focus on other priorities.
Expert Consulting	Our experienced consultants provide guidance on database topics like architecture design, migration planning, performance optimization, and security best practices.
Comprehensive Training	Our training programs help your team develop skills to manage databases effectively, offering virtual and in-person courses.

We're here to help you every step of the way. Whether you need a quick fix or a long-term partnership, we're ready to provide your expertise and support.

Get started

Quickstart guides

Percona Server for MongoDB is an enhanced, fully compatible, source available, drop-in replacement for MongoDB 6.0 Community Edition with enterprise-grade features.

Find the full list of supported platforms for Percona Server for MongoDB on the Percona Software and Platform Lifecycle page.

Install Percona Server for MongoDB Regular

You can use any of the easy-install guides. We recommend to use **the package manager of your operating system** for a convenient and quick way to install the software for production use. **Use Docker** to try the software first.

Package manager

Use the package manager of your operating system to install Percona Server for MongoDB:

on Debian and Ubuntu → | on RHEL and derivatives → | on Amazon Linux 2023 →

We gather Telemetry data in Percona packages.

Docker

Get our Docker image and spin up Percona Server for MongoDB for a quick evaluation.

Check the Docker guide for step-by-step guidelines.

Run in Docker →

We gather Telemetry data in Docker images.

Kubernetes

Percona Operator for Kubernetes is a controller introduced to simplify complex deployments that require meticulous and secure database expertise.

Check the Quickstart guides how to deploy and run Percona Server for MongoDB on Kubernetes with Percona Operator for MongoDB.

Deploy in Kubernetes Quickstart →

Build from source

Have a full control over the installation by building Percona Server for MongoDB from source code.

Check the guide below for step-by-step instructions.

Build from source →

Manual download

If you need to install Percona Server for MongoDB offline or prefer a specific version of it, check out the link below for a step-by-step guide and get access to the downloads directory.

Note that for this scenario you must make sure that all dependencies are satisfied.

Install from tarballs →

Install Percona Server for MongoDB Pro

Percona Server for MongoDB Pro is available only from Percona repositories.

Install Percona Server for MongoDB Pro →

Upgrade instructions

If you are currently using MongoDB Community Edition, see Upgrading from MongoDB.

If you are running an earlier version of Percona Server for MongoDB, see Upgrading from Version 5.0.

If you wish to upgrade to Percona Server for MongoDB Pro, see Upgrade to Percona Server for MongoDB Pro guide.

1. Installation

System requirements

x86_64

Percona Server for MongoDB requires the following minimum x86_64 microarchitectures:

- For Intel x86_64, it requires one of the following:
- a *Sandy Bridge* or later Core processor, or
- a *Tiger Lake* or later Celeron or Pentium processor.
- For AMD x86_64, it requires a *Bulldozer* or later processor.

`mongod` and `mongos` instances are supported on x86_64 platforms that must meet these minimum microarchitecture requirements:

- Only Oracle Linux running the Red Hat Compatible Kernel (RHCK) is supported. MongoDB does not support the Unbreakable Enterprise Kernel (UEK).
- MongoDB 5.0 and above require the AVX instruction set, which is available on select Intel and AMD processors.

ARM64

Percona Server for MongoDB requires the ARMv8.2-A or later microarchitectures. Support for ARM64 (AARch64) includes AWS Graviton2 or newer processors.

Virtual hardware recommendations for cloud deployments

Percona Server for MongoDB runs reliably on cloud infrastructure and is supported for all cloud providers.

This document includes virtual hardware recommendations for the most popular cloud providers.

Amazon Web Services (AWS)

Percona recommends the AWS EC2 memory-optimized instances as they best suit Percona Server for MongoDB usage. The `R7i` offers the best performance-per-dollar ratio among all memory-optimized AWS EC2 instance types. The cost efficiency makes these instances a strong choice for organizations that need high and cost-efficient performance. You can review the Amazon website for more details on Amazon EC2 R5 Instances.

Instance size	vCPU	Memory (GiB)
r7i.xlarge	4	32
r7i.2xlarge	8	64
r7i.4xlarge	16	128
r7i.8xlarge	32	256
r7i.16xlarge	64	512

The recommendation is based on Yahoo! Cloud Serving Benchmark (YCSB) version 0.17.0 and is fully described in the article "Which memory-optimized AWS EC2 instance type is best for MongoDB?"

Microsoft Azure

Percona recommends Virtual Machine (VM) sizes from the D-series for Percona Server for MongoDB deployments in Microsoft Azure. `Dsv5` instance family is the most cost-efficient choice. For more information on Azure Virtual Machines, see Linux Virtual Machines pricing.

Instance size	vCPU	Memory (GiB)
D8s v5	8	32
D16s v5	16	64
D32s v5	32	128
D64s v5	64	256
D96s v5	96	384

The recommendation is based on Yahoo! Cloud Serving Benchmark (YCSB) version 0.17.0 and fully described in the article "Best Virtual Machine Size for Self-Managed MongoDB on Microsoft Azure"

Google Cloud

Percona recommends `c3-standard` machine families among other general-purpose GCP instances for Percona Server for MongoDB deployment in Google Cloud Platform (GCP). For more information on Google virtual machines, see Google Compute Products.

Instance size	vCPU	Memory (GiB)
c3-standard-8	8	32
c3-standard-22	16	88
c3-standard-44	32	176
c3-standard-88	64	352

The recommendation is based on Yahoo! Cloud Serving Benchmark (YCSB) version 0.17.0 and fully described in the article "MongoDB: Best choice of instance type on GCP"

Install Percona Server for MongoDB on Debian and Ubuntu

This document describes how to install Percona Server for MongoDB from Percona repositories on DEB-based distributions such as Debian and Ubuntu.

We gather Telemetry data to understand the use of the software and improve our products.

Package contents

Package	Contains
`percona-server-mongodb`	The `mongosh` shell, import/export tools, other client utilities, server software, default configuration, and `init.d` scripts.
`percona-server-mongodb-server`	The `mongod` server, default configuration files, and `init.d` scripts
`percona-server-mongodb-shell`	The `mongosh` shell
`percona-server-mongodb-mongos`	The `mongos` sharded cluster query router
`percona-server-mongodb-tools`	Mongo tools for high-performance MongoDB fork from Percona
`percona-server-mongodb-dbg`	Debug symbols for the server

Procedure

Before you start, check the system requirements.

Configure Percona repository

Percona provides the `percona-release` configuration tool that simplifies operating repositories and enables to install and update both Percona Server for MongoDB packages and required dependencies smoothly.

1. Fetch `percona-release` packages from Percona web:

```
$ wget https://repo.percona.com/apt/percona-release_latest.$(lsb_release -
sc)_all.deb
```

2. Install the downloaded package with **dpkg**:

   ```
   $ sudo dpkg -i percona-release_latest.$(lsb_release -sc)_all.deb
   ```

   After you install this package, you have the access to Percona repositories. You can check the repository setup in the `/etc/apt/sources.list.d/percona-release.list` file.

3. Enable the repository:

   ```
   $ sudo percona-release enable psmdb-60 release
   ```

4. Remember to update the local cache:

   ```
   $ sudo apt update
   ```

Install Percona Server for MongoDB

Install the latest version

Run the following command to install the latest version of Percona Server for MongoDB:

```
$ sudo apt install percona-server-mongodb
```

Install a specific version

To install a specific version of Percona Server for MongoDB, do the following:

1. List available versions:

   ```
   $ sudo apt-cache madison percona-server-mongodb
   ```

   Sample output:

   ```
   percona-server-mongodb | 6.0.24-19.jammy | http://repo.percona.com/psmdb-
   60/apt jammy/main amd64 Packages
   ```

2. Install a specific version packages. You must specify each package with the version number. For example, to install Percona Server for MongoDB 6.0.24-19, run the following command:

   ```
   $ sudo apt install percona-server-mongodb=6.0.24-19.jammy percona-server-
   mongodb-mongos=6.0.24-19.jammy percona-server-mongodb-shell=6.0.24-19.jammy
   percona-server-mongodb-server=6.0.24-19.jammy percona-server-mongodb-
   tools=6.0.24-19.jammy
   ```

By default, Percona Server for MongoDB stores data files in `/var/lib/mongodb/` and configuration parameters in `/etc/mongod.conf`.

Run Percona Server for MongoDB

Percona Server for MongoDB is started automatically after installation unless it encounters errors during the installation process.

Start the service

You can manually start the service using the following command:

```
$ sudo systemctl start mongod
```

Confirm that the service is running

Check the service status using the following command:

```
$ sudo systemctl status mongod
```

Stop the service

```
$ sudo systemctl stop mongod
```

Restart the service

```
$ sudo systemctl restart mongod
```

Congratulations! Your Percona Server for MongoDB is up and running.

Next steps

Connect to MongoDB →

Install Percona Server for MongoDB on Red Hat Enterprise Linux and derivatives

This document describes how to install Percona Server for MongoDB on RPM-based distributions such as Red Hat Enterprise Linux and compatible derivatives.

We gather Telemetry data to understand the use of the software and improve our products.

Package contents

Package	Contains
`percona-server-mongodb`	The `mongosh` shell, import/export tools, other client utilities, server software, default configuration, and `init.d` scripts.
`percona-server-mongodb-server`	The `mongod` server, default configuration files, and `init.d` scripts
`percona-server-mongodb-shell`	The `mongosh` shell
`percona-server-mongodb-mongos`	The `mongos` sharded cluster query router
`percona-server-mongodb-tools`	Mongo tools for high-performance MongoDB fork from Percona
`percona-server-mongodb-dbg`	Debug symbols for the server

Procedure

Before you start, check the system requirements.

Configure Percona repository

Percona provides the `percona-release` configuration tool that simplifies operating repositories and enables to install and update both Percona Server for MongoDB packages and required dependencies smoothly.

1. Install **percona-release**:

```
$ sudo yum install https://repo.percona.com/yum/percona-release-latest.noarch.rpm
```

Example output

```
Retrieving https://repo.percona.com/yum/percona-release-latest.noarch.rpm
Preparing...                ########################################### [100%]
1:percona-release           ########################################### [100%]
```

2. Enable the repository:

```
$ sudo percona-release enable psmdb-60 release
```

Install Percona Server for MongoDB packages

Install the latest version

To install the latest version of *Percona Server for MongoDB*, use the following command:

```
$ sudo yum install percona-server-mongodb
```

Install a specific version

To install a specific version of *Percona Server for MongoDB*, do the following:

1. List available versions:

   ```
   $ sudo yum list percona-server-mongodb --showduplicates
   ```

   Sample output:

   ```
       Available Packages

   percona-server-mongodb.x86_64    6.0.24-19.el8       psmdb-60-release-x86_64
   ```

2. Install a specific version packages. For example, to install *Percona Server for MongoDB* 6.0.24-19, run the following command:

   ```
   $ sudo yum install percona-server-mongodb-6.0.24-19.el8
   ```

By default, Percona Server for MongoDB stores data files in `/var/lib/mongodb/` and configuration parameters in `/etc/mongod.conf`.

Run Percona Server for MongoDB

> **Note**
>
> If you use SELinux in enforcing mode, you must customize your SELinux user policies to allow access to certain `/sys` and `/proc` files for OS-level statistics. Also, you must customize directory and port access policies if you are using non-default locations.
>
> Please refer to Configure SELinux section of MongoDB Documentation for policy configuration guidelines.

Start the service

Percona Server for MongoDB is not started automatically after installation. Start it manually using the following command:

```
$ sudo systemctl start mongod
```

Confirm that service is running

Check the service status using the following command:

```
$ sudo systemctl status mongod
```

Stop the service

Stop the service using the following command:

```
$ sudo systemctl stop mongod
```

Restart the service

Restart the service using the following command:

```
$ sudo systemctl restart mongod
```

Run after reboot

The `mongod` service is not automatically started after you reboot the system.

To make it start automatically after reboot, enable it using the systemctl utility:

```
$ sudo systemctl enable mongod
```

Then start the `mongod` service:

```
$ sudo systemctl start mongod
```

Next steps

Connect to MongoDB →

Install Percona Server for MongoDB on Amazon Linux 2023

This guide walks you through the installation of Percona Server for MongoDB on Amazon Linux 2023.

We gather Telemetry data to understand the use of the software and improve our products.

Compatibility with Amazon Linux 2023

We build and test Percona Server for MongoDB only on the latest versions of Amazon Linux 2023. Because of the way Amazon Linux updates their libraries, Percona Server for MongoDB works only on specific Amazon Linux versions.

The following table shows Percona Server for MongoDB versions that are supported on specific versions of Amazon Linux 2023:

Percona Server for MongoDB version	Amazon Linux 2023 version
6.0.20-17	2023.6.x and earlier
6.0.21-18	2023.7.x

To upgrade Percona Server for MongoDB, make sure that you run a compatible version of Amazon Linux 2023. Use the update instructions to update the operating system.

Package contents

Package	Contains
`percona-server-mongodb`	The `mongosh` shell, import/export tools, other client utilities, server software, default configuration, and `init.d` scripts.
`percona-server-mongodb-server`	The `mongod` server, default configuration files, and `init.d` scripts
`percona-server-mongodb-shell`	The `mongosh` shell
`percona-server-mongodb-mongos`	The `mongos` sharded cluster query router
`percona-server-mongodb-tools`	Mongo tools for high-performance MongoDB fork from Percona
`percona-server-mongodb-dbg`	Debug symbols for the server

Procedure

Before you start, check the system requirements.

Configure Percona repository

Percona provides the `percona-release` configuration tool that simplifies operating repositories and enables to install and update both Percona Server for MongoDB packages and required dependencies smoothly.

1. Install **percona-release**:

```
$ sudo yum install https://repo.percona.com/yum/percona-release-
latest.noarch.rpm
```

Example output

```
Retrieving https://repo.percona.com/yum/percona-release-latest.noarch.rpm
Preparing...                ########################################### [100%]
1:percona-release           ########################################### [100%]
```

2. Enable the repository:

```
$ sudo percona-release enable psmdb-60 release
```

Install Percona Server for MongoDB packages

Install the latest version

To install the latest version of *Percona Server for MongoDB*, use the following command:

```
$ sudo yum install percona-server-mongodb
```

Install a specific version

To install a specific version of *Percona Server for MongoDB*, do the following:

1. List available versions:

```
$ sudo yum list percona-server-mongodb --showduplicates
```

Sample output:

```
    Available Packages

percona-server-mongodb.aarch64    6.0.24-19.amzn2023       psmdb-60-release-
aarch64
```

2. Install a specific version packages. For example, to install *Percona Server for MongoDB* 6.0.24-19, run the following command:

```
$ sudo yum install percona-server-mongodb-6.0.24-19.amzn2023
```

By default, Percona Server for MongoDB stores data files in `/var/lib/mongodb/` and configuration parameters in `/etc/mongod.conf`.

Run Percona Server for MongoDB

> **Note**
>
> If you use SELinux in enforcing mode, you must customize your SELinux user policies to allow access to certain `/sys` and `/proc` files for OS-level statistics. Also, you must customize directory and port access policies if you are using non-default locations.
>
> Please refer to Configure SELinux section of MongoDB Documentation for policy configuration guidelines.

Start the service

Percona Server for MongoDB is not started automatically after installation. Start it manually using the following command:

```
$ sudo systemctl start mongod
```

Confirm that service is running

Check the service status using the following command:

```
$ sudo systemctl status mongod
```

Stop the service

Stop the service using the following command:

```
$ sudo systemctl stop mongod
```

Restart the service

Restart the service using the following command:

```
$ sudo systemctl restart mongod
```

Run after reboot

The `mongod` service is not automatically started after you reboot the system.

To make it start automatically after reboot, enable it using the systemctl utility:

```
$ sudo systemctl enable mongod
```

Then start the `mongod` service:

```
$ sudo systemctl start mongod
```

Next steps

Connect to MongoDB →

Install Percona Server for MongoDB from binary tarball

You can find links to the binary tarballs under the *Generic Linux* menu item on the Percona website

There are the following tarballs available:

- `percona-server-mongodb-6.0.24-19-x86_64.<operating-system>.tar.gz` is the tarball for a supported operating system.
- `percona-mongodb-mongosh-2.5.0-x86_64.tar.gz` is the tarball for `mongosh` shell.

Tarball types

Type	Name	Description
Full	percona-server-mongodb-6.0.24-19-x86_64..tar.gz	Contains binaries and libraries
Minimal	percona-server-mongodb-6.0.24-19-x86_64.-minimal.tar.gz	Contains binaries and libraries without debug symbols
Checksum	percona-server-mongodb-6.0.24-19-x86_64.-minimal.tar.gz.sha256sum	Contains the MD5 checksum to verify the integrity of the files after the extraction

Preconditions

Install the following dependencies required to install Percona Server for MongoDB from tarballs.

RHEL and derivatives

```
$ sudo yum install openldap cyrus-sasl-gssapi curl
```

Ubuntu

```
$ sudo apt install curl libsasl2-modules-gssapi-mit
```

Debian

```
$ sudo apt curl libsasl2-modules-gssapi-mit
```

Procedure

Follow these steps to install Percona Server for MongoDB from a tarball:

1. Fetch and the binary tarballs:

```
$ wget https://www.percona.com/downloads/percona-server-mongodb-6.0/percona-server-mongodb-6.0.24-19/binary/tarball/percona-server-mongodb-6.0.24-19-x86_64.jammy.tar.gz\
$ wget https://www.percona.com/downloads/percona-server-mongodb-6.0/percona-server-mongodb-6.0.24-19/binary/tarball/percona-mongodb-mongosh-2.5.0-x86_64.tar.gz
```

2. Extract the tarballs

```
$ tar -xf percona-server-mongodb-6.0.24-19-x86_64.jammy.tar.gz
$ tar -xf percona-mongodb-mongosh-2.5.0-x86_64.tar.gz
```

3. Add the location of the binaries to the `PATH` variable:

```
$ export PATH=~/percona-server-mongodb-6.0.24-19/bin/:~/percona-mongodb-mongosh-2.5.0/bin/:$PATH
```

4. Create the default data directory:

```
$ mkdir -p /data/db
```

5. Make sure that you have read and write permissions for the data directory and run `mongod`.

Next steps

Connect to MongoDB →

Build from source code

This document guides you though the steps how to build Percona Server for MongoDB from source code.

Available builds

- Pro buildsThese builds include features that are typically demanded by large enterprises. They are included into packages built by Percona and are available to Percona Customers. Learn how to become a Customer.
- Regular builds. These include all Percona Server for MongoDB functionality except the solutions in Pro builds. The packages built by Percona are available to everyone.

Build options

- Manually
- Using the build script. You can build only Regular builds with it.

Manual build

To build Percona Server for MongoDB manually, you need the following:

- A modern C++ compiler capable of compiling C++17 like GCC 8.2 or newer
- Amazon AWS Software Development Kit for C++ library
- Python 3.7.x and Pip modules.
- The set of dependencies for your operating system. The following table lists dependencies for Ubuntu 22.04 and Red Hat Enterprise 9 and compatible derivatives:

Linux Distribution	Dependencies
Debian/Ubuntu	gcc g++ cmake curl libssl-dev libldap2-dev libkrb5-dev libcurl4-openssl-dev libsasl2-dev liblz4-dev libbz2-dev libsnappy-dev zlib1g-dev libzlcore-dev liblzma-dev e2fslibs-dev
RedHat Enterprise Linux/CentOS 9	gcc gcc-c++ cmake curl openssl-devel openldap-devel krb5-devel libcurl-devel cyrus-sasl-devel bzip2-devel zlib-devel lz4-devel xz-devel e2fsprogs-devel

- About 13 GB of disk space for the core binaries (`mongod`, `mongos`, and `mongo`) and about 600 GB for the install-all target.

Build steps

Install Python and Python modules

1. Make sure the `python3`, `python3-dev`, `python3-pip` Python packages are installed on your machine. Otherwise, install them using the package manager of your operating system.

2. Clone Percona Server for MongoDB repository

```
$ git clone https://github.com/percona/percona-server-mongodb.git
```

3. Switch to the Percona Server for MongoDB branch that you are building and install Python3 modules

```
$ cd percona-server-mongodb && git checkout v6.0
$ python3 -m pip install --user -r etc/pip/dev-requirements.txt
```

4. Define Percona Server for MongoDB version (6.0.6 for the time of writing this document)

```
$ echo '{"version": "6.0.6"}' > version.json
```

Install operating system dependencies

Debian and Ubuntu

The following command installs the dependencies for Ubuntu 22.04:

```
$ sudo apt install -y gcc g++ cmake curl libssl-dev libldap2-dev libkrb5-dev
libcurl4-openssl-dev libsasl2-dev liblz4-dev libbz2-dev libsnappy-dev zlib1g-dev
libzlcore-dev liblzma-dev e2fslibs-dev
```

RHEL and derivatives

The following command installs the dependencies for Oracle Linux 9:

```
$ sudo yum -y install gcc gcc-c++ cmake curl openssl-devel openldap-devel krb5-
devel libcurl-devel cyrus-sasl-devel bzip2-devel zlib-devel lz4-devel xz-devel
e2fsprogs-devel
```

Build AWS Software Development Kit for C++ library

1. Clone the AWS Software Development Kit for C++ repository

   ```
   $ git clone --recurse-submodules https://github.com/aws/aws-sdk-cpp.git
   ```

2. Create a directory to store the AWS library

   ```
   $ mkdir -p /tmp/lib/aws
   ```

3. Declare an environment variable `AWS_LIBS` for this directory

   ```
   $ export AWS_LIBS=/tmp/lib/aws
   ```

4. Percona Server for MongoDB is built with AWS SDK CPP 1.9.379 version. Switch to this version

   ```
   $ cd aws-sdk-cpp && git checkout 1.9.379
   ```

5. It is recommended to keep build files outside the SDK directory. Create a build directory and navigate to it

   ```
   $ mkdir build && cd build
   ```

6. Generate build files using `cmake`

```
$ cmake .. -DCMAKE_BUILD_TYPE=Release '-DBUILD_ONLY=s3;transfer' -
DBUILD_SHARED_LIBS=OFF -DMINIMIZE_SIZE=ON -DCMAKE_INSTALL_PREFIX="${AWS_LIBS}"
```

7. Install the SDK

```
$ make install
```

Build Percona Server for MongoDB

1. Change directory to `percona-server-mongodb`

```
$ cd percona-server-mongodb
```

2. Build Percona Server for MongoDB from `buildscripts/scons.py`

Regular build

```
$ buildscripts/scons.py --disable-warnings-as-errors --release --ssl --opt=on
-j$(nproc --all) --use-sasl-client --wiredtiger --audit --inmemory --hotbackup
CPPPATH="${AWS_LIBS}/include" LIBPATH="${AWS_LIBS}/lib ${AWS_LIBS}/lib64"
install-mongod install-mongos
```

Pro build

```
$ buildscripts/scons.py --disable-warnings-as-errors --release --ssl --opt=on
-j$(nproc --all) --use-sasl-client --wiredtiger --audit --inmemory --hotbackup
--full-featured CPPPATH="${AWS_LIBS}/include" LIBPATH="${AWS_LIBS}/lib
${AWS_LIBS}/lib64" install-mongod install-mongos
```

This command builds core components of the database. Other available targets for the `scons` command are:

- `install-mongod`
- `install-mongos`
- `install-servers` (includes `mongod` and `mongos`)
- `install-core` (includes `mongod` and `mongos`)
- `install-devcore` (includes `mongod`, `mongos`, and `jstestshell` (formerly mongo shell))
- `install-all`

The built binaries are in the `percona-server-mongodb/bin` directory.

Use the build script

To automate the build process, Percona provides the build script. With this script you can either build binary tarballs or DEB/RPM packages to install a regular build of Percona Server for MongoDB from.

Prerequisites

To use the build script you need the following:

- Docker up and running on your machine
- About 200GB of disk space

Prepare the build environment

1. Create the folder where all build actions take place. For the steps below we use the `/tmp/psmdb/test` folder.

2. Navigate to the build folder and download the build script. Replace the `<tag>` placeholder with the required version of Percona Server for MongoDB:

```
$ wget https://raw.githubusercontent.com/percona/percona-server-mongodb/psmdb-<tag>/percona-packaging/scripts/psmdb_builder.sh -O psmdb_builder.sh
```

Build steps

Use the following instructions to build tarballs or packages:

Tarballs

> **Note**
>
> You can build only Percona Server for MongoDB Regular tarballs with the build script. Percona Server for MongoDB Pro tarballs are not supported.

To build tarballs, the steps are the following:

1. The following command builds tarballs of Percona Server for MongoDB 6.0.12-9 on Oracle Linux 8. Change the Docker image and the values for `--branch`, `--psm_ver`, `--psm_release` flags to build tarballs of a different version and on a different operating system.

```
$ docker run -ti -u root -v /tmp/psmdb:/tmp/psmdb oraclelinux:8 sh -c '
set -o xtrace
cd /tmp/psmdb
bash -x ./psmdb_builder.sh --builddir=/tmp/psmdb/test --install_deps=1
bash -x ./psmdb_builder.sh --builddir=/tmp/psmdb/test --
repo=https://github.com/percona/percona-server-mongodb.git \
--branch=release-6.0.12-9 --psm_ver=6.0.12 --psm_release=9 --
mongo_tools_tag=100.7.0 --get_sources=1 --build_tarball=1
'
```

   The command does the following:

   - runs Docker daemon as the root user using the Oracle Linux 8 image
   - mounts the build directory into the container
   - establishes the shell session inside the container
   - inside the container, navigates to the build directory and runs the build script to install dependencies
   - runs the build script again to build the tarball for the Percona Server for MongoDB version 6.0.12-9

2. Check that tarballs are built:

```
$ ls -la /tmp/psmdb/test/tarball/
```

   Sample output

```
total 88292
-rw-r--r--. 1 root root 90398894 Jul  1 10:58 percona-server-mongodb-6.0.12-9-
x86_64.glibc2.17.tar.gz
```

Packages

The steps are the following:

1. Build the source tarball. It serves as the base for source packages. It is important to build source tarball using the oldest supported operating system, which is Oracle Linux 8.

```
$ docker run -ti -u root -v /tmp/psmdb:/tmp/psmdb oraclelinux:8 sh -c '
set -o xtrace
cd /tmp/psmdb
bash -x ./psmdb_builder.sh --builddir=/tmp/psmdb/test --install_deps=1
bash -x ./psmdb_builder.sh --builddir=/tmp/psmdb/test --
repo=https://github.com/percona/percona-server-mongodb.git --branch=release-
6.0.12-9 --psm_ver=6.0.12 --psm_release=9 --mongo_tools_tag=100.7.0 --
get_sources=1'
```

2. Build source packages. These packages include the source code and patches and are used to build binary packages.

   Note that to build source packages you still have to use the oldest supported operating system: Oracle Linux 8 for RPMs and Ubuntu 22.04 (Jelly Fish) for DEB packages.

DEB

```
$ docker run -ti -u root -v /tmp/psmdb:/tmp/psmdb ubuntu:bionic sh -c '
set -o xtrace
cd /tmp/psmdb
bash -x ./psmdb_builder.sh --builddir=/tmp/psmdb/test --install_deps=1
bash -x ./psmdb_builder.sh --builddir=/tmp/psmdb/test --
repo=https://github.com/percona/percona-server-mongodb.git \
--branch=release-6.0.12-9 --psm_ver=6.0.12--psm_release=9 --
mongo_tools_tag=100.7.0 --build_src_deb=1
'
```

Check that source packages are created

```
$ ls -la /tmp/psmdb/test/source_deb/
```

Sample output

```
rw-r--r--. 1 root root 90398894 Jul  1 11:45 percona-server-mongodb_6.0.12.orig.tar.gz
```

RPM

```
$ docker run -ti -u root -v /tmp/psmdb:/tmp/psmdb oraclelinux:8 sh -c '
set -o xtrace
cd /tmp/psmdb
bash -x ./psmdb_builder.sh --builddir=/tmp/psmdb/test --install_deps=1
bash -x ./psmdb_builder.sh --builddir=/tmp/psmdb/test --
repo=https://github.com/percona/percona-server-mongodb.git \
--branch=release-6.0.12-9 --psm_ver=6.0.12--psm_release=9 --
mongo_tools_tag=100.7.0 --build_src_rpm=1
'
```

Check that source packages are created

```
$ ls -la /tmp/psmdb/test/srpm/
```

Sample output

```
rw-r--r--. 1 root root 90398894 Jul  1 11:45 percona-server-mongodb-6.0.12-
9.generic.src.rpm
```

3. Build Percona Server for MongoDB packages. Here you can use the operating system of your choice. In the commands below, we use Oracle Linux 9 for RPMs and Ubuntu 22.04 (Jammy Jellyfish) for DEB packages.

DEB

```
$ docker run -ti -u root -v /tmp/psmdb:/tmp/psmdb ubuntu:jammy sh -c '
set -o xtrace
cd /tmp/psmdb
bash -x ./psmdb_builder.sh --builddir=/tmp/psmdb/test --install_deps=1
bash -x ./psmdb_builder.sh --builddir=/tmp/psmdb/test --
repo=https://github.com/percona/percona-server-mongodb.git \
--branch=release-6.0.12-9 --psm_ver=6.0.12 --psm_release=9 --
mongo_tools_tag=100.7.0 --build_deb=1
'
```

Check that source packages are created

```
$ ls -la /tmp/psmdb/test/deb/
```

Sample output

```
rw-r--r--. 1 root root 90398894 Jul  1 13:16 percona-server-mongodb-dbg_6.0.12-
9.jammy_amd64.deb
rw-r--r--. 1 root root 90398894 Jul  1 13:16 percona-server-mongodb-mongos-pro_6.0.12-
9.jammy_amd64.deb
rw-r--r--. 1 root root 90398894 Jul  1 13:16 percona-server-mongodb-server_6.0.12-
9.jammy_amd64.deb
rw-r--r--. 1 root root 90398894 Jul  1 13:16 percona-server-mongodb-tools_6.0.12-
9.jammy_amd64.deb
rw-r--r--. 1 root root 90398894 Jul  1 13:16 percona-server-mongodb_6.0.12-
9.jammy_amd64.deb
```

RPM

```
$ docker run -ti -u root -v /tmp/psmdb:/tmp/psmdb oraclelinux:9 sh -c '
set -o xtrace
cd /tmp/psmdb
bash -x ./psmdb_builder.sh --builddir=/tmp/psmdb/test --install_deps=1
bash -x ./psmdb_builder.sh --builddir=/tmp/psmdb/test --
repo=https://github.com/percona/percona-server-mongodb.git \
--branch=release-6.0.12-9 --psm_ver=6.0.12 --psm_release=9 --
mongo_tools_tag=100.7.0 --build_rpm=1
'
```

Check that source packages are created

```
$ ls -la /tmp/psmdb/test/rpm/
```

Sample output

```
rw-r--r--. 1 root root 90398894 Jul  1 13:16 percona-server-mongodb-6.0.12-
9.el9.x86_64.rpm
rw-r--r--. 1 root root 90398894 Jul  1 13:16 percona-server-mongodb-debugsource-6.0.12-
9.el9.x86_64.rpm
rw-r--r--. 1 root root 90398894 Jul  1 13:16 percona-server-mongodb-mongos-6.0.12-
9.el9.x86_64.rpm
rw-r--r--. 1 root root 90398894 Jul  1 13:16 percona-server-mongodb-mongos-debuginfo-
6.0.12-9.el9.x86_64.rpm
rw-r--r--. 1 root root 90398894 Jul  1 13:16 percona-server-mongodb-server-6.0.12-
9.el9.x86_64.rpm
rw-r--r--. 1 root root 90398894 Jul  1 13:16 percona-server-mongodb-server-debuginfo-
6.0.12-9.el9.x86_64.rpm
rw-r--r--. 1 root root 90398894 Jul  1 13:16 percona-server-mongodb-tools-6.0.12-
9.el9.x86_64.rpm
rw-r--r--. 1 root root 90398894 Jul  1 13:16 percona-server-mongodb-tools-debuginfo-
6.0.12-9.el9.x86_64.rpm
```

Next steps

Connect to MongoDB →

Run Percona Server for MongoDB in a Docker container

Docker images of Percona Server for MongoDB are hosted publicly on Docker Hub.

For more information about using Docker, see the Docker Docs.

Note

Make sure that you are using the latest version of Docker. The ones provided via `apt` and `yum` may be outdated and cause errors.

By default, Docker will pull the image from Docker Hub if it is not available locally.

We gather Telemetry data to understand the use of the software and improve our products.

To run the latest Percona Server for MongoDB 6.0 in a Docker container, run the following command as the root user or via `sudo`:

```
$ docker run -d --name psmdb -p 27017:27017 --restart always percona/percona-
server-mongodb:<TAG>
```

The command does the following:

- The `docker run` command instructs the `docker` daemon to run a container from an image.
- The `-d` option starts the container in detached mode (that is, in the background).
- The `--name` option assigns a custom name for the container that you can use to reference the container within a Docker network. In this case: `psmdb`.
- The `-p` option binds the container's port `27017` to TCP port `27017` on all host network interfaces. This makes the container accessible externally.
- The `--restart` option defines the container's restart policy. Setting it to `always` ensures that the Docker daemon will start the container on startup and restart it if the container exits.
- `percona/percona-server-mongodb` is the name of the image to derive the container from.
- `<TAG>` is the tag specifying the version you need. For example, `6.0.24-19`. Docker automatically identifies the architecture (x86_64 or ARM64) and pulls the respective image. See the full list of tags.

Access container shell

Run the following command to start the bash session and run commands inside the container:

```
$ docker exec -it <container-name>
```

where `<container-name>` is the name of your database container.

For example, to connect to Percona Serer for MongoDB, run:

```
$ mongosh
```

Connecting from another Docker container

The Percona Server for MongoDB container exposes standard MongoDB port (27017), which can be used for connection from an application running in another container.

For example, to set up a replica set for testing purposes, you have the following options:

- Interconnect the `mongod` nodes in containers on a default `bridge` network. In this scenario, containers communicate with each other by their IP address.
- Create a user-defined network and interconnect the `mongod` nodes on it. In this scenario, containers communicate with each other by name.
- Automate the container provisioning and the replica set setup via the Docker Compose tool.

The following example demonstrates the setup on x86_64 platforms. The `rs101`, `rs102`, `rs103` are the container names for Percona Server for MongoDB and `rs` is the replica set name.

For ARM64 architectures, change the image to `percona/percona-server-mongodb:<TAG>-arm64`.

Bridge network

When you start Docker, a default `bridge` network is created and all containers are automatically attached to it unless otherwise specified.

1. Start the containers and expose different ports

```
$ docker run --rm -d --name rs101 -p 27017:27017  percona/percona-server-
mongodb:6.0 --port=27017 --replSet rs
$ docker run --rm -d --name rs102 -p 28017:28017  percona/percona-server-
mongodb:6.0 --port=28017 --replSet rs
$ docker run --rm -d --name rs103 -p 29017:29017  percona/percona-server-
mongodb:6.0 --port=29017 --replSet rs
```

2. Check that the containers are started

```
$ docker container ls
```

Output:

```
CONTAINER ID  IMAGE                                          COMMAND
CREATED         STATUS             PORTS                     NAMES
3a4b70cd386b  percona/percona-server-mongodb:6.0  --port=27017 --re...  3
minutes ago   Up 3 minutes ago   0.0.0.0:27017->27017/tcp  rs101
c9b40a00e32b  percona/percona-server-mongodb:6.0  --port=28017 --re...  11
seconds ago  Up 11 seconds ago  0.0.0.0:28017->28017/tcp  rs102
b8aebc00309e  percona/percona-server-mongodb:6.0  --port=29017 --re...  3
seconds ago   Up 3 seconds ago   0.0.0.0:29017->29017/tcp  rs103
```

3. Get the IP addresses of each container

```
$ docker inspect --format='{{range .NetworkSettings.Networks}}{{.IPAddress}}
{{end}}' rs101
$ docker inspect --format='{{range .NetworkSettings.Networks}}{{.IPAddress}}
{{end}}' rs102
$ docker inspect --format='{{range .NetworkSettings.Networks}}{{.IPAddress}}
{{end}}' rs103
```

4. Interconnect the containers and initiate the replica set. Replace `rs101SERVER`, `rs102SERVER` and `rs103SERVER` with the IP address of each respective container.

```
$ docker exec -ti rs101 mongosh --eval 'config={"_id":"rs","members":
[{"_id":0,"host":"rs101SERVER:27017"},{"_id":1,"host":"rs102SERVER:28017"},
{"_id":2,"host":"rs103SERVER:29017"}]};rs.initiate(config);'
```

5. Check your setup

```
$ docker exec -it rs101 mongosh --eval 'rs.status()'
```

User-defined network

You can isolate desired containers in a user-defined network and provide DNS resolution across them so that they communicate with each other by hostname.

1. Create the network:

```
$ docker network create my-network
```

2. Start the containers and connect them to your network, exposing different ports

```
$ docker run --rm -d --name rs101 --net my-network -p 27017:27017
percona/percona-server-mongodb:6.0 --port=27017 --replSet rs
$ docker run --rm -d --name rs102 --net my-network -p 28017:28017
percona/percona-server-mongodb:6.0 --port=28017 --replSet rs
$ docker run --rm -d --name rs103 --net my-network -p 29017:29017
percona/percona-server-mongodb:6.0 --port=29017 --replSet rs
```

   Alternatively, you can connect the already running containers to your network:

```
$ docker network connect my-network rs101 rs102 rs103
```

3. Interconnect the containers and initiate the replica set.

```
$ docker exec -ti rs101 mongosh --eval 'config={"_id":"rs","members":
[{"_id":0,"host":"rs101:27017"},{"_id":1,"host":"rs102:28017"},
{"_id":2,"host":"rs103:29017"}]};rs.initiate(config);'
```

4. Check your setup

```
$ docker exec -it rs101 mongosh --eval 'rs.status()'
```

Docker Compose

As the precondition, you need to have Docker Engine and Docker Compose on your machine. Refer to Docker documentation for how to get Docker Compose.

1. Create a compose file and define the services in it.

docker-compose.yaml

```
version: "3"
services:
  rs101:
    image: percona/percona-server-mongodb:6.0
    container_name: rs101
    hostname: rs101
    ports:
      - "27017:27017"
    networks:
      - my-network
    command: "--port=27017 --replSet rs"

  rs102:
    image: percona/percona-server-mongodb:6.0
    container_name: rs102
    hostname: rs102
    ports:
      - "28017:28017"
    networks:
      - my-network
    command: "--port=28017 --replSet rs"

  rs103:
    image: percona/percona-server-mongodb:6.0
    container_name: rs103
    hostname: rs103
    ports:
      - "29017:29017"
    networks:
      - my-network
    command: "--port=29017 --replSet rs"

  rs-init:
    image: percona/percona-server-mongodb:6.0
    container_name: rs-init
    restart: "no"
    networks:
      - my-network
    depends_on:
      - rs101
      - rs102
      - rs103
    command: >
      mongosh --host rs101:27017 --eval
      '
      config = {
      "_id" : "rs",
      "members" : [
        {
          "_id" : 0,
```

```
          "host" : "rs101:27017"
        },
        {
          "_id" : 1,
          "host" : "rs102:28017"
        },
        {
          "_id" : 2,
          "host" : "rs103:29017"
        }
      ]
      };
      rs.initiate(config);
      '
networks:
  my-network:
    driver: bridge
```

2. Build and run the replica set with Compose

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

3. Check your setup

```
$ docker exec -it rs101 mongosh --eval 'rs.status()'
```

Connecting with the `mongosh` shell

To start another container with the `mongosh` shell that connects to your Percona Server for MongoDB container, run the following command:

```
$ docker run -it --link psmdb --rm percona/percona-server-mongodb:6.0 mongosh
mongodb://MONGODB_SERVER:PORT/DB_NAME
```

Set `MONGODB_SERVER`, `PORT`, and `DB_NAME` with the IP address of the `psmdb` container, the port of your MongoDB Server (default value is 27017), and the name of the database you want to connect to.

You can get the IP address by running this command:

```
$ docker inspect -f '{{range.NetworkSettings.Networks}}{{.IPAddress}}{{end}}'
psmdb
```

Install Pro packages of Percona Server for MongoDB

This document provides guidelines how to install Percona Server for MongoDB Pro from Percona repositories and from binary tarballs. Learn more about Percona Server for MongoDB Pro.

If you already run Percona Server for MongoDB and wish to upgrade to Percona Server for MongoDB Pro, see the upgrade guide.

Get the access token to the Pro repository

As a Percona Customer, you have the access to the ServiceNow portal. To request the access token, do the following:

1. In **ServiceNow**, click **My Account** and select **Entitlements**.
2. Select your entitlement.
3. If you are entitled for Pro builds, you will see the **Token Management** widget. Click the **Get Percona Builds Token** button.

   If you don't see the widget, contact Percona Support.
4. Click **Request Token** button in the **Request a Percona Pro Builds Token** dialog window.
5. A token will be generated for you. You will also see the Customer ID. Copy both the Customer ID and the token as you will use them to configure the Pro repository and install the software.

Install from Percona repository

Debian and Ubuntu

1. Install `percona-release` repository management tool. Fetch `percona-release` packages from Percona web:

```
$ wget https://repo.percona.com/apt/percona-release_latest.$(lsb_release -sc)_all.deb
```

2. Install the downloaded package with **dpkg**:

```
$ sudo dpkg -i percona-release_latest.$(lsb_release -sc)_all.deb
```

3. Update the local cache

```
$ sudo apt update
```

4. Enable the repository. Choose your preferable method:

   Command line

   Run the following command and pass your credentials to the Pro repository:

```
$ sudo percona-release enable psmdb-60-pro release --user_name=<Your Customer ID> --repo_token=<Your PRO repository token>
```

   Configuration file

   a. Create the `/root/.percona-private-repos.config` configuration file with the following content:

   /root/.percona-private-repos.config

```
[psmdb-60-pro]
USER_NAME=<Your Customer ID>
REPO_TOKEN=<Your PRO repository token>
```

   b. Enable the repository

```
$ sudo percona-release enable psmdb-60-pro release
```

5. Install Percona Server for MongoDB Pro packages:

```
$ sudo apt install -y percona-server-mongodb-pro
```

6. Start the server

```
$ sudo systemctl start mongod
```

RHEL and derivatives

1. Install `percona-release` using the following command:

```
$ sudo yum install https://repo.percona.com/yum/percona-release-
latest.noarch.rpm
```

2. Enable the repository. Choose your preferable method:

Command line

Run the following command and pass your credentials to the Pro repository:

```
$ sudo percona-release enable psmdb-60-pro release --user_name=<Your Customer
ID> --repo_token=<Your PRO repository token>
```

Configuration file

a. Create the `/root/.percona-private-repos.config` configuration file with the following content:

/root/.percona-private-repos.config

```
[psmdb-60-pro]
USER_NAME=<Your Customer ID>
REPO_TOKEN=<Your PRO repository token>
```

b. Enable the repository

```
$ sudo percona-release enable psmdb-60-pro release
```

3. Install Percona Server for MongoDB Pro packages:

```
$ sudo yum install -y percona-server-mongodb-pro
```

4. Start the server

```
$ sudo systemctl start mongod
```

Install from binary tarballs

Binary tarballs are available for the following operating systems:

Starting with version 6.0.13-10:

- Ubuntu 22.04 (Jammy Jellyfish)
- Red Hat Enterprise Linux 9

Starting with 6.0.14-11:

- Red Hat Enterprise Linux 8

Preconditions

The following packages are required for the installation.

On Debian and Ubuntu

- `libcurl4`
- `libsasl2-modules`
- `libsasl2-modules-gssapi-mit`

On Red hat Enterprise Linux and derivatives

- `libcurl`
- `cyrus-sasl-gssapi`
- `cyrus-sasl-plain`

Procedure

The steps below describe the installation on Ubuntu 22.04.

1. Download the tarballs from the pro repository

```
$ wget https://repo.percona.com/private/ID-TOKEN/psmdb-60-
pro/tarballs/percona-server-mongodb-6.0.24-19/percona-server-mongodb-pro-
6.0.24-19-x86_64.jammy.tar.gz \
$ wget https://repo.percona.com/private/ID-TOKEN/psmdb-60-
pro/tarballs/percona-mongodb-mongosh-2.5.0/percona-mongodb-mongosh-2.5.0-
x86_64.tar.gz
```

2. Extract the tarballs

```
$ tar -xf percona-server-mongodb-6.0.24-19-x86_64.jammy.tar.gz
$ tar -xf percona-mongodb-mongosh-2.5.0-x86_64.tar.gz
```

2. Add the location of the binaries to the `PATH` variable:

```
$ export PATH=~/percona-server-mongodb-pro-6.0.24-19-
x86_64.jammy/bin/:~/percona-mongodb-mongosh-2.5.0/bin/:$PATH
```

3. Create the default data directory:

```
$ mkdir -p /data/db
```

4. Make sure that you have read and write permissions for the data directory and run `mongod`.

Next steps

Connect to MongoDB →

Connect to Percona Server for MongoDB

After you have successfully installed and started Percona Server for MongoDB, let's connect to it.

By default, access control is disabled in MongoDB. We recommend enabling it so that users must verify their identity to be able to connect to the database. Percona Server for MongoDB supports several authentication methods. We will use the default one, SCRAM, to configure authentication.

The steps are the following:

1. Connect to Percona Server for MongoDB instance without authentication:

```
$ mongosh
```

Sample output

```
Current Mongosh Log ID: 6598270a3a0c418751550ded
Connecting to:      mongodb://127.0.0.1:27017/?
directConnection=true&serverSelectionTimeoutMS=2000&appName=mongosh+2.0.0
Using MongoDB:      6.0.24-19
Using Mongosh:      2.0.0

For mongosh info see: https://docs.mongodb.com/mongodb-shell/

test>
```

2. Create the administrative user in the `admin` database:

    1. Switch to the `admin` database

    ```
    > use admin
    ```

    Sample output

    ```
    switched to db admin
    ```

    2. Create the user:

    ```
    > db.createUser(
        {
          user: "admin",
          pwd: passwordPrompt(), // or cleartext password
          roles: [
            { role: "userAdminAnyDatabase", db: "admin" },
            { role: "readWriteAnyDatabase", db: "admin" }
          ]
        }
      )
    ```

3. Shutdown the `mongod` instance and exit `mongosh`

```
> db.adminCommand( { shutdown: 1 } )
```

4. Enable authentication

Command line

Start the server with authentication enabled using the following command:

```
$ mongod --auth --port 27017 --dbpath /var/lib/mongodb --fork --syslog
```

Configuration file

1. Edit the configuration file

   /etc/mongod.conf

   ```
   security:
       authorization: enabled
   ```

2. Start the `mongod` service

   ```
   $ systemctl start mongod
   ```

5. Connect to Percona Server for MongoDB and authenticate.

```
$ mongosh --port 27017  --authenticationDatabase \
"admin" -u "admin" -p
```

Next steps

Run simple queries →

Manipulate data in Percona Server for MongoDB

After you connected to Percona Server for MongoDB, let's insert some data and operate with it.

Note

To secure the data, you may wish to use data-at-rest encryption. Note that you can only enable it on an empty database. Otherwise you must clean up the data directory first.

See the following documentation for data-at-rest encryption:

- Using HashiCorp Vault server
- Using KMIP server
- Using a local keyfile

Insert data

1. For example, let's add an item to the `fruits` collection. Use the `insertOne()` command for this purpose:

```
> db.fruits.insertOne(
     {item: "apple", qty: 50}
     )
```

If there is no `fruits` collection in the database, it will be created during the command execution.

Sample output

```
{
  acknowledged: true,
  insertedId: ObjectId('659c2b846252bfad93fc1578')
}
```

2. Now, let's add more fruits to the `fruits` collection using the `insertMany()` command:

```
> db.fruits.insertMany([
     {item: "banana", weight: "kg", qty: 10 },
     {item: "peach", weight: "kg", qty: 30}
     ])
```

Sample output

```
{
  acknowledged: true,
  insertedIds: {
    '0': ObjectId('659c2bc46252bfad93fc1579'),
    '1': ObjectId('659c2bc46252bfad93fc157a')
  }
}
```

See Insert documents for more information about data insertion.

Query data

Run the following command to query data in MongoDB:

```
> db.fruits.find()
```

Sample output

```
[
  { _id: ObjectId('659c2b846252bfad93fc1578'), item: 'apple', qty: 50 },
  {
    _id: ObjectId('659c2bc46252bfad93fc1579'),
    item: 'banana',
    weight: 'kg',
    qty: 10
  },
  {
    _id: ObjectId('659c2bc46252bfad93fc157a'),
    item: 'peach',
    weight: 'kg',
    qty: 30
  }
]
```

Refer to the Query documents documentation to for more information about reading data.

Update data

Let's update the `apples` entry by adding weight to it.

1. Use the `updateOne()` command for that:

```
> db.fruits.updateOne(
    {"item": "apple" },
    {$set: {"weight": "kg"}}
    )
```

Sample output

```
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}
```

2. Query the collection to check the updated document:

```
> db.fruits.find({item: "apple"})
```

Sample output

```
[
  {
    _id: ObjectId('659c2b846252bfad93fc1578'),
    item: 'apple',
    qty: 50,
    weight: 'kg'
  }
]
```

See Update methods documentation for other available data update methods

Delete data

Run the following command to delete all documents where the quantity is less than 30 kg:

```
> db.fruits.deleteMany(
    {"qty": {$lt: 30} }
    )
```

Sample output

```
{ acknowledged: true, deletedCount: 1 }
```

Learn more about deleting data in Delete methods documentation.

Congratulations! You have used basic create, read, update and delete (CRUD) operations to manipulate data in Percona Server for MongoDB. See MongoDB CRUD Concepts manual to learn more about CRUD operations.

Next steps

What's next? →

What's next?

Congratulations on completing your first hands-on experience with Percona Server for MongoDB.

To deepen your knowledge in working with the database, see the MongoDB documentation on aggregation, indexes, data modelling, transactions.

The following sections help you achieve your organization's goals on:

High availability

Multiple copies of the data on different servers provide redundancy and high availability. MongoDB replica sets serve this purpose. Replica sets also increase data availability and provide fault tolerance against the loss of a database instance.

Replica set deployment →

Scalability

Ensure your database handles the load as your data set grows without performance degradation. The sharding method in MongoDB is the distribution of data across multiple servers where each server handles a subset of data. This is the horizontal scaling mechanism where you can add additional servers if needed for a lower overall cost than upgrading existing hardware. The tradeoff is additional complexity in the infrastructure management.

Deploy a sharded cluster →

Encryption

Protecting your data from unauthorized access is crucial. Introducing data-at-rest encryption helps protect sensitive information when it is stored on storage devices, such as hard drives, solid-state drives, or other types of persistent storage. Percona Server for MongoDB is integrated with several external key managers.

Data-at-rest encryption →

Backup and restore

Protect your database against data loss by implementing a backup strategy. You can either use the built-in hot backup feature or consider deploying Percona Backup for MongoDB - an open source solution for making consistent backups and restores in sharded clusters and replica sets.

Percona Backup for MongoDB →

Monitoring

Get insights into the database health and performance using Percona Monitoring and Management (PMM) - an open-source database monitoring, management, and observability solution for MySQL, PostgreSQL, and MongoDB. It allows you to observe the health of your database systems, explore new patterns in their behavior, troubleshoot them and perform database management operations

Get started with PMM →

Advanced command line tools

Perform sophisticated database management and administration tasks using Percona Toolkit - a collection of advanced command-line tools developed and tested by Percona as an alternative to private or “one-off” scripts.

Get Percona Toolkit →

Features

Percona Server for MongoDB feature comparison

Percona Server for MongoDB 6.0 is based on MongoDB Community Edition 6.0 and extends it with the functionality, that is otherwise only available in MongoDB Enterprise Edition.

	PSMDB	MongoDB
Storage Engines	- WiredTiger (default) - Percona Memory Engine	- WiredTiger (default) - In-Memory (Enterprise only)
Encryption-at-Rest	- Key servers = Hashicorp Vault, KMIP - Fully open source	- Key server = KMIP - Enterprise only
Hot Backup	YES (replica set)	NO
LDAP Authentication	(legacy) LDAP authentication with SASL	Enterprise only
LDAP Authorization	YES	Enterprise only
Kerberos Authentication	YES	Enterprise only
AWS IAM authentication	YES	MongoDB Atlas
Audit Logging	YES	Enterprise only
Log redaction	YES	Enterprise only
SNMP Monitoring	NO	Enterprise only

	PSMDB	MongoDB
Database profiler	YES with the `--rateLimit` argument	YES

Profiling Rate Limiting

Profiling Rate Limiting was added to *Percona Server for MongoDB* in v3.4 with the `--rateLimit` argument. Since v3.6, MongoDB Community (and Enterprise) Edition includes a similar option slowOpSampleRate. Please see Profiling Rate Limit for more information.

Storage

Percona Memory Engine

Percona Memory Engine is a special configuration of WiredTiger that does not store user data on disk. Data fully resides in the main memory, making processing much faster and smoother. Keep in mind that you need to have enough memory to hold the data set, and ensure that the server does not shut down.

The Percona Memory Engine is available in Percona Server for MongoDB along with the default MongoDB engine WiredTiger.

Usage

As of version 3.2, Percona Server for MongoDB runs with WiredTiger by default. You can select a storage engine using the `--storageEngine` command-line option when you start `mongod`. Alternatively, you can set the `storage.engine` variable in the configuration file (by default, `/etc/mongod.conf`):

```
storage:
  dbPath: <dataDir>
  engine: inMemory
```

Configuration

You can configure Percona Memory Engine using either command-line options or corresponding parameters in the `/etc/mongod.conf` file. The following are the configuration examples:

Configuration file

The configuration file is formatted in YAML

```
storage:
  engine: inMemory
  inMemory:
    engineConfig:
      inMemorySizeGB: 140
      statisticsLogDelaySecs: 0
```

Command line

Setting parameters in the configuration file is the same as starting the `mongod` daemon with the following options:

```
mongod --storageEngine=inMemory \
--inMemorySizeGB=140 \
--inMemoryStatisticsLogDelaySecs=0
```

Options

The following options are available (with corresponding YAML configuration file parameters):

Configuration file	storage.inMemory.engineConfig.inMemorySizeGB
Command line	`inMemorySizeGB()`
Default	50% of total memory minus 1024 MB, but not less than 256 MB
Description	Specifies the maximum memory in gigabytes to use for data

Configuration file	storage.inMemory.engineConfig.statisticsLogDelaySecs
Command line	`inMemoryStatisticsLogDelaySecs()()`
Default	0
Description	Specifies the number of seconds between writes to statistics log. A 0 value means statistics are not logged

Switching storage engines

Considerations

If you have data files in your database and want to change to Percona Memory Engine, consider the following:

- Data files created by one storage engine are not compatible with other engines, because each one has its own data model.
- When changing the storage engine, the `mongod` node requires an empty `dbPath` data directory when it is restarted. Though Percona Memory Engine stores all data in memory, some metadata files, diagnostics logs and statistics metrics are still written to disk. This is controlled with the `--inMemoryStatisticsLogDelaySecs` option.

Creating a new `dbPath` data directory for a different storage engine is the simplest solution. Yet when you switch between disk-using storage engines (e.g. from WiredTiger to Percona Memory Engine), you may have to delete the old data if there is not enough disk space for both. Double-check that your backups are solid and/or the replica set nodes are healthy before you switch to the new storage engine.

Procedure

To change a storage engine, you have the following options:

Temporarily test Percona Memory Engine

Set a different data directory for the `dbPath` variable in the configuration file. Make sure that the user running `mongod` has read and write permissions for the new data directory.

1. Stop `mongod`

```
$ service mongod stop
```

2. Edit the configuration file

```
storage:
  dbPath: <newDataDir>
  engine: inmemory
```

3. Start `mongod`

```
$ service mongod start
```

Permanent switch to Percona Memory Engine without any valuable data in your database

Clean out the `dbPath` data directory (by default, `/var/lib/mongodb`) and edit the configuration file:

1. Stop `mongod`

```
$ service mongod stop
```

2. Clean out the `dbPath` data directory

```
$ sudo rm -rf <dbpathDataDir>
```

3. Edit the configuration file

```
storage:
  dbPath: <newDataDir>
  engine: inmemory
```

4. Start `mongod`

```
$ service mongod start
```

Switch to Percona Memory Engine with data migration and compatibility

Standalone instance

For a standalone instance or a single-node replica set, use the `mongodump` and `mongorestore` utilities:

1. Export the dataDir contents

```
$ mongodump --out <dumpDir>
```

2. Stop `mongod`

```
$ service mongod stop
```

3. Clean out the `dbPath` data directory

```
$ sudo rm -rf <dbpathDataDir>
```

4. Update the configuration file by setting the new value for the `storage.engine` variable. Set the engine-specific settings such as `storage.inMemory.engineConfig.inMemorySizeGB`
5. Start `mongod`

```
$ service mongod start
```

6. Restore the database

```
$ mongorestore <dumpDir>
```

Replica set

Use the “rolling restart” process.

1. Switch to the Percona Memory Engine on the secondary node. Clean out the `dbPath` data directory and edit the configuration file:
2. Stop `mongod`

```
$ service mongod stop
```

3. Clean out the `dbPath` data directory

```
$ sudo rm -rf <dbpathDataDir>
```

4. Edit the configuration file

```
storage:
  dbPath: <newDataDir>
  engine: inmemory
```

5. Start `mongod`

```
$ service mongod start
```

6. Wait for the node to rejoin with the other nodes and report the SECONDARY status.
7. Repeat the procedure to switch the remaining nodes to Percona Memory Engine.

Data at rest encryption

Using Data at Rest Encryption means using the same `storage.\*` configuration options as for WiredTiger. To change from normal to Data at Rest Encryption mode or backward, you must clean up the `dbPath` data directory, just as if you change the storage engine. This is because **mongod** cannot convert the data files to an encrypted format 'in place'. It must get the document data again either via the initial sync from another replica set member, or from imported backup dump.

Backup

Hot backup

Percona Server for MongoDB includes an integrated open source hot backup system for the default WiredTiger storage engine. It creates a physical data backup on a running server without notable performance and operating degradation.

Note

Hot backups are done on `mongod` servers independently, without synchronizing them across replica set members and shards in a cluster. To ensure data consistency during backups and restores, we recommend using Percona Backup for MongoDB.

Make a backup

To take a hot backup of the database in your current `dbpath`, do the following:

1. Provide access to the backup directory for the `mongod` user:

```
$ sudo chown mongod:mongod <backupDir>
```

2. Run the `createBackup` command as administrator on the `admin` database and specify the backup directory.

```
> use admin
switched to db admin
> db.runCommand({createBackup: 1, backupDir: "<backup_data_path>"})
{ "ok" : 1 }
```

The backup taken is the snapshot of the `mongod` server's `dataDir` at the moment of the `createBackup` command start.

If the backup was successful, you should receive an `{ "ok" : 1 }` object. If there was an error, you will receive a failing `ok` status with the error message, for example:

```
> db.runCommand({createBackup: 1, backupDir: ""})
{ "ok" : 0, "errmsg" : "Destination path must be absolute" }
```

Save a backup to a TAR archive

To save a backup as a *tar* archive, use the `archive` field to specify the destination path:

```
> use admin
...
> db.runCommand({createBackup: 1, archive: <path_to_archive>.tar })
```

Streaming hot backups to a remote destination

Percona Server for MongoDB enables uploading hot backups to an Amazon S3 or a compatible storage service, such as MinIO.

This method requires that you provide the *bucket* field in the *s3* object:

```
> use admin
...
> db.runCommand({createBackup: 1, s3: {bucket: "backup20190510", path:
<some_optional_path>} })
```

In addition to the mandatory `bucket` field, the `s3` object may contain the following fields:

Field	Type	Description
bucket	string	The only mandatory field. Names are subject to restrictions described in the Bucket Restrictions and Limitations section of Amazon S3 documentation
path	string	The virtual path inside the specified bucket where the backup will be created. If the `path` is not specified, then the backup is created in the root of the bucket. If there are any objects under the specified path, the backup will not be created and an error will be reported.
endpoint	string	The endpoint address and port - mainly for AWS S3 compatible servers such as the *MinIO* server. For a local MinIO server, this can be “127.0.0.1:9000”. For AWS S3 this field can be omitted.
scheme	string	“HTTP” or “HTTPS” (default). For a local MinIO server started with the *minio server* command this should field should contain *HTTP*.
useVirtualAddressing	bool	The style of addressing buckets in the URL. By default ‘true’. For MinIO servers, set this field to **false**. For more information, see Virtual Hosting of Buckets in the Amazon S3 documentation.
region	string	The name of an AWS region. The default region is **US_EAST_1**. For more information see AWS Service Endpoints in the Amazon S3 documentation.
profile	string	The name of a credentials profile in the *credentials* configuration file. If not specified, the profile named **default** is used.
accessKeyId	string	The access key id
secretAccessKey	string	The secret access key

Credentials

If the user provides the *access key id* and the *secret access key* parameters, these are used as credentials.

If the *access key id* parameter is not specified then the credentials are loaded from the credentials configuration file. By default, it is `~/.aws/credentials`.

Example credentials file

~/.aws/credentials

```
[default]
aws_access_key_id = ABC123XYZ456QQQAAAFFF
aws_secret_access_key = zuf+secretkey0secretkey1secretkey2
[localminio]
aws_access_key_id = ABCABCABCABC55566678
aws_secret_access_key = secretaccesskey1secretaccesskey2secretaccesskey3
```

Examples

Backup in root of bucket on local instance of MinIO server

```
> db.runCommand({createBackup: 1,  s3: {bucket: "backup20190901500",
scheme: "HTTP",
endpoint: "127.0.0.1:9000",
useVirtualAddressing: false,
profile: "localminio"}})
```

Backup on MinIO testing server with the default credentials profile

The following command creates a backup under the virtual path “year2019/day42” in the `backup` bucket:

```
> db.runCommand({createBackup: 1,  s3: {bucket: "backup",
path: "year2019/day42",
endpoint: "sandbox.min.io:9000",
useVirtualAddressing: false}})
```

Backup on AWS S3 service using default settings

```
> db.runCommand({createBackup: 1,  s3: {bucket: "backup", path:
"year2019/day42"}})
```

See also

AWS Documentation: Providing AWS Credentials

Restore data from backup

Restore from a backup on a standalone server

Note

If you try to restore the node into the existing replica set and there is more recent data, the restored node detects that it is out of date with the other replica set members, deletes the data and makes an initial sync.

Run the following commands as root or by using the `sudo` command

1. Stop the `mongod` service

```
$ systemctl stop mongod
```

2. Clean out the data directory

```
$ rm -rf /var/lib/mongodb/*
```

3. Copy backup files

```
$ cp -RT <backup_data_path> /var/lib/mongodb/
```

4. Grant permissions to data files for the `mongod` user

```
$ chown -R mongod:mongod /var/lib/mongodb/
```

5. Start the `mongod` service

```
$ systemctl start mongod
```

Restoring from backup in a replica set

The recommended way to restore the replica set from a backup is to restore it into a standalone node and then initiate it as the first member of a new replica set.

> **Note**
>
> If you try to restore the node into the existing replica set and there is more recent data, the restored node detects that it is out of date with the other replica set members, deletes the data and makes an initial sync.

Run the following commands as root or by using the **sudo** command

1. Stop the `mongod` service:

```
$ systemctl stop mongod
```

2. Clean the data directory and then copy the files from the backup directory to your data directory. Assuming that the data directory is `/var/lib/mongodb/`, use the following commands:

```
$ rm -rf /var/lib/mongodb/*
$ cp -RT <backup_data_path> /var/lib/mongodb/
```

3. Grant permissions to the data files for the `mongod` user

```
$ chown -R mongod:mongod /var/lib/mongodb/
```

4. Make sure the replication is disabled in the config file and start the `mongod` service.

```
$ systemctl start mongod
```

5. Connect to your standalone node via the `mongo` shell and drop the local database

```
> mongo
> use local
> db.dropDatabase()
```

6. Restart the node with the replication enabled

- Shut down the node.

```
$ systemctl stop mongod
```

- Edit the configuration file and specify the `replication.replSetname` option
- Start the `mongod` node:

```
$ systemctl start mongod
```

7. Initiate a new replica set

```
# Start the mongosh shell
> mongosh
# Initiate a new replica set
> rs.initiate()
```

$backupCursor and $backupCursorExtend aggregation stages

`$backupCursor` and `$backupCursorExtend` aggregation stages expose the WiredTiger API which allows making consistent backups. Running these stages allows listing and freezing the files so you can copy them without the files being deleted or necessary parts within them being overwritten.

- `$backupCursor` outputs the list of files and their size to copy.
- `$backupCursorExtend` outputs the list of WiredTiger transaction log files that have been updated or newly added since the `$backupCursor` was first run. Saving these files enables restoring the database to any arbitrary time between the `$backupCursor` and `$backupCursorExtend` execution times.

They are available in Percona Server for MongoDB starting with version 6.0.2-1.

Percona provides Percona Backup for MongoDB (PBM) – a light-weight open source solution for consistent backups and restores across sharded clusters. PBM relies on these aggregation stages for physical backups and restores. However, if you wish to develop your own backup application, this document describes the `$backupCursor` and `$backupCursorExtend` aggregation stages.

Usage

You can run these stages in any type of MongoDB deployment. If you need to back up a single node in a replica set, first run the `$backupCursor`, then the `$backupCursorExtend` and save the output files to the backup storage.

To make a consistent backup of a sharded cluster, run both aggregation stages on one node from each shard and the config server replica set. It can be either the primary or the secondary node. Note that since the secondary node may lag in syncing the data from the primary one, you will have to wait for the exact same time before running the `$backupCursorExtend`.

Note that for standalone MongoDB node with disabled oplogs, you can only run the `$backupCursor` aggregation stage.

Get a list of all files to copy with $backupCursor

```
var bkCsr = db.getSiblingDB("admin").aggregate([{$backupCursor: {}}])
bkCsrMetadata = bkCsr.next().metadata
```

Sample output:

```
[
  {
    metadata: {
      backupId: UUID("35c34101-0107-44cf-bdec-fad285e07534"),
      dbpath: '/var/lib/mongodb',
      oplogStart: { ts: Timestamp({ t: 1666631297, i: 1 }), t: Long("-1") },
      oplogEnd: { ts: Timestamp({ t: 1666631408, i: 1 }), t: Long("1") },
      checkpointTimestamp: Timestamp({ t: 1666631348, i: 1 })
    }
  },
```

Store the `metadata` document somewhere, because you need to pass the `backupId` parameter from this document as the input parameter for the `$backupCursorExtend` stage. Also you need the `oplogEnd` timestamp. Make sure that the `$backupCursor` is complete on all shards in your cluster.

> **Note**
>
> Note that when running `$backupCursor` in a standalone node deployment, `oplogStart`, `oplogEnd`, `checkpointTimesatmp` values may be absent. This is because standalone node deployments don't have oplogs.

Run `$backupCursorExtend` to retrieve the WiredTiger transaction logs

Pass the `backupId` from the metadata document as the first parameter. For the `timestamp` parameter, use the maximum (latest) value among the `oplogEnd` timestamps from all shards and config server replica set. This will be the target time to restore.

```
var bkExtCsr = db.aggregate([{$backupCursorExtend: {backupId:
bkCsrMetadata.backupId, timestamp: new Timestamp(1666631418, 1)}}])
```

Sample output:

```
{ "filename" : "/data/plain_rs/n1/data/journal/WiredTigerLog.0000000042" }
{ "filename" : "/data/plain_rs/n1/data/journal/WiredTigerLog.0000000043" }
{ "filename" : "/data/plain_rs/n1/data/journal/WiredTigerLog.0000000044" }
```

Loop the `$backupCursor`

Prevent the backup cursor from closing on timeout (default – 10 minutes). This is crucial since it prevents overwriting backup snapshot file blocks with new ones if the files take longer than 10 minutes to copy. Use the getMore command for this purpose.

Copy the files to the storage

Now you can copy the output of both aggregation stages to your backup storage.

After the backup is copied to the storage, terminate the getMore command and close the cursor.

> **Note**
>
> Save the timestamp that you passed for the `$backupCursorExtend` stage somewhere since you will need it for the restore.

This document is based on the blog post Experimental Feature: $backupCursorExtend in Percona Server for MongoDB by Akira Kurogane

Authentication

Authentication

Authentication is the process of verifying a client's identity. Normally, a client needs to authenticate themselves against the MongoDB server user database before doing any work or reading any data from a `mongod` or `mongos` instance.

By default, Percona Server for MongoDB provides a SCRAM authentication mechanism where clients authenticate themselves by providing their user credentials. In addition, you can integrate Percona Server for MongoDB with a separate service, such as OpenLDAP or Active Directory. This enables users to access the database with the same credentials they use for their emails or workstations.

You can use any of these authentication mechanisms supported in Percona Server for MongoDB:

- SCRAM (default)
- x.509 certificate authentication
- LDAP authentication with SASL
- Kerberos Authentication
- Authentication and authorization with direct binding to LDAP
- AWS IAM authentication

SCRAM

SCRAM is the default authentication mechanism. Percona Server for MongoDB verifies the credentials against the user's name, password and the database where the user record is created for a client (authentication database). For how to enable this mechanism, see Enable authentication.

x.509 certificate authentication

This authentication mechanism enables a client to authenticate in Percona Server for MongoDB by providing an x.509 certificate instead of user credentials. Each certificate contains the `subject` field defined in the DN format. In Percona Server for MongoDB, each certificate has a corresponding user record in the `$external` database. When a user connects to the database, Percona Server for MongoDB matches the `subject` value against the usernames defined in the `$external` database.

For production use, we recommend using valid CA certificates. For testing purposes, you can generate and use self-signed certificates.

x.509 authentication is compatible with with LDAP authorization to enable you to control user access and operations in Percona Server for MongoDB. For configuration guidelines, refer to Set up x.509 authentication and LDAP authorization.

See also

MongoDB Documentation: x.509

Percona Blog: Setting up MongoDB with Member x509 auth and SSL + easy-rsa

LDAP authentication with SASL

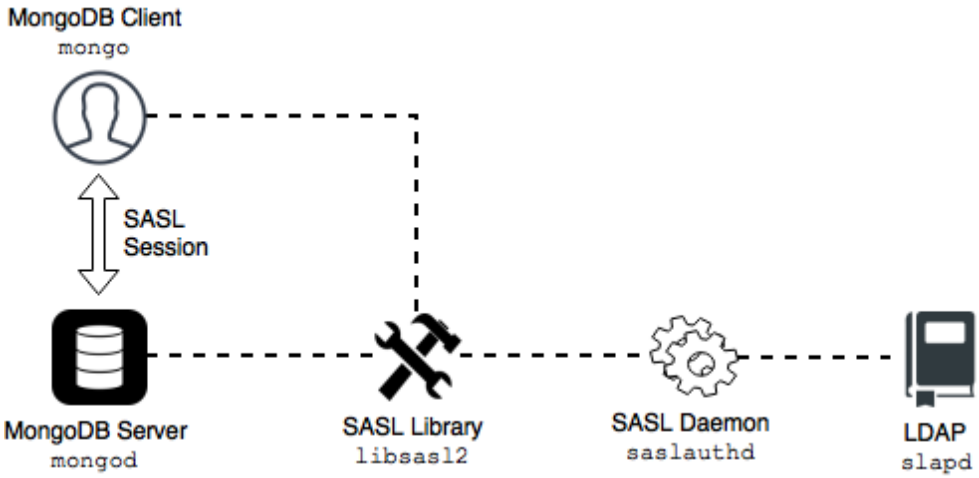
Overview

LDAP authentication with SASL means that both the client and the server establish a SASL session using the SASL library. Then authentication (bind) requests are sent to the LDAP server through the SASL authentication daemon (`saslauthd`) that acts as a remote proxy for the `mongod` server.

The following components are necessary for external authentication to work:

- **LDAP Server**: Remotely stores all user credentials (i.e. user name and associated password).
- **SASL Daemon**: Used as a MongoDB server-local proxy for the remote LDAP service.
- **SASL Library**: Used by the MongoDB client and server to create data necessary for the authentication mechanism.

The following image illustrates this architecture:



An authentication session uses the following sequence:

1. A `mongosh` client connects to a running `mongod` instance.
2. The client creates a `PLAIN` authentication request using the SASL library.
3. The client then sends this SASL request to the server as a special mongo command.
4. The `mongod` server receives this SASL message, with its authentication request payload.
5. The server then creates a SASL session scoped to this client, using its own reference to the SASL library.
6. Then the server passes the authentication payload to the SASL library, which in turn passes it on to the `saslauthd` daemon.
7. The `saslauthd` daemon passes the payload on to the LDAP service to get a YES or NO authentication response (in other words, does this user exist and is the password correct).
8. The YES/NO response moves back from `saslauthd`, through the SASL library, to `mongod`.
9. The `mongod` server uses this YES/NO response to authenticate the client or reject the request.
10. If successful, the client has authenticated and can proceed.

For configuration instructions, refer to Setting up LDAP authentication with SASL.

Kerberos authentication

Percona Server for MongoDB supports Kerberos authentication starting from release 6.0.2-1.

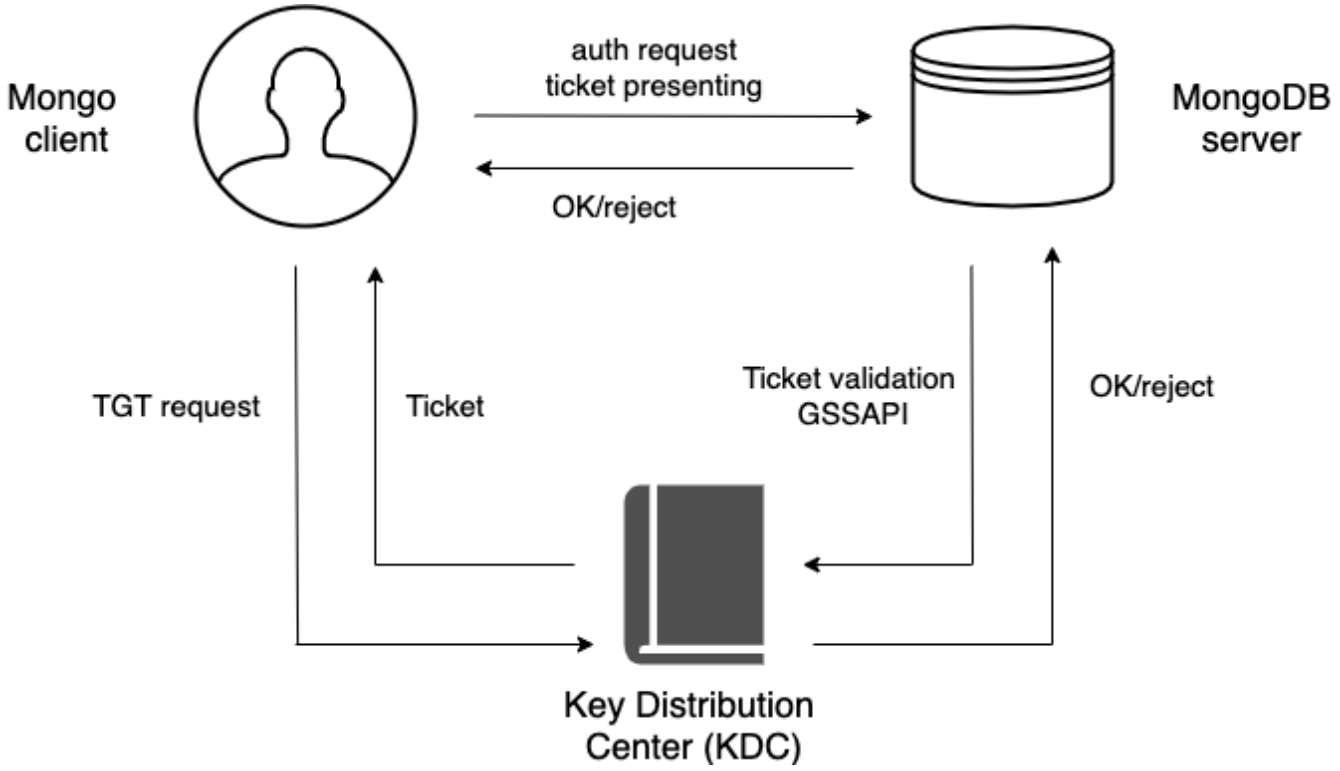
This authentication mechanism involves the use of a Key Distribution Center (KDC) - a symmetric encryption component which operates with tickets. A ticket is a small amount of encrypted data which is used for authentication. It is issued for a user session and has a limited lifetime.

When using Kerberos authentication, you also operate with principals and realms.

A realm is the logical network, similar to a domain, for all Kerberos nodes under the same master KDC.

A principal is a user or a service which is known to Kerberos. A principal name is used for authentication in Kerberos. A service principal represents the service, e.g. `mongodb`. A user principal represents the user. The user principal name corresponds to the username in the `$external` database in Percona Server for MongoDB.

The following diagram shows the authentication workflow:



The sequence is the following:

1. A `mongo` client sends the Ticket-Grantng Ticket (TGT) request to the Key Distribution Center (KDC)
2. The KDC issues the ticket and sends it to the `mongo` client.
3. The `mongo` client sends the authentication request to the `mongod` server presenting the ticket.
4. The `mongod` server validates the ticket in the KDC.
5. Upon successful ticket validation, the authentication request is approved and the user is authenticated.

Kerberos authentication in Percona Server for MongoDB is implemented the same way as in MongoDB Enterprise.

See also

MongoDB Documentation: Kerberos Authentication

Enable SCRAM authentication

By default, Percona Server for MongoDB does not restrict access to data and configuration.

Enabling authentication enforces users to identify themselves when accessing the database. This documents describes how to enable built-in SCRAM authentication mechanism. *Percona Server for MongoDB* also supports the number of external authentication mechanisms. To learn more, refer to Authentication.

You can enable authentication either automatically or manually.

Automatic setup

To enable authentication and automatically set it up, run the `/usr/bin/percona-server-mongodb-enable-auth.sh` script as root or using `sudo`.

This script creates the `dba` user with the `root` role. The password is randomly generated and printed out in the output. Then the script restarts *Percona Server for MongoDB* with access control enabled. The `dba` user has full superuser privileges on the server. You can add other users with various roles depending on your needs.

For usage information, run the script with the `-h` option.

Manual setup

To enable access control manually:

1. Add the following lines to the configuration file:

```
security:
  authorization: enabled
```

2. Run the following command on the `admin` database:

```
> db.createUser({user: 'USER', pwd: 'PASSWORD', roles: ['dbAdmin'] });
```

3. Restart the `mongod` service:

```
$ service mongod restart
```

4. Connect to the database as the newly created user:

```
$ mongosh --port 27017 -u 'USER' -p 'PASSWORD'  --authenticationDatabase
"admin"
```

See also

MongoDB Documentation: Enable Access Control

Set up LDAP authentication with SASL

This document describes an example configuration suitable only to test out the external authentication functionality in a non-production environment. Use common sense to adapt these guidelines to your production environment.

To learn more about how the authentication works, see LDAP authentication with SASL.

Environment setup and configuration

The following components are required:

- `slapd`: OpenLDAP server.
- `libsasl2` version 2.1.25 or later.
- `saslauthd`: Authentication Daemon (distinct from `libsasl2`).

The following steps will help you configure your environment:

Assumptions

Before we move on to the configuration steps, we assume the following:

1. You have the LDAP server up and running and have configured users on it. The LDAP server is accessible to the server with Percona Server for MongoDB installed. This document focuses on OpenLDAP server. If you use Microsoft Windows Active Directory, see to the *Microsoft Windows Active Directory* section for `saslauthd` configuration.

2. You must place these two servers behind a firewall as the communications between them will be in plain text. This is because the SASL mechanism of PLAIN can only be used when authenticating and credentials will be sent in plain text.
3. You have `sudo` privilege to the server with the *Percona Server for MongoDB* installed.

Configuring `saslauthd`

1. Install the SASL packages. Depending on your OS, use the following command:

   Debian and Ubuntu

   ```
   $ sudo  apt install -y sasl2-bin
   ```

   RHEL and derivatives

   ```
   $ sudo  yum install -y cyrus-sasl
   ```

2. Configure SASL to use `ldap` as the authentication mechanism.

   > **Note**
   >
   > Back up the original configuration file before making changes.

Debian and Ubuntu

Use the following commands to enable the `saslauthd` to auto-run on startup and to set the `ldap` value for the `--MECHANISMS` option:

```
$ sudo sed -i -e s/^MECH=pam/MECH=ldap/g /etc/sysconfig/saslauthdsudo sed -i -
e s/^MECHANISMS="pam"/MECHANISMS="ldap"/g /etc/default/saslauthd
$ sudo sed -i -e s/^START=no/START=yes/g /etc/default/saslauthd
```

Alternatively, you can edit the `/etc/default/sysconfig/saslauthd` configuration file:

```
START=yes
MECHANISMS="ldap
```

RHEL and derivatives

Specify the `ldap` value for the `--MECH` option using the following command:

```
$ sudo sed -i -e s/^MECH=pam/MECH=ldap/g /etc/sysconfig/saslauthd
```

Alternatively, you can edit the /etc/sysconfig/saslauthd configuration file:

```
MECH=ldap
```

3. Create the `/etc/saslauthd.conf` configuration file and specify the settings that `saslauthd` requires to connect to a local LDAP service:

OpenLDAP server

The following is the example configuration file. Note that the server address **MUST** match the OpenLDAP installation:

```
ldap_servers: ldap://localhost
ldap_mech: PLAIN
ldap_search_base: dc=example,dc=com
ldap_filter: (cn=%u)
ldap_bind_dn: cn=admin,dc=example,dc=com
ldap_password: secret
```

Note the LDAP password (`ldap_password`) and bind domain name (`ldap_bind_dn`). This allows the `saslauthd` service to connect to the LDAP service as admin. In production, this would not be the case; users should not store administrative passwords in unencrypted files.

Microsoft Windows Active Directory

In order for LDAP operations to be performed against a Windows Active Directory server, a user record must be created to perform the lookups.

The following example shows configuration parameters for `saslauthd` to communicate with an Active Directory server:

```
ldap_servers: ldap://localhost
ldap_mech: PLAIN
ldap_search_base: CN=Users,DC=example,DC=com
ldap_filter: (sAMAccountName=%u)
ldap_bind_dn: CN=ldapmgr,CN=Users,DC=<AD Domain>,DC=<AD TLD>
ldap_password: ld@pmgr_Pa55word
```

In order to determine and test the correct search base and filter for your Active Directory installation, the Microsoft LDP GUI Tool can be used to bind and search the LDAP-compatible directory.

4. Start the `saslauthd` process and set it to run at restart:

```
$ sudo systemctl start saslauthd
$ sudo systemctl enable saslauthd
```

5. Give write permissions to the `/run/saslauthd` folder for the `mongod`. Either change permissions to the `/run/saslauthd` folder:

```
$ sudo chmod 755 /run/saslauthd
```

Or add the `mongod` user to the `sasl` group:

```
$ sudo usermod -a -G sasl mongod
```

Sanity check

Verify that the `saslauthd` service can authenticate against the users created in the LDAP service:

```
$ testsaslauthd -u christian -p secret  -f /var/run/saslauthd/mux
```

This should return `0:OK "Success"`. If it doesn't, then either the user name and password are not in the LDAP service, or `sasaluthd` is not configured properly.

Configuring libsasl2

The `mongod` also uses the SASL library for communications. To configure the SASL library, create a configuration file.

The configuration file **must** be named `mongodb.conf` and placed in a directory where `libsasl2` can find and read it. `libsasl2` is hard-coded to look in certain directories at build time. This location may be different depending on the installation method.

In the configuration file, specify the following:

```
pwcheck_method: saslauthd
saslauthd_path: /var/run/saslauthd/mux
log_level: 5
mech_list: plain
```

The first two entries (`pwcheck_method` and `saslauthd_path`) are required for `mongod` to successfully use the `saslauthd` service. The `log_level` is optional but may help determine configuration errors.

See also

SASL documentation

Configuring `mongod` server

The configuration consists of the following steps:

- Creating a user with the **root** privileges. This user is required to log in to *Percona Server for MongoDB* after the external authentication is enabled.
- Editing the configuration file to enable the external authentication

Create a root user

Create a user with the **root** privileges in the `admin` database. If you have already created this user, skip this step. Otherwise, run the following command to create the admin user:

```
> use admin
switched to db admin
> db.createUser({"user": "admin", "pwd": "$3cr3tP4ssw0rd", "roles": ["root"]})
Successfully added user: { "user" : "admin", "roles" : [ "root" ] }
```

Enable external authentication

Edit the `etc/mongod.conf` configuration file to enable the external authentication:

```
security:
  authorization: enabled

setParameter:
  authenticationMechanisms: PLAIN,SCRAM-SHA-1
```

Restart the `mongod` service:

```
$ sudo systemctl restart mongod
```

Add an external user to Percona Server for MongoDB

User authentication is done by mapping a user object on the LDAP server against a user created in the `$external` database. Thus, at this step, you create the user in the `$external` database and they inherit the roles and privileges. Note that the username must exactly match the name of the user object on the LDAP server.

Connect to Percona Server for MongoDB and authenticate as the root user.

```
$ mongosh --host localhost --port 27017 -u admin -p '$3cr3tP4ssw0rd' --
authenticationDatabase 'admin'
```

Use the following command to add an external user to Percona Server for MongoDB:

```
> db.getSiblingDB("$external").createUser( {user : "christian", roles: [ {role:
"read", db: "test"} ]} );
```

Authenticate as an external user in Percona Server for MongoDB

When running the `mongo` client, a user can authenticate against a given database using the following command:

```
> db.getSiblingDB("$external").auth({ mechanism:"PLAIN", user:"christian",
pwd:"secret", digestPassword:false})
```

Alternatively, a user can authenticate while connecting to *Percona Server for MongoDB*:

```
$ mongo --host localhost --port 27017 --authenticationMechanism PLAIN --
authenticationDatabase \$external -u christian -p
```

This section is based on the blog post Percona Server for MongoDB Authentication Using Active Directory by *Doug Duncan*:

Set up x.509 authentication and LDAP authorization

x.509 certificate authentication is one of the supported authentication mechanisms in Percona Server for MongoDB. It is compatible with LDAP authorization to enable you to control user access and operations in your database environment.

This document provides the steps on how to configure and use x.509 certificates for authentication in Percona Server for MongoDB and authorize users in the LDAP server.

Considerations

1. For testing purposes, in this tutorial we use OpenSSL to issue self-signed certificates. For production use, we recommend using certificates issued and signed by the CA in Percona Server for MongoDB. Client certificates must meet the client certificate requirements.
2. The setup of the LDAP server and the configuration of the LDAP schema is out of scope of this document. We assume that you have the LDAP server up and running and accessible to Percona Server for MongoDB.

Setup procedure

Issue certificates

1. Create a directory to store the certificates. For example, `/var/lib/mongocerts`.

```
$ sudo mkdir -p /var/lib/mongocerts
```

2. Grant access to the `mongod` user to this directory:

```
$ sudo chown mongod:mongod /var/lib/mongocerts
```

Generate the root Certificate Authority certificate

The root Certificate Authority certificate will be used to sign the SSL certificates.

Run the following command and in the `-subj` flag, provide the details about your organization:

- C - Country Name (2 letter code);
- ST - State or Province Name (full name);
- L - Locality Name (city);
- O - Organization Name (company);
- CN - Common Name (your name or your server's hostname) .

```
$ cd /var/lib/mongocerts
$ sudo openssl req -nodes -x509 -newkey rsa:4096 -keyout ca.key -out ca.crt -subj
"/C=US/ST=California/L=SanFrancisco/O=Percona/OU=root/CN=localhost"
```

Generate server certificate

1. Create the server certificate request and key. In the `-subj` flag, provide the details about your organization:
   - C - Country Name (2 letter code);
   - ST - State or Province Name (full name);
   - L - Locality Name (city);
   - O - Organization Name (company);
   - CN - Common Name (your name or your server's hostname) .

```
$ sudo openssl req -nodes -newkey rsa:4096 -keyout server.key -out server.csr
-subj "/C=US/ST=California/L=SanFrancisco/O=Percona/OU=server/CN=localhost"
```

2. Sign the server certificate request with the root CA certificate:

```
$ sudo openssl x509 -req -in server.csr -CA ca.crt -CAkey ca.key -set_serial
01 -out server.crt
```

3. Combine the server certificate and key to create a certificate key file. Run this command as the `root` user:

```
$ cat server.key server.crt > server.pem
```

Generate client certificates

1. Generate client certificate request and key. In the `-subj` flag, specify the information about clients in the format.

```
$ openssl req -nodes -newkey rsa:4096 -keyout client.key -out client.csr -subj
"/DC=com/DC=percona/CN=John Doe"
```

2. Sign the client certificate request with the root CA certificate.

```
$ openssl x509 -req -in client.csr -CA ca.crt -CAkey ca.key -set_serial 02 -
out client.crt
```

3. Combine the client certificate and key to create a certificate key file.

```
$ cat client.key client.crt > client.pem
```

Set up the LDAP server

The setup of the LDAP server is out of scope of this document. Please work with your LDAP administrators to set up the LDAP server and configure the LDAP schema.

Configure the `mongod` server

The configuration consists of the following steps:

- Creating a role that matches the user group on the LDAP server
- Editing the configuration file to enable the x.509 authentication

Note

When you use x.509 authentication with LDAP authorization, you don't need to create users in the `$external` database. User management is done on the LDAP server so when a client connects to the database, they are authenticated and authorized through the LDAP server.

Create roles

At this step, create the roles in the `admin` database with the names that exactly match the names of the user groups on the LDAP server. These roles are used for user LDAP authorization in Percona Server for MongoDB.

In our example, we create the role `cn=otherusers,dc=percona,dc=com` that has the corresponding LDAP group.

```
var admin = db.getSiblingDB("admin")
db.createRole(
   {
     role: "cn=otherusers,dc=percona,dc=com",
     privileges: [],
     roles: [
           "userAdminAnyDatabase",
           "clusterMonitor",
           "clusterManager",
           "clusterAdmin"
            ]
   }
)
```

Output:

```
{
     "role" : "cn=otherusers,dc=percona,dc=com",
     "privileges" : [ ],
     "roles" : [
            "userAdminAnyDatabase",
            "clusterMonitor",
            "clusterManager",
            "clusterAdmin"
     ]
}
```

Enable x.509 authentication

1. Stop the `mongod` service

   ```
   $ sudo systemctl stop mongod
   ```

2. Edit the `/etc/mongod.conf` configuration file.

```
net:
  port: 27017
  bindIp: 127.0.0.1
  tls:
    mode: requireTLS
    certificateKeyFile: /var/lib/mongocerts/server.pem
    CAFile: /var/lib/mongocerts/ca.crt

security:
  authorization: enabled
  ldap:
    servers: "ldap.example.com"
    transportSecurity: none
    authz:
      queryTemplate: "dc=percona,dc=com??sub?(&(objectClass=groupOfNames)
(member={USER}))"

setParameter:
  authenticationMechanisms: PLAIN,MONGODB-X509
```

Replace `ldap.example.com` with the hostname of your LDAP server. In the LDAP query template, replace the domain controllers `percona` and `com` with those relevant to your organization.

3. Start the `mongod` service

```
$ sudo systemctl start mongod
```

Authenticate with the x.509 certificate

To test the authentication, connect to *Percona Server for MongoDB* using the following command:

```
$ mongosh --host localhost --tls --tlsCAFile /var/lib/mongocerts/ca.crt --
tlsCertificateKeyFile <path_to_client_certificate>/client.pem  --
authenticationMechanism MONGODB-X509 --authenticationDatabase='$external'
```

The result should look like the following:

```
> db.runCommand({connectionStatus : 1})
{
     "authInfo" : {
             "authenticatedUsers" : [
                     {
                             "user" : "CN=John Doe,DC=percona,DC=com",
                             "db" : "$external"
                     }
             ],
             "authenticatedUserRoles" : [
                     {
                             "role" : "cn=otherreaders,dc=percona,dc=com",
                             "db" : "admin"
                     },
                     {
                             "role" : "clusterAdmin",
                             "db" : "admin"
                     },
                     {
                             "role" : "userAdminAnyDatabase",
                             "db" : "admin"
                     },
                     {
                             "role" : "clusterManager",
                             "db" : "admin"
                     },
                     {
                             "role" : "clusterMonitor",
                             "db" : "admin"
                     }
             ]
     },
     "ok" : 1
}
```

Setting up Kerberos authentication

This document provides configuration steps for setting up Kerberos Authentication in Percona Server for MongoDB.

Assumptions

The setup of the Kerberos server itself is not included in this document. Please refer to the Kerberos documentation for the installation and configuration steps relevant to your operating system.

We assume that you have successfully completed the following steps:

- Installed and configured the Kerberos server
- Added necessary realms
- Added service, admin, and user principals
- Configured the `A` and `PTR` DNS records for every host running `mongod` instance to resolve the hostnames onto Kerberos realm.

Add user principals to Percona Server for MongoDB

To authenticate, users must exist in the Kerberos and Percona Server for MongoDB servers. Their usernames must match exactly.

After you have defined the user principals in the Kerberos server, add them to the `$external` database in Percona Server for MongoDB and assign required roles:

```
> use $external
> db.createUser({user: "demo@PERCONATEST.COM",roles: [{role: "read", db:
"admin"}]})
```

Replace `demo@PERCONATEST.COM` with your username and Kerberos realm.

Configure Kerberos `keytab` files

A `keytab` file stores the authentication keys for a service principal representing a `mongod` instance to access the Kerberos admin server.

After you have added the service principal to the Kerberos admin server, the entry for this principal is added to the `/etc/krb5.keytab` file.

To authenticate, the `mongod` server must have access to the `keytab` file. To keep the `keytab` file secure, restrict access to it only to the user running the `mongod` process.

1. Stop the `mongod` service

   ```
   $ sudo systemctl stop mongod
   ```

2. Generate the keytab file or get a copy of it if you generated the `keytab` file on another host. Save the key file under a separate path (e.g. `/etc/mongodb.keytab`)

   ```
   $ cp /etc/krb5.keytab /etc/mongodb.keytab
   ```

3. Change the ownership to the `keytab` file. The user name and group name depend on how you installed Percona Server for MongoDB:

   RPM/DEB packages or tarballs

   ```
   $ sudo chown mongod:mongod /etc/mongodb.keytab
   ```

   Percona Docker container images

   ```
   $ sudo chown mongodb:mongodb /etc/mongodb.keytab
   ```

4. Set the `KRB5_KTNAME` variable in the environment file for the `mongod` process.

   Debian and Ubuntu

   Edit the environment file at the path `/etc/default/mongod` and specify the `KRB5_KTNAME` variable:

   ```
   KRB5_KTNAME=/etc/mongodb.keytab
   ```

   If you have a different path to the keytab file, specify it accordingly.

   RHEL and derivatives

   Edit the environment file at the path `/etc/sysconfig/mongod` and specify the `KRB5_KTNAME` variable:

   ```
   KRB5_KTNAME=/etc/mongodb.keytab
   ```

   If you have a different path to the keytab file, specify it accordingly.

5. Restart the `mongod` service

   ```
   $ sudo systemctl start mongod
   ```

AWS IAM authentication

Version added: 6.0.5-4

IAM (Identity Access Management) is the AWS service that allows you to securely control access to AWS resources. Percona Server for MongoDB supports authentication with AWS IAM enabling you to use the same AWS credentials both for it and other components of your infrastructure. This saves your DBAs from managing different sets of secrets and frees their time on other activities.

You can configure AWS IAM for a password-less authentication. Instead of username and password, the user or the application presents the AWS security credentials for authentication, but the secret key is not sent to Percona Server for MongoDB. This significantly increases the security in your infrastructure.

Percona Server for MongoDB supports two authentication types:

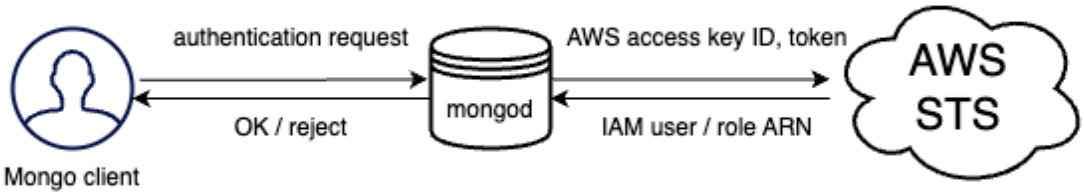
User authentication

This authentication type is typically used by human operators. Every user account in AWS has the ARN (Amazon Resource Name), which uniquely identifies this account and the user associated with it. During authentication, the ARN is used to verify the user's identity.

Role authentication

This type is typically used for applications / `mongo` clients. For instance, if your application is running on AWS resources like EC2 instance or ECS (Elastic Container Service) which uses the IAM role assigned to it. Another scenario is to allow users to assume the IAM role and in such a way, grant a user the permissions outlined in the IAM role. The ARN of the IAM role is used to authenticate the application in Percona Server for MongoDB.

For either type of AWS IAM authentication, the flow is the following:



1. A `mongo` client (a Mongo shell or an application that talks to Percona Server for MongoDB via a driver) gets AWS credentials from either EC2/ECS instance metadata service, environmental variables or MongoDB URI connection string.
2. The `mongo` client constructs the authentication request which includes the AWS access key ID, token and the signature and sends it to Percona Server for MongoDB

   Important

   The `mongo` client never sends the secret access key to Percona Server for MongoDB.

3. Percona Server for MongoDB sends the received credentials to the AWS STS (Security Token Service) for verification

4. The AWS STS service validates whether the signature is correct and answers with the user / role ARN that created the signature
5. Percona Server for MongoDB looks for the same username as the received ARN in the `$external` database and grants privileges to access Percona Server for MongoDB as defined for the respective user.

Starting with version 6.0.8-6, you can configure the AWS STS endpoint by specifying the `setParameter.awsStsHost` in the configuration file. This allows you to send requests to the AWS resources of your choice to meet security requirements of your organization and ensure successful authentication.

See also

- AWS documentation:
  - AWS Identity and Access Management
  - Temporary security credentials in IAM
  - Authenticating Requests (AWS Signature Version 4)
  - Managing AWS STS in an AWS Region
- MongoDB documentation: Set Up Passwordless Authentication with AWS IAM

Configuration

For how to configure AWS IAM authentication, see Setting up AWS IAM authentication.

Setting up AWS IAM authentication

This document provides guidelines how to configure Percona Server for MongoDB to use AWS IAM authentication. The use of this authentication method enables you to natively integrate Percona Server for MongoDB with AWS services, increase security of your infrastructure by setting up password-less authentication and offload your DBAs from managing different sets of secrets. To learn more, see AWS IAM authentication

To configure AWS IAM authentication means to set up your AWS environment and configure Percona Server for MongoDB. The AWS environment setup is out of scope of this document. Consult the AWS documentation to perform the following setup steps:

1. Configure the AWS resource to work with IAM.
2. For user authentication:
   - Create the IAM user and copy its ARN (Amazon Resource Name)

   For role authentication:

- Create the IAM role
- Attach the IAM role to the AWS resource.
- Copy the ARN of the IAM role.

Configure Percona Server for MongoDB

The steps are the following:

1. Create users in the `$external` database with the username as the IAM user/role ARN
2. Enable authentication and specify the authentication mechanism as `MONGODB-AWS`.

Create users in `$external` database

During the authentication, Percona Server for MongoDB matches the ARN of the IAM user or role retrieved from AWS STS against the user created in the `$external` database. Thus, the username for this user must include their ARN and have the following format:

User authentication

```
arn:aws:iam::<ARN>:user/<user_name>
```

Role authentication

```
arn:aws:iam::<ARN>:role/<role_name>
```

Create a user and assign the required roles to them. Specify the ARN and names in the following example commands:

User authentication

```
> use $external
> db.createUser(
   {
       user: "arn:aws:iam::000000000000:user/myUser",
       roles: [{role: "read", db: "admin"}]
   }
)
```

Role authentication

```
> use $external
> db.createUser(
   {
       user: "arn:aws:iam::111111111111:role/myRole",
       roles: [{role: "read", db: "admin"}]
   }
)
```

Enable authentication

Run the following commands as root or via `sudo`

1. Stop the `mongod` service

   ```
   $ sudo systemctl stop mongod
   ```

2. Edit the `/etc/mongod.conf` configuration file

   ```
   security:
     authorization: enabled

   setParameter:
     authenticationMechanisms: MONGODB-AWS
   ```

3. Start the `mongod` service

   ```
   $ sudo systemctl start mongod
   ```

Configure AWS STS endpoint

By default, all authentication requests are sent to the `sts.amazonaws.com` endpoint. If this endpoint is unavailable for some reason, you can override it and send AWS STS requests to the endpoints of your choice to ensure successful authentication. You must enable the AWS region to use it.

Edit the `/etc/mongod.conf` configuration file and specify the AWS endpoint for the `awsStsHost` parameter.

```
security:
  authorization: enabled

setParameter:
  authenticationMechanisms: MONGODB-AWS
  awsStsHost: <aws-endpoint>
```

See the list of AWS endpoints.

Authenticate in Percona Server for MongoDB using AWS IAM

To test the authentication, use either of the following methods:

MongoDB connection string

Replace `<aws_access_key_id>`, `<aws_secret_access_key>` and `psmdb.example.com` with actual values in the following command:

```
$ mongosh 'mongodb://<aws_access_key_id>:
<aws_secret_access_key>:@psmdb.example.com/admin?
authSource=$external&authMechanism=MONGODB-AWS'
```

To pass temporary credentials and AWS token, replace `<aws_access_key_id>`, `<aws_secret_access_key>`, `<aws_session_token>` and `psmdb.example.com` in the following command:

```
$ mongosh 'mongodb://<aws_access_key_id>:
<aws_secret_access_key>:@psmdb.example.com/admin?
authSource=$external&authMechanism=MONGODB-
AWS&authMechanismProperties=AWS_SESSION_TOKEN:<aws_session_token>'
```

Environment variables

Set AWS environment variables:

```
export AWS_ACCESS_KEY_ID='<aws_access_key_id>'
export AWS_SECRET_ACCESS_KEY='<aws_secret_access_key>'
export AWS_SESSION_TOKEN='<aws_session_token>'
```

Connect to Percona Server for MongoDB:

```
$ mongosh 'mongodb://psmdb.example.com/testdb?
authSource=$external&authMechanism=MONGODB-AWS'
```

AWS resource metadata

If your application is running on the AWS resource, it receives the credentials from the resource metadata. To connect to Percona Server for MongoDB, run the command as follows:

```
$ mongosh --authenticationMechanism=MONGODB-AWS --
authenticationDatabase='$external'
```

Upon successful authentication, the result should look like the following:

```
> db.runCommand( { connectionStatus: 1 })
{
  authInfo: {
    authenticatedUsers: [
      {
        user: 'arn:aws:iam::00000000000:user/myUser',
        db: '$external'
      }
    ],
    authenticatedUserRoles: [ { role: 'read', db: 'admin' } ]
  },
  ok: 1
}
```

LDAP authorization

LDAP authorization allows you to control user access and operations in your database environment using the centralized user management storage – an LDAP server. You create and manage user credentials and permission information in the LDAP server. In addition, you create roles in the `admin` database with the names that exactly match the LDAP group Distinguished Name. These roles define what privileges the users who belong to the corresponding LDAP group.

Supported authentication mechanisms

LDAP authorization is compatible with the following authentication mechanisms:

- x.509 certificate authentication
- Kerberos Authentication
- Authentication and authorization with direct binding to LDAP

Authentication and authorization with direct binding to LDAP

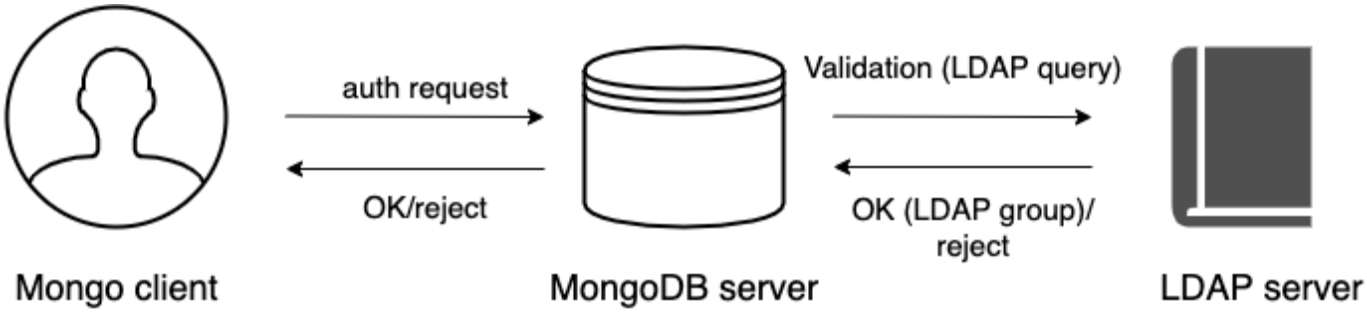
You can configure Percona Server for MongoDB to communicate with the LDAP server directly to authenticate and authorize users.

The advantage of using this mechanism is that it is easy to setup and does not require pre-creating users in the dummy `$external` database. Nevertheless, the `--authenticationDatabase` connection argument will still need to be specified as `$external`.

The following example illustrates the connection to Percona Server for MongoDB from the `mongosh` shell:

```
$ mongosh -u "CN=alice,CN=Users,DC=engineering,DC=example,DC=com" -p --
authenticationDatabase '$external' --authenticationMechanism PLAIN
```

The following diagram illustrates the authentication and authorization flow:



1. A user connects to the database providing their credentials
2. If required, Percona Server for MongoDB transforms the username to match the user in the LDAP server according to the mapping rules specified for the `--ldapUserToDNMapping` parameter.
3. Percona Server for MongoDB queries the LDAP server for the user identity and/or the LDAP groups this user belongs to.
4. The LDAP server evaluates the query and if a user exists, returns their LDAP groups.
5. Percona Server for MongoDB authorizes the user by mapping the DN of the returned groups against the roles assigned to the user in the `admin` database. If a user belongs to several groups they receive permissions associated with every group.

Username transformation

If clients connect to Percona Server for MongoDB with usernames that are not LDAP DN, these usernames must be converted to the format acceptable by LDAP.

To achieve this, the `--ldapUserToDNMapping` parameter is available in Percona Server for MongoDB configuration.

The `--ldapUserToDNMapping` parameter is a JSON string representing an ordered array of rules expressed as JSON documents. Each document provides a regex pattern (`match` field) to match against a provided username. If that pattern matches, there are two ways to continue:

- If there is the `substitution` value, then the matched pattern becomes the username of the user for further processing.
- If there is the `ldapQuery` value, the matched pattern is sent to the LDAP server and the result of that LDAP query becomes the DN of the user for further processing.

Both `substitution` and `ldapQuery` should contain placeholders to insert parts of the original username – those placeholders are replaced with regular expression submatches found on the `match` stage.

So having an array of documents, Percona Server for MongoDB tries to match each document against the provided name and if it matches, the name is replaced either with the substitution string or with the result of the LDAP query.

Escaping special characters in usernames

A username can contain special characters in any of its parts. A special character is any character which is not alphanumeric and not an ASCII character.

These characters must be escaped to formulate the correct LDAP query on the following stages:

- To transform a username to the LDAP DN, and the matched pattern of a username must be first queried in the LDAP server to become the DN.
- To retrieve the groups a user is the member of.

Additionally, the username pattern to match for the transformation can have special characters that must be escaped too.

What exactly characters require escaping depends on the Percona Server for MongoDB configuration. Namely, on the configuration of the LDAP query template and the regular expressions inside the `--ldapUserToDNMapping` parameter.

The escaping rules are described in the following documents:

- RFC 4514 | LDAP: Distinguished Names - Escaping in Distinguished Names
- RFC 4515 | LDAP: String Representation of Search Filters - LDAP search filters utilize its own escaping mechanism
- RFC 4516 | LDAP: Uniform Resource Locator - General URL escaping rules.

Their explanation is out of the scope of the Percona Server For MongoDB documentation. Please review the RFC directly or use your preferred LDAP resource.

To summarize, username escaping happens in the following cases:

- When a username is defined as the LDAP DN and has special characters in any of its parts.
- When a username must be transformed to the LDAP DN and the username pattern for the transformation has special characters
- When the transformed LDAP DN value contains special characters in any of its parts.

LDAP referrals

As of version 6.0.2-1, Percona Server for MongoDB supports LDAP referrals as defined in RFC 4511 4.1.10. For security reasons, referrals are disabled by default. Double-check that using referrals is safe before enabling them.

To enable LDAP referrals, set the `ldapFollowReferrals` server parameter to `true` using the setParameter command or by editing the configuration file.

```
setParameter:
   ldapFollowReferrals: true
```

Connection pool

As of version 6.0.2-1, Percona Server for MongoDB always uses a connection pool to LDAP server to process bind requests. The connection pool is enabled by default. The default connection pool size is 2 connections.

You can change the connection pool size either at the server startup or dynamically by specifying the value for the `ldapConnectionPoolSizePerHost` server parameter.

For example, to set the number of connections in the pool to 5, use the setParameter command:

Command line

```
> db.adminCommand( { setParameter: 1, ldapConnectionPoolSizePerHost: 5  } )
```

Configuration file

```
setParameter:
  ldapConnectionPoolSizePerHost: 5
```

Support for multiple LDAP servers

As of version 6.0.2-1, you can specify multiple LDAP servers for failover. Percona Server for MongoDB sends bind requests to the first server defined in the list. When this server is down or unavailable, it sends requests to the next server and so on. Note that Percona Server for MongoDB keeps sending requests to this server even after the unavailable server recovers.

Specify the LDAP servers as a comma-separated list in the format `<host>:<port>` for the –ldapServers option.

You can define the option value at the server startup by editing the configuration file.

```
security:
  authorization: "enabled"
  ldap:
    servers: "ldap1.example.net,ldap2.example.net"
```

You can change `ldapServers` dynamically at runtime using the setParameter.

```
> db.adminCommand( { setParameter: 1,
ldapServers:"localhost,ldap1.example.net,ldap2.example.net"} )
{ "was" : "ldap1.example.net,ldap2.example.net", "ok" : 1 }
```

See also

MongoDB Documentation:

- Authenticate and Authorize Users Using Active Directory via Native LDAP
- LDAP referrals

Configuration

For how to configure LDAP authorization with the native LDAP authentication, see Setting up LDAP authentication and authorization using NativeLDAP.

Set up LDAP authentication and authorization using NativeLDAP

This document describes an example configuration of LDAP authentication and authorization using direct binding to an LDAP server (Native LDAP). We recommend testing this setup in a non-production environment first, before applying it in production.

Assumptions

- The setup of an LDAP server is out of scope of this document. We assume that you are familiar with the LDAP server schema.
- If usernames contain special characters, they must be escaped as described in RFC4514, RFC4515, RFC4516. The usage of particular escaping rules depends on the part of the LDAP query which will contain the substituted value. An explanation of escaping rules or LDAP queries is out of scope of this setup. Please review the RFC directly or use your preferred LDAP resource.
- You have the LDAP server up and running and it's accessible to the servers with Percona Server for MongoDB installed.

- This document primarily focuses on OpenLDAP used as the LDAP server and the examples are given based on the OpenLDAP format. If you are using Active Directory, refer to the Active Directory configuration section.
- In examples below, we use anonymous binds to the LDAP server and the following OpenLDAP groups:

```
dn: cn=testusers,dc=percona,dc=com
objectClass: groupOfNames
cn: testusers
member: cn=alice,dc=percona,dc=com

dn: cn=otherusers,dc=percona,dc=com
objectClass: groupOfNames
cn: otherusers
member: cn=bob,dc=percona,dc=com
```

Prerequisites

- To configure LDAP, you must have the `sudo` privilege to the server with the {{ no such element: dict object['psmdb_full_name'] }} installed.
- If your LDAP server disallows anonymous binds, create the user that Percona Server for MongoDB will use to connect to and query the LDAP server. Afterwards, set that username and password using the `security.ldap.bind.queryUser` and `security.ldap.bind.queryPassword` parameters in the `mongod.conf` configuration file. If the username or any part of it ends up substituted as distinguished name, it must be escaped according to RFC 4514. It may happen when:
  - A username is a fully distinguished name and can be substituted directly into the LDAP query without using any transformation. The LDAP query is defined within the `security.ldap.authz.queryTemplate` configuration parameter.
  - A username represents an email address or a full name and requires transformation to LDAP DN. The transformation rules are defined via the `security.ldap.userToDNMapping` configuration parameter. After the transformation, some parts of the username may become part of distinguished name substituted into the `security.ldap.authz.queryTemplate` parameter.

Setup procedure

Configure TLS/SSL connection for Percona Server for MongoDB

By default, Percona Server for MongoDB establishes the TLS connection when binding to the LDAP server and thus, it requires access to the LDAP certificates. To make Percona Server for MongoDB aware of the certificates, do the following:

1. Place the certificate in the `certs` directory. The path to the `certs` directory is:

- On RHEL / derivatives: `/etc/openldap/certs/`
- On Debian / Ubuntu: `/etc/ssl/certs/`

2. Specify the path to the certificates in the `ldap.conf` file:

RHEL and derivatives

```
tee -a /etc/openldap/ldap.conf <<EOF
TLS_CACERT /etc/openldap/certs/my_CA.crt
EOF
```

Debian / Ubuntu

```
tee -a /etc/openldap/ldap.conf <<EOF
TLS_CACERT /etc/ssl/certs/my_CA.crt
EOF
```

Create roles for LDAP groups in Percona Server for MongoDB

Percona Server for MongoDB authorizes users based on LDAP group membership. For every group, you must create the role in the `admin` database with the name that exactly matches the of the LDAP group.

Percona Server for MongoDB maps the user's LDAP group to the roles and determines what role is assigned to the user. Percona Server for MongoDB then grants privileges defined by this role.

To create the roles, use the following command:

```
var admin = db.getSiblingDB("admin")
admin.createRole(
   {
     role: "cn=testusers,dc=percona,dc=com",
     privileges: [],
     roles: [ "readWrite"]
   }
)

admin.createRole(
   {
     role: "cn=otherusers,dc=percona,dc=com",
     privileges: [],
     roles: [ "read"]
   }
)
```

Percona Server for MongoDB configuration

Access without username transformation

This section assumes that users connect to Percona Server for MongoDB by providing their LDAP DN as the username and the LDAP DNs don't contain special characters. Otherwise, you must escape them according to RFC 4514 | LDAP: Distinguished Names.

1. Edit the Percona Server for MongoDB configuration file (by default, `/etc/mongod.conf`) and specify the following configuration:

   ```
   security:
     authorization: "enabled"
     ldap:
       servers: "ldap.example.com"
       transportSecurity: tls
       authz:
          queryTemplate: "dc=percona,dc=com??sub?(&(objectClass=groupOfNames)
   (member={PROVIDED_USER}))"

   setParameter:
     authenticationMechanisms: "PLAIN"
   ```

   The `{PROVIDED_USER}` variable substitutes the provided username before authentication or username transformation takes place.

   Replace `ldap.example.com` with the hostname of your LDAP server. In the LDAP query template, replace the domain controllers `percona` and `com` with those relevant to your organization.

2. Restart the `mongod` service:

   ```
   $ sudo systemctl restart mongod
   ```

3. Test the access to Percona Server for MongoDB:

   ```
   $ mongosh -u "cn=alice,dc=percona,dc=com" -p "secretpwd" --
   authenticationDatabase '$external' --authenticationMechanism 'PLAIN'
   ```

Access with username transformation

If users connect to Percona Server for MongoDB with usernames that are not LDAP, you need to transform these usernames to be accepted by the LDAP server. If usernames contain special characters, these characters must be escaped.

Using the `--ldapUserToDNMapping` configuration parameter allows you to do this. You specify the match pattern as a regexp to capture a username. Next, specify how to transform it - either to use a substitution value or to query the LDAP server for a username.

If you don’t know what the Substitution or LDAP query string should be, please consult with the LDAP administrators to figure this out.

Note that you can use only the `LDAP query` or the `Substitution` stage, and you cannot combine the two.

Substitution

1. Edit the Percona Server for MongoDB configuration file (by default, `/etc/mongod.conf`) and specify the `userToDNMapping` parameter:

```
security:
  authorization: "enabled"
  ldap:
    servers: "ldap.example.com"
    transportSecurity: tls
    authz:
       queryTemplate: "dc=percona,dc=com??sub?(&(objectClass=groupOfNames)
(member={USER}))"
    userToDNMapping: >-
          [
            {
              match: "([^@]+)@percona\\.com",
              substitution: "CN={0},DC=percona,DC=com"
            }
          ]

setParameter:
  authenticationMechanisms: "PLAIN"
```

   The `{USER}` variable substitutes the username transformed during the `userToDNMapping` stage.

   Modify the given example configuration to match your deployment.

2. Restart the `mongod` service:

```
$ sudo systemctl restart mongod
```

3. Test the access to Percona Server for MongoDB:

```
$ mongosh -u "alice@percona.com" -p "secretpwd" --authenticationDatabase
'$external' --authenticationMechanism 'PLAIN'
```

LDAP query

1. Edit the Percona Server for MongoDB configuration file (by default, `/etc/mongod.conf`) and specify the `userToDNMapping` parameter:

```
security:
  authorization: "enabled"
  ldap:
    servers: "ldap.example.com"
    transportSecurity: tls
    authz:
       queryTemplate: "dc=percona,dc=com??sub?(&(objectClass=groupOfNames)
(member={USER}))"
    userToDNMapping: >-
          [
            {
              match: "([^@]+)@percona\\.com",
              ldapQuery: "dc=percona,dc=com??sub?(&
(objectClass=organizationalPerson)(cn={0}))"
            }
          ]

setParameter:
  authenticationMechanisms: "PLAIN"
```

The `{USER}` variable substitutes the username transformed during the userToDNMapping stage.

Modify the given example configuration to match your deployment, For example, replace `ldap.example.com` with the hostname of your LDAP server. Replace the domain controllers (DC) `percona` and `com` with those relevant to your organization. Depending on your LDAP schema, further modifications of the LDAP query may be required.

2. Restart the `mongod` service:

```
$ sudo systemctl restart mongod
```

3. Test the access to Percona Server for MongoDB:

```
mongosh -u "alice" -p "secretpwd" --authenticationDatabase '$external' --
authenticationMechanism 'PLAIN'
```

Escaping special characters

The **`substitution` parameter**

The result of the substitution becomes the value of the `{USER}` placeholder, which is a `{USER}` value in the `security.ldap.authz.queryTemplate` parameter. Escaping requirements depend on the part of the query template that will be substituted. For example, the result of the substitution can be a full distinguished name or a part of it. In this case, according to RFC4514, you must escape special characters in the `substitution` parameter. Using other escaping mechanisms in this parameter is unnecessary because {{ no such element: dict object['psmdb_full_name'] }} applies the necessary escaping as outlined in RFC4515 and RFC4516 while substituting the `security.ldap.authz.queryTemplate` parameter.

The **`ldapQuery` and `queryTemplate` parameters**

To properly escape special characters, follow these steps:

1. Escape special characters in full or partially distinguished names in the query according to RFC 4514.
2. Next, escape special characters within the LDAP search filter portion of the query, as outlined in RFC 4515.
3. Then, escape special characters in the query according to RFC 4516. Note that you do not need to escape question marks if they are being used to separate parts of the query.
4. Finally, if you plan to use the result in a YAML configuration file, you may need to escape characters according to the YAML specification

Active Directory configuration

Microsoft Active Directory uses a different schema for user and group definition. To illustrate Percona Server for MongoDB configuration, we will use the following AD users:

```
dn:CN=alice,CN=Users,DC=testusers,DC=percona,DC=com
userPrincipalName: alice@testusers.percona.com
memberOf: CN=testusers,CN=Users,DC=percona,DC=com

dn:CN=bob,CN=Users,DC=otherusers,DC=percona,DC=com
userPrincipalName: bob@otherusers.percona.com
memberOf: CN=otherusers,CN=Users,DC=percona,DC=com
```

The following are respective groups:

```
dn:CN=testusers,CN=Users,DC=percona,DC=com
member:CN=alice,CN=Users,DC=testusers,DC=example,DC=com

dn:CN=otherusers,CN=Users,DC=percona,DC=com
member:CN=bob,CN=Users,DC=otherusers,DC=example,DC=com
```

Use one of the given Percona Server for MongoDB configurations for user authentication and authorization in Active Directory. Read about escaping special characters in usernames to modify the configuration accordingly.

No username transformation

1. Edit the `/etc/mongod.conf` configuration file:

```
ldap:
  servers: "ldap.example.com"
  authz:
    queryTemplate: "DC=percona,DC=com??sub?(&(objectClass=group)
(member:1.2.840.113556.1.4.1941:={PROVIDED_USER}))"

  setParameter:
    authenticationMechanisms: "PLAIN"
```

2. Restart the `mongod` service:

```
$ sudo systemctl restart mongod
```

3. Test the access to Percona Server for MongoDB:

```
$ mongosh -u "CN=alice,CN=Users,DC=testusers,DC=percona,DC=com" -p "secretpwd"
--authenticationDatabase '$external' --authenticationMechanism 'PLAIN'
```

Username substitution

1. Edit the `/etc/mongod.conf` configuration file:

```
ldap:
  servers: "ldap.example.com"
  authz:
    queryTemplate: "DC=percona,DC=com??sub?(&(objectClass=group)
(member:1.2.840.113556.1.4.1941:={USER}))"
  userToDNMapping: >-
        [
          {
            match: "([^@]+)@([^\\.]+)\\.percona\\.com",
            substitution: "CN={0},CN=Users,DC={1},DC=percona,DC=com"
          }
        ]

  setParameter:
    authenticationMechanisms: "PLAIN"
```

2. Restart the `mongod` service:

```
$ sudo systemctl restart mongod
```

3. Test the access to Percona Server for MongoDB:

```
$ mongosh -u "alice@percona.com" -p "secretpwd" --authenticationDatabase
'$external' --authenticationMechanism 'PLAIN'
```

LDAP query

1. Edit the `/etc/mongod.conf` configuration file:

```
ldap:
  servers: "ldap.example.com"
  authz:
    queryTemplate: "DC=percona,DC=com??sub?(&(objectClass=group)
(member:1.2.840.113556.1.4.1941:={USER}))"
  userToDNMapping: >-
        [
          {
            match: "(.+)",
            ldapQuery: "dc=example,dc=com??sub?(&
(objectClass=organizationalPerson)(userPrincipalName={0}))"
          }
        ]

  setParameter:
    authenticationMechanisms: "PLAIN"
```

2. Restart the `mongod` service:

```
$ sudo systemctl restart mongod
```

3. Test the access to Percona Server for MongoDB:

```
$ mongosh -u "alice" -p "secretpwd" --authenticationDatabase '$external' --
authenticationMechanism 'PLAIN'
```

Modify one of this example configuration to match your deployment.

This document is based on the following posts from Percona Database Performance Blog:

- Percona Server for MongoDB LDAP Enhancements: User-to-DN Mapping by Igor Solodovnikov
- Authenticate Percona Server for MongoDB Users via Native LDAP by Ivan Groenewold

Encryption

Data at rest encryption

Data at rest encryption for the WiredTiger storage engine in MongoDB was introduced in MongoDB Enterprise version 3.2 to ensure that encrypted data files can be decrypted and read by parties with the decryption key.

Differences from upstream

The data encryption at rest in Percona Server for MongoDB is introduced in version 3.6 to be compatible with data encryption at rest interface in MongoDB. In the current release of Percona Server for MongoDB, the data encryption at rest does not include support for Amazon AWS key management service. Instead, Percona Server for MongoDB is integrated with HashiCorp Vault.

Starting with release 6.0.2-1, Percona Server for MongoDB supports the secure transfer of keys using Key Management Interoperability Protocol (KMIP). This allows users to store encryption keys in their favorite KMIP-compatible key manager when they set up encryption at rest.

Workflow

Important

You can only enable data at rest encryption and provide all encryption settings on an empty database, when you start the mongod instance for the first time. You cannot enable or disable encryption while the Percona Server for MongoDB server is already running and / or has some data. Nor can you change the effective encryption mode by simply restarting the server. Every time you restart the server, the encryption settings must be the same.

Each node of Percona Server for MongoDB generates a random, individual key for every database. It encrypts every database with an individual key and puts those keys into the special, so-called key database. Then each node of Percona Server for MongoDB randomly generates a unique master encryption key and encrypts the key database with this key.

Thus, two types of keys are used for data at rest encryption:

- Database keys to encrypt data. They are stored internally, near the data that they encrypt.
- The master key to encrypt database keys. It is kept separately from the data and database keys and requires external management.

To manage the master encryption key, use one of the supported key management options:

- Integration with an external key server (recommended). Percona Server for MongoDB is integrated with HashiCorp Vault for this purpose and supports the secure transfer of keys using Key Management Interoperability Protocol (KMIP).
- Local key management using a keyfile.

Note that you can use only one of the key management options at a time. However, you can switch from one management option to another (e.g. from a keyfile to HashiCorp Vault). Refer to Migrating from Key File Encryption to HashiCorp Vault Encryption section for details.

Important configuration options

Percona Server for MongoDB supports the `encryptionCipherMode` option where you choose one of the following cipher modes:

- AES256-CBC
- AES256-GCM

By default, the `AES256-CBC` cipher mode is applied. The following example demonstrates how to apply the AES256-GCM cipher mode when starting the `mongod` service:

```
$ mongod ... --encryptionCipherMode AES256-GCM
```

See also

MongoDB Documentation: encryptionCipherMode Option

Encryption of rollback files

Starting from version 3.6, Percona Server for MongoDB also encrypts rollback files when data at rest encryption is enabled. To inspect the contents of these files, use **perconadecrypt**. This is a tool that you run from the command line as follows:

```
$ perconadecrypt --encryptionKeyFile FILE  --inputPath FILE --outputPath FILE [--encryptionCipherMode MODE]
```

When decrypting, the cipher mode must match the cipher mode which was used for the encryption. By default, the `--encryptionCipherMode` option uses the `AES256-CBC` mode.

Parameters of `perconadecrypt`

Option	Purpose
`--encryptionKeyFile`	The path to the encryption key file
`--encryptionCipherMode`	The cipher mode for decryption. The supported values are `AES256-CBC` or `AES256-GCM`
`--inputPath`	The path to the encrypted rollback file
`--outputPath`	The path to save the decrypted rollback file

HashiCorp Vault integration

Percona Server for MongoDB is integrated with HashiCorp Vault. HashiCorp Vault supports different secrets engines. Percona Server for MongoDB only supports the HashiCorp Vault back end with KV Secrets Engine - Version 2 (API) with versioning enabled.

See also

Percona Blog: Using Vault to Store the Master Key for Data at Rest Encryption on Percona Server for MongoDB

HashiCorp Vault Documentation: How to configure the KV Engine

Version changes

The following table lists the changes in the implementation of HashiCorp Vault integration with Percona Server for MongoDB and the versions that introduced those changes:

Version	Description
6.0.5-4	Key rotation in replica sets
6.0.18-15	Master key loss prevention

HashiCorp Vault parameters

Command line	Configuration file	Type	Description
vaultServerName	security.vault.serverName	string	The IP address of the Vault server
vaultPort	security.vault.port	int	The port on the Vault server
vaultTokenFile	security.vault.tokenFile	string	The path to the vault token file. The token file is used by MongoDB to access HashiCorp Vault. The vault token file consists of the raw vault token and does not include any additional strings or parameters. Example of a vault token file: `s.uTrHtzsZnEE7KyHeA797CkWA`
vaultSecret	security.vault.secret	string	The path to the Vault secret. The Vault secret path format must be `<secrets_engine_mount_path>/data/<custom_path>` where: - `<secrets_engine_mount_path>` is the path to the Key/Value Secrets Engine v2; - `data` is the mandatory path prefix required by Version 2 API; - `<custom_path>` is the path to the specific secret. Example: `secret_v2/data/psmdb-`

Command line	Configuration file	Type	Description
			`test/rs1-27017` Starting with version 6.0.5-4, a distinct Vault secret path for every replica set member is no longer mandatory. In earlier versions, it is recommended to use different secret paths for every database node in the entire deployment to avoid issues during the master key rotation.
vaultSecretVersion	security.vault. secretVersion	unsigned long	(Optional) The version of the Vault secret to use
vaultRotateMasterKey	security.vault. rotateMasterKey	switch	When enabled, rotates the master key and exits
vaultServerCAFile	security.vault. serverCAFile	string	The path to the TLS certificate file
vaultDisableTLSForTesting	security.vault. disableTLSForTesting	switch	Disables secure connection to Vault using SSL/TLS client certificates
vaultCheckMaxVersions	security.vault. checkMaxVersions	boolean	Verifies that the current number of secret versions has not reached the maximum, defined by the `max_versions` parameter for the secret or the secrets engine on the Vault server. If the number of versions has reached the maximum, the server logs an error and exits. Enabled by default. Available starting with version 6.0.18-15.

Config file example

```
security:
  enableEncryption: true
  vault:
    serverName: 127.0.0.1
    port: 8200
    tokenFile: /home/user/path/token
    secret: secret/data/hello
```

Starting with 6.0.18-15, Percona Server for MongoDB checks the number of the secrets on the Vault server before adding a new one thus preventing the loss of the old master key. For these checks, Percona Server for MongoDB requires read permissions for the secret's metadata and the secrets engine configuration. You configure these permissions within the access policy on the Vault server.

Find the sample policy configuration below:

```
path "secret/data/*" {
  capabilities = ["create","read","update","delete"]
}
path "secret/metadata/*" {
  capabilities = ["read"]
}
path "secret/config" {
  capabilities = ["read"]
}
```

During the first run of the Percona Server for MongoDB, the process generates a new random master encryption key. Then, it wraps it into a secret and puts the latter on a Vault server at the configured path. Vault increments the value of the `current_version`, associates the resulting value with a new secret, and returns the version. Percona Server for MongoDB then saves the full path and the version in the metadata and uses them later to get the key from the Vault server.

During the subsequent start, the server tries to read the master key from the Vault. If the configured secret does not exist, Vault responds with the HTTP 404 error.

Namespaces

Namespaces are isolated environments in Vault that allow for separate secret key and policy management.

You can use Vault namespaces with Percona Server for MongoDB. Specify the namespace(s) for the `security.vault.secret` option value as follows:

```
<namespace>/secret/data/<secret_path>
```

For example, the path to secret keys for namespace `test` on the secrets engine `secret` will be `test/secret/<my_secret_path>`.

Targeting a namespace in Vault configuration

You have the following options of how to target a particular namespace when configuring Vault:

1. Set the VAULT_NAMESPACE environment variable so that all subsequent commands are executed against that namespace. Use the following command to set the environment variable for the namespace `test`:

```
$ export VAULT_NAMESPACE=test
```

2. Provide the namespace with the `-namespace` flag in commands

> **See also**
>
> HashiCorp Vault Documentation:
>
> - Namespaces
> - Secure Multi-Tenancy with Namespaces

Key rotation

Key rotation is replacing the old master key with a new one. This process helps to comply with regulatory requirements.

To rotate the keys for a single `mongod` instance, do the following:

1. Stop the `mongod` process
2. Add `--vaultRotateMasterKey` option via the command line or `security.vault.rotateMasterKey` to the config file.
3. Run the `mongod` process with the selected option, the process will perform the key rotation and exit.
4. Remove the selected option from the startup command or the config file.
5. Start `mongod` again.

Rotating the master key process also re-encrypts the keystore using the new master key. The new master key is stored in the vault. The entire dataset is not re-encrypted.

Key rotation in replica sets

Starting with version 6.0.5-4, you can store the master key at the same path on every replica set member in your entire deployment. Vault assigns different versions to the master keys stored at the same path. The path and the version serve as the unique identifier of a master key. The `mongod` server stores that identifier and uses it to retrieve the correct master key from the Vault server during the restart.

In versions 6.0.4-3 and earlier, every `mongod` node in a replica set in your entire deployment must have a distinct path to the master keys on a Vault server.

The key rotation steps are the following:

1. Rotate the master key for the secondary nodes one by one.
2. Step down the primary and wait for another primary to be elected.
3. Rotate the master key for the previous primary node.

Master key loss prevention

Starting with version 6.0.18-15, Percona Server for MongoDB checks if the number of secret versions has reached the maximum (10 by default) before adding a new master key to the Vault server as a versioned secret. You configure this number using the `max_versions` parameter on the Vault server.

If the number of secrets reaches the maximum, Percona Server for MongoDB logs an error and exits. This prevents the Vault server from dropping the oldest secret version and the encryption key it stores.

To continue, increase the maximum versions for the secret or the entire secrets engine on the Vault server, then restart Percona Server for MongoDB. To check the number of secrets on the Vault server, ensure Percona Server for MongoDB has read permissions for the secret's metadata and the secrets engine configuration.

Using the Key Management Interoperability Protocol (KMIP)

Percona Server for MongoDB adds support for secure transfer of keys using the OASIS Key Management Interoperability Protocol (KMIP). The KMIP implementation was tested with the PyKMIP server and the HashiCorp Vault Enterprise KMIP Secrets Engine.

KMIP enables the communication between key management systems and the database server. KMIP provides the following benefits:

- Streamlines encryption key management
- Eliminates redundant key management processes
- Reduces the mean time to resolve (MTTR) compromised encryption key incidents via key state polling

Version changes

The following table lists the changes in the KMIP implementation in Percona Server for MongoDB and the versions that introduced those changes:

Version	Description
6.0.17-14	Key state polling.

Support for multiple KMIP servers

You can specify multiple KMIP servers for failover. On startup, Percona Server for MongoDB connects to the servers in the order listed and selects the one with which the connection is successful.

Optional key identifier

Starting with version 6.0.2-1, the `kmipKeyIdentifier` option is no longer mandatory. When left blank, the database server creates a key on the KMIP server and uses that for encryption. When you specify the identifier, the key with such an ID must exist on the key storage.

Note

Starting with version 6.0.6-5, the master key is stored in a raw-byte format. If you set up Percona Server for MongoDB 6.0.6-5 with data-at-rest encryption using KMIP and wish to downgrade to some previous version, this downgrade is not possible via binary replacement. Consider using the logical backup and restore via Percona Backup for MongoDB for this purpose.

Key rotation

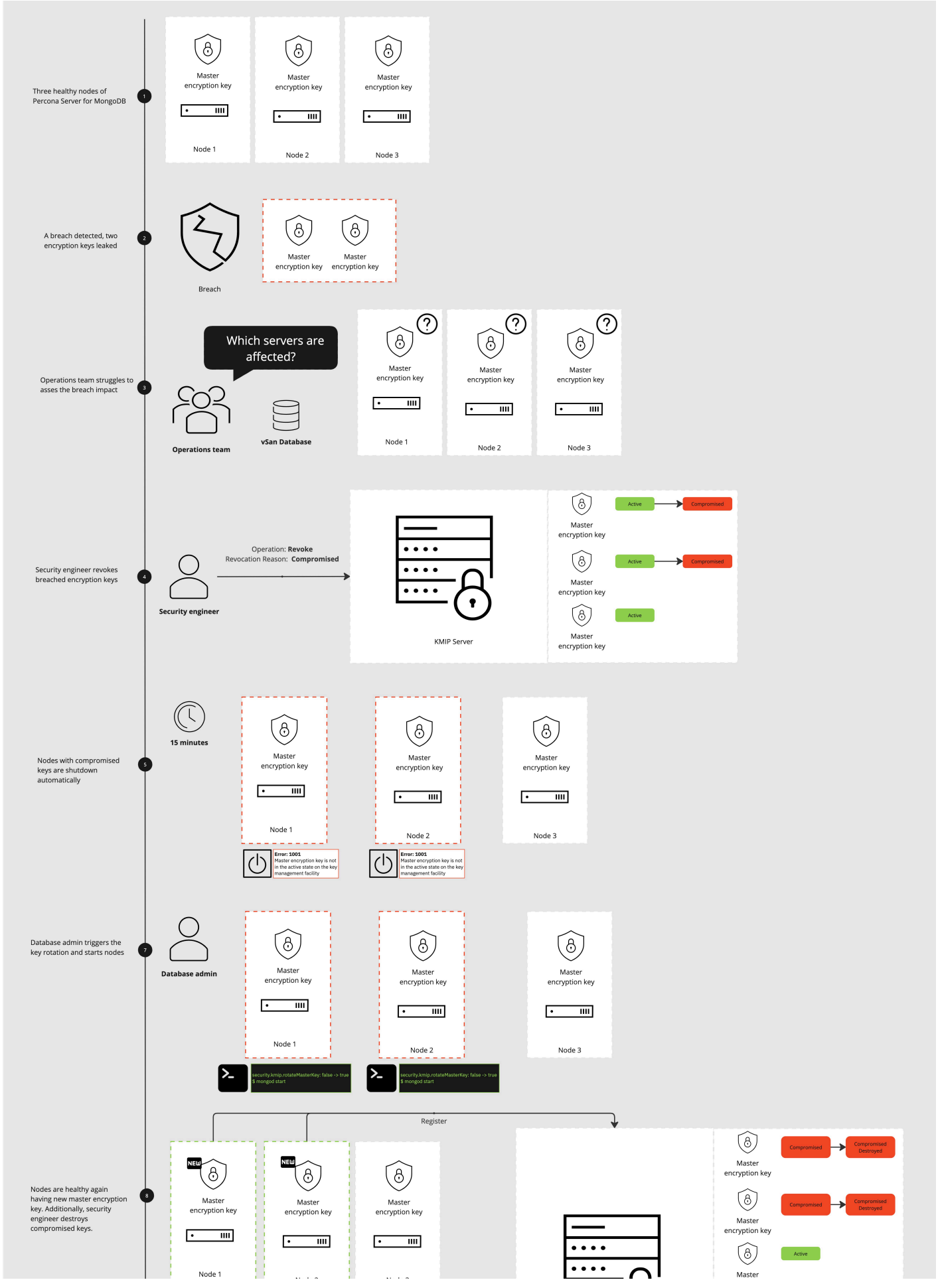
Percona Server for MongoDB supports master key rotation. This enables users to comply with data security regulations when using KMIP.

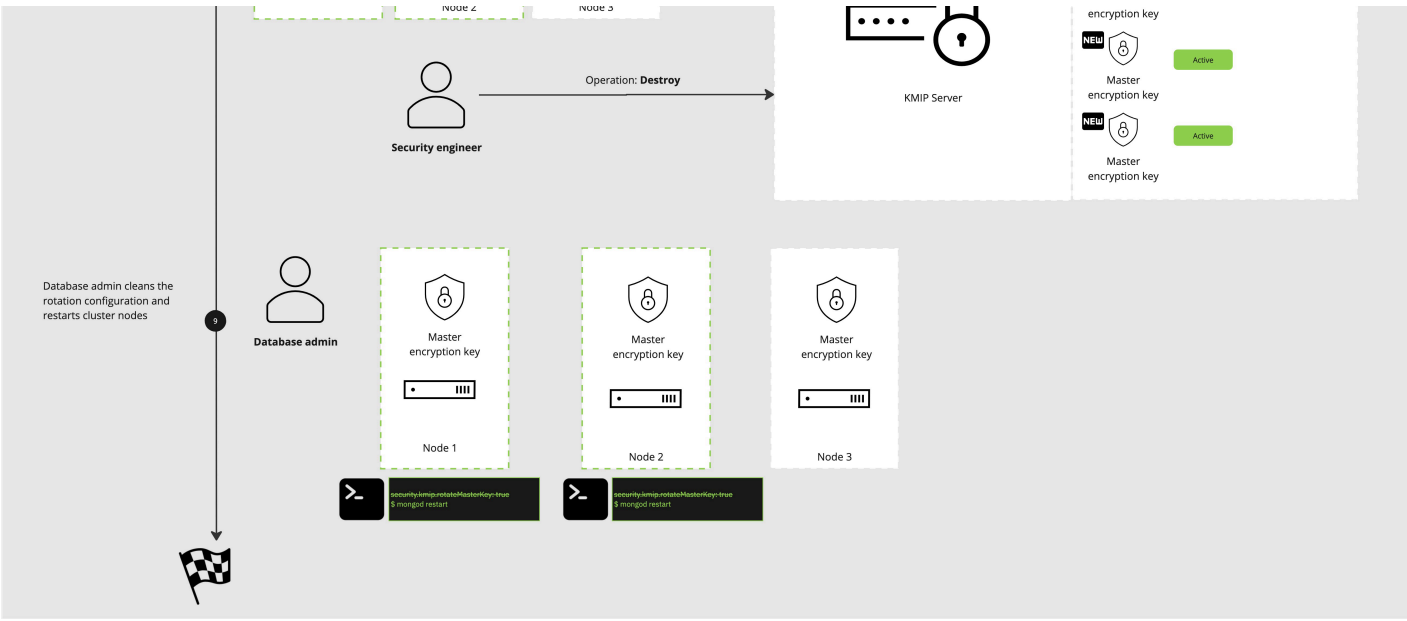
Key state polling

When a Percona Server for MongoDB node generates a new master encryption key, it registers the key on the KMIP server with the `Pre-Active` state. Starting with version 6.0.17-14, Percona Server for MongoDB automatically activates the master encryption key and periodically checks (polls) its state. If a master encryption key for a node is not in the `Active` state, the node reports an error and shuts down. This process helps security engineers identify the nodes that require out-of-schedule master key rotation.

Key state polling es enabled by default and is regulated by these configuration file options: `kmip.activateKeys` and `kmip.keyStatePollingSeconds`.

The following diagram illustrates the master key lifecycle with key state polling:


Three healthy nodes of Percona Server for MongoDB
1
Master encryption key
Node 1
Master encryption key
Node 2
Master encryption key
Node 3
A breach detected, two encryption keys leaked
2
Breach
Master encryption key
Master encryption key
Operations team struggles to asses the breach impact
3
Which servers are affected?
Operations team
vSan Database
Master encryption key
Node 1
Master encryption key
Node 2
Master encryption key
Node 3
Security engineer revokes breached encryption keys
4
Security engineer
Operation: Revoke
Revocation Reason: Compromised
KMIP Server
Master encryption key
Active
Compromised
Master encryption key
Active
Compromised
Master encryption key
Active
Nodes with compromised keys are shutdown automatically
5
15 minutes
Master encryption key
Node 1
Error: 1001
Master encryption key is not in the active state on the key management facility
Master encryption key
Node 2
Error: 1001
Master encryption key is not in the active state on the key management facility
Master encryption key
Node 3
Database admin triggers the key rotation and starts nodes
7
Database admin
Master encryption key
Node 1
security.kmip.rotateMasterKey: false -> true
$ mongod start
Master encryption key
Node 2
security.kmip.rotateMasterKey: false -> true
$ mongod start
Master encryption key
Node 3
Register
Nodes are healthy again having new master encryption key. Additionally, security engineer destroys compromised keys.
8
NEW
Master encryption key
Node 1
NEW
Master encryption key
Master encryption key
Master encryption key
Compromised
Compromised Destroyed
Master encryption key
Compromised
Compromised Destroyed
Master encryption key
Active
Master



The master key state polling functionality is particularly useful in cluster deployments with hundreds of nodes. If some master keys are compromised, security engineers change their state from `Active` so that the nodes encrypted with these keys identify themselves. This approach allows the security engineers to rotate master keys only on the affected nodes instead of the entire cluster, thus reducing the mean time to resolve (MTTR) compromised encryption key incidents.

See also

Percona Blog: Improve the Security of a Percona Server for MongoDB Deployment with KMIP Key State Polling by Konstantin Trushin.

KMIP parameters

Configuration file	security.kmip.serverName
Command line	`kmipServerName`
Type	string
Description	The hostname or IP address of the KMIP server. Multiple KMIP servers are supported as the comma-separated list, e.g. `kmip1.example.com,kmip2.example.com`

Configuration file	security.kmip.port
Command line	`kmipPort`

Configuration file	security.kmip.port
Type	number
Description	The port used to communicate with the KMIP server. When undefined, the default port `5696` is used

Configuration file	security.kmip.serverCAFile
Command line	`kmipServerCAFile`
Type	string
Description	The path to the certificate of the root authority that issued the certificate for the KMIP server. Required only if the root certificate is not trusted by default on the machine the database server works on.

Configuration file	security.kmip.clientCertificateFile
Command line	`kmipClientCertificateFile`
Type	string
Description	The path to the PEM file with the KMIP client private key and the certificate chain. The database server uses this PEM file to authenticate the KMIP server

Configuration file	security.kmip.keyIdentifier
Command line	`kmipKeyIdentifier`
Type	string
Description	Optional. The identifier of the KMIP key. If not specified, the database server creates a key on the KMIP server and saves its identifier internally for future use. When you specify the identifier, the key with such an ID must exist on the key storage. You can only use this setting for the first time you enable encryption.

Configuration file	security.kmip.rotateMasterKey
Command line	`kmipRotateMasterKey`
Type	boolean
Description	Controls master keys rotation. When enabled, generates the new master key and re-encrypts the keystore.

Configuration file	security.kmip.clientCertificatePassword
Command line	`kmipClientCertificatePassword`
Type	string
Description	The password for the KMIP client private key or certificate. Use this parameter only if the KMIP client private key or certificate is encrypted.

Configuration file	security.kmip.connectRetries
Command line	`kmipConnectRetries`
Type	int
Description	Defines how many times to retry the initial connection to the KMIP server. The max number of connection attempts equals to `connectRetries + 1`. Default: 0. The option accepts values greater than zero. Use it together with the `connectTimeoutMS` parameter to control how long `mongod` waits for the response before making the next retry.

Configuration file	security.kmip.connectTimeoutMS
Command line	`kmipConnectTimeoutMS`
Type	int

Configuration file	security.kmip.connectTimeoutMS
Description	The time to wait for the response from the KMIP server. Min value: 1000. Default: 5000. If the `connectRetries` setting is specified, the `mongod` waits up to the value specified with `connectTimeoutMS` for each retry.

Configuration file	security.kmip.activateKeys
Command line	`kmipActivateKeys`
Type	boolean
Description	When enabled, Percona Server for MongoDB activates a newly created master encryption key or verifies that the existing master key is in the Active state at startup. It also initiates the key state polling. Enabled by default. Available starting with version 6.0.17-14.

Configuration file	security.kmip.keyStatePollingSeconds
Command line	`kmipKeyStatePollingSeconds`
Type	int
Description	The period in seconds to check the state of the master encryption key. Default: 900. If the master encryption key is not in the Active state, the node logs the error and shuts down. Available starting with version 6.0.17-14.

Configuration file	security.kmip.useLegacyProtocol
Command line	`kmipUseLegacyProtocol`
Type	boolean
Description	When `true`, sets the KMIP protocol version 1.0 or 1.1. This option has no effect, because Percona Server for MongoDB uses KMIP version 1.0 by default. It exists for compatibility with MongoDB Enterprise Advanced to align configuration files and simplify the migration process to Percona Server for MongoDB. Available starting with version 6.0.21-18.

Configuration

Considerations

Make sure you have obtained the root certificate, and the keypair for the KMIP server and the `mongod` client. For testing purposes you can use the OpenSSL to issue self-signed certificates. For production use we recommend you use the valid certificates issued by the key management appliance.

Procedure

To enable data-at-rest encryption in Percona Server for MongoDB using KMIP, edit the `/etc/mongod.conf` configuration file as follows:

```
security:
  enableEncryption: true
  kmip:
    serverName: <kmip_server_name>
    port: <kmip_port>
    clientCertificateFile: </path/client_certificate.pem>
    serverCAFile: </path/ca.pem>
    keyIdentifier: <key_name>
```

Alternatively, you can start Percona Server for MongoDB using the command line as follows:

```
$ mongod --enableEncryption \
  --kmipServerName <kmip_servername> \
  --kmipPort <kmip_port> \
  --kmipServerCAFile <path_to_ca_file> \
  --kmipClientCertificateFile <path_to_client_certificate> \
  --kmipKeyIdentifier <kmip_identifier>
```

Upgrade considerations

To version 6.0.17-14 and higher

Percona Server for MongoDB 6.0.17-14 and subsequent versions tolerate already existing `Pre-Active` master keys as follows: if at startup Percona Server for MongoDB detects that the data directory is encrypted with an existing master key in the `Pre-Active` state, it logs a warning and continues to operate as usual. In that case, Percona Server for MongoDB does not do periodic key state polling regardless the value specified for the `kmipKeyStatePollingSeconds` option. Read more about key state polling.

We recommend to either rotate a master encryption key or manually change the existing key to the Active state. You can also explicitly set the `security.kmip.activateKeys` configuration file option to ensure that only the active keys are used. This one-time operation smooths the major upgrade flow.

Local key management using a keyfile

The key file must contain a 32 character string encoded in base64. You can generate a random key and save it to a file by using the `openssl` command:

```
$ openssl rand -base64 32 > mongodb-keyfile
```

Then, as the owner of the `mongod` process, update the file permissions: only the owner should be able to read and modify this file. The effective permissions specified with the `chmod` command can be:

- **600** - only the owner may read and modify the file
- **400** - only the owner may read the file.

```
$ chmod 600 mongodb-keyfile
```

Enable the data encryption at rest in Percona Server for MongoDB by setting these options:

- `--enableEncryption` to enable data at rest encryption
- `--encryptionKeyFile` to specify the path to a file that contains the encryption key

```
$ mongod ... --enableEncryption --encryptionKeyFile <fileName>
```

By default, Percona Server for MongoDB uses the `AES256-CBC` cipher mode. If you want to use the `AES256-GCM` cipher mode, then use the `--encryptionCipherMode` parameter to change it.

If `mongod` is started with the `--relaxPermChecks` option and the key file is owned by `root`, then `mongod` can read the file based on the group bit set accordingly. The effective key file permissions in this case are:

- **440** - both the owner and the group can only read the file, or
- **640** - only the owner can read and the change the file, the group can only read the file.

All these options can be specified in the configuration file:

```
security:
   enableEncryption: <boolean>
   encryptionCipherMode: <string>
   encryptionKeyFile: <string>
   relaxPermChecks: <boolean>
```

Migrate from key file encryption to HashiCorp Vault encryption

The steps below describe how to migrate from the key file encryption to using HashiCorp Vault.

> **Note**
>
> This is a simple guideline and it should be used for testing purposes only. We recommend to contact Percona Consulting Services to assist you with migration in production environment.

Assumptions

We assume that you have installed and configured the vault server and enabled the KV Secrets Engine as the secrets storage for it.

1. Stop `mongod`.

   ```
   $ sudo systemctl stop mongod
   ```

2. Insert the key from keyfile into the HashiCorp Vault server to the desired secret path.
3. Retrieve the key value from the keyfile

   ```
   $ sudo cat /data/key/mongodb.key
   d0JTFcePmvROyLXwCbAH8fmiP/ZRm0nYbeJDMGaI7Zw=
   ```

4. Insert the key into vault

   ```
   $ vault kv put secret/dc/psmongodb1
   value=d0JTFcePmvROyLXwCbAH8fmiP/ZRm0nYbeJDMGaI7Zw=
   ```

   !!! note

   ```
    Vault KV Secrets Engine uses different read and write secrets paths. To
   insert data to Vault, specify the secret path without the `data/` prefix.
   ```

5. Edit the configuration file to provision the HashiCorp Vault configuration options instead of the key file encryption options.

```
security:
   enableEncryption: true
   vault:
      serverName: 10.0.2.15
      port: 8200
      secret: secret/data/dc/psmongodb1
      tokenFile: /etc/mongodb/token
      serverCAFile: /etc/mongodb/vault.crt
```

6. Start the `mongod` service

```
$ sudo systemctl start mongod
```

FIPS compliance

FIPS (Federal Information Processing Standard) is the US government computer security standard for cryptography modules that include both hardware and software components. Percona Server for MongoDB supports FIPS certified module for OpenSSL, enabling US organizations to introduce FIPS-compliant encryption and thus meet the requirements towards data security.

The FIPS compliance in Percona Server for MongoDB is implemented in the same way, as in MongoDB Enterprise. It is available Percona Server for MongoDB Pro out of the box starting with version 6.0.9-7. You can also receive this functionality by building Percona Server for MongoDB from source code.

Platform support

Starting with Percona Server for MongoDB 6.0.9-7, you can run Percona Server for MongoDB in FIPS mode on all supported operating systems. To use FIPS mode for Percona Server for MongoDB, your Linux system must be configured with the OpenSSL FIPS certified module.

Note, that FIPS modules on Ubuntu 24.04 are not available yet as they are awaiting final certification by CMVP.

See Configure MongoDB for FIPS in MongoDB documentation for configuration guidelines.

Auditing

Auditing allows administrators to track and log user activity on a MongoDB server. With auditing enabled, the server will generate an audit log file. This file contains information about different user events including authentication, authorization failures, and so on.

To enable audit logging, specify where to send audit events using the `--auditDestination` option on the command line or the `auditLog.destination` variable in the configuration file.

If you want to output events to a file, also specify the format of the file using the `--auditFormat` option or the `auditLog.format` variable, and the path to the file using the `--auditPath` option or the `auditLog.path` variable.

To filter recorded events, use the `--auditFilter` option or the `auditLog.filter` variable.

For example, to log only events from a user named **tim** and write them to a JSON file `/var/log/psmdb/audit.json`, start the server with the following parameters:

```
$ mongod \
 --dbpath data/db
 --auditDestination file \
 --auditFormat JSON \
 --auditPath /var/log/psmdb/audit.json \
 --auditFilter '{ "users.user" : "tim" }'
```

The options in the previous example can be used as variables in the MongoDB configuration file:

```
storage:
  dbPath: data/db
auditLog:
  destination: file
  format: JSON
  path: /var/log/psmdb/audit.json
  filter: '{ "users.user" : "tim" }'
```

This example shows how to send audit events to the `syslog`. Specify the following parameters:

```
mongod \
--dbpath data/db
--auditDestination syslog \
```

Alternatively, you can edit the MongoDB configuration file:

```
storage:
 dbPath: data/db
auditLog:
 destination: syslog
```

Note

If you start the server with auditing enabled, you cannot disable auditing dynamically during runtime.

Audit options

The following options control audit logging:

Command line	Configuration file	Type	Description
`--auditDestination`	`auditLog.destination`	string	Enables auditing and specifies where to send audit events: - `console`: Output audit events to `stdout`. - `file`: Output audit events to a file specified by the `--auditPath` option in a format specified by the `--auditFormat` option. - `syslog`: Output audit events to `syslog`
`--auditFilter`	`auditLog.filter`	string	Specifies a filter to apply to incoming audit events, enabling the administrator to only capture a subset of them. The value must be interpreted as a query object with the following syntax: `{ <field1>: <expression1>, ... }` Audit log events that match this query will be logged. Events that do not match this query will be ignored. For more information, see Audit filter examples
`--auditFormat`	`auditLog.format`	string	Specifies the format of the audit log file, if you set the `--auditDestination` option to `file`. The default value is `JSON`. Alternatively, you can set it to `BSON`
`--auditPath`	`auditLog.path`	string	Specifies the fully qualified path to the file where audit log events are written, if you set the `--auditDestination` option to `file`. If this option is not specified, then the `auditLog.json` file is created in the server's configured log path. If log path is not configured on the server, then the `auditLog.json` file is created in the current directory (from which `mongod` was started). **NOTE**: This file will rotate in the same manner as the system log path, either on server reboot or using the `logRotate` command. The time of rotation will be added to the old file's name.

Audit message syntax

Audit logging writes messages in JSON format with the following syntax:

```
{
  atype: <String>,
  ts : { "$date": <timestamp> },
  local: { ip: <String>, port: <int> },
  remote: { ip: <String>, port: <int> },
  users : [ { user: <String>, db: <String> }, ... ],
  roles: [ { role: <String>, db: <String> }, ... ],
  param: <document>,
  result: <int>
}
```

Parameter	Description
`atype`	Event type
`ts`	Date and UTC time of the event
`local`	Local IP address and port number of the instance
`remote`	Remote IP address and port number of the incoming connection associated with the event
`users`	Users associated with the event
`roles`	Roles granted to the user
`param`	Details of the event associated with the specific type
`result`	Exit code (`0` for success)

Audit filter examples

The following examples show the flexibility of audit log filters.

```
auditLog:
   destination: file
      filter: '{atype: {$in: [
         "authenticate", "authCheck",
         "renameCollection", "dropCollection", "dropDatabase",
         "createUser", "dropUser", "dropAllUsersFromDatabase", "updateUser",
         "grantRolesToUser", "revokeRolesFromUser", "createRole", "updateRole",
         "dropRole", "dropAllRolesFromDatabase", "grantRolesToRole",
"revokeRolesFromRole",
         "grantPrivilegesToRole", "revokePrivilegesFromRole",
         "replSetReconfig",
         "enableSharding", "shardCollection", "addShard", "removeShard",
         "shutdown",
         "applicationMessage"
      ]}}'
```

Standard query selectors

You can use query selectors, such as `$eq`, `$in`, `$gt`, `$lt`, `$ne`, and others to log multiple event types.

For example, to log only the `dropCollection` and `dropDatabase` events:

Command line

```
--auditDestination file --auditFilter '{ atype: { $in: [ "dropCollection",
"dropDatabase" ] } }'
```

Config file

```
auditLog:
  destination: file
  filter: '{ atype: { $in: [ "dropCollection", "dropDatabase" ] } }'
```

Regular expressions

Another way to specify multiple event types is using regular expressions.

For example, to filter all `drop` operations:

Command line

```
--auditDestination file --auditFilter '{ "atype" : /^drop.*/ }'
```

Config file

```
auditLog:
  destination: file
  filter: '{ "atype" : /^drop.*/ }'
```

Read and write operations

By default, operations with successful authorization are not logged, so for this filter to work, enable `auditAuthorizationSuccess` parameter, as described in Enabling auditing of authorization success.

For example, to filter read and write operations on all the collections in the `test` database:

> **Note**
>
> The dot (`.`) after the database name in the regular expression must be escaped with two backslashes (`\\\\`).

Command line

```
--setParameter auditAuthorizationSuccess=true --auditDestination file --
auditFilter '{ atype: "authCheck", "param.command": { $in: [ "find", "insert",
"delete", "update", "findandmodify" ] }, "param.ns": /^test\\./ } }'
```

Config file

```
auditLog:
  destination: file
  filter: '{ atype: "authCheck", "param.command": { $in: [ "find", "insert",
"delete", "update", "findandmodify" ] }, "param.ns": /^test\\./ } }'

setParameter: { auditAuthorizationSuccess: true }
```

Enabling auditing of authorization success

By default, the audit system logs only authorization failures for the `authCheck` action. The `authCheck` action refers to the operations a user is or is not authorized to perform on the server according to the privileges outlined in the roles assigned to the user.

To enable logging of authorization successes, set the `auditAuthorizationSuccess` parameter to `true`. Audit events will then be triggered by every command that requires authorization, including CRUD ones.

> **Warning**
>
> Enabling the `auditAuthorizationSuccess` parameter heavily impacts the performance compared to logging only authorization failures.

You can enable it on a running server using the following command:

```
db.adminCommand( { setParameter: 1, auditAuthorizationSuccess: true } )
```

To enable it on the command line, use the following option when running `mongod` or `mongos` process:

```
--setParameter auditAuthorizationSuccess=true
```

You can also add it to the configuration file as follows:

```
setParameter:
  auditAuthorizationSuccess: true
```

Example of the audit message


```
{
  "atype": "authCheck",
  "ts": {
    "$date": "2024-03-13T06:28:04.631-04:00"
  },
  "local": {
    "ip": "172.17.0.2",
    "port": 20040
  },
  "remote": {
    "ip": "127.0.0.1",
    "port": 52128
  },
  "users": [
    {
      "user": "admin",
      "db": "admin"
    }
  ],
  "roles": [
    {
      "role": "clusterAdmin",
      "db": "admin"
    },
    {
      "role": "readWriteAnyDatabase",
      "db": "admin"
    },
    {
      "role": "userAdminAnyDatabase",
      "db": "admin"
    }
  ],
  "param": {
    "command": "insert",
    "ns": "audit_authz_insert.foo",
    "args": {
      "insert": "foo",
      "ordered": true,
      "lsid": {
        "id": {
          "$binary": "nfnnHQo0RDOtI6722FlP5w==",
          "$type": "04"
        }
      },
      "$db": "audit_authz_insert"
    }
  },
  "result": 0
}
```


Profiling rate limit

Percona Server for MongoDB can limit the number of queries collected by the database profiler to decrease its impact on performance. Rate limit is an integer between 1 and 1000 and represents the fraction of queries to be profiled. For example, if you set it to 20, then every 20^{th} query will be logged. For compatibility reasons, rate limit of 0 is the same as setting it to 1, and will effectively disable the feature meaning that every query will be profiled.

The MongoDB database profiler can operate in one of three modes:

- `0`: Profiling is disabled. This is the default setting.
- `1`: The profiler collects data only for *slow* queries. By default, queries that take more than 100 milliseconds to execute are considered *slow*.
- `2`: Collects profiling data for all database operations.

Mode `1` ignores all *fast* queries, which may be the cause of problems that you are trying to find. Mode `2` provides a comprehensive picture of database performance, but may introduce unnecessary overhead.

With rate limiting you can collect profiling data for all database operations and reduce overhead by sampling queries. Slow queries ignore rate limiting and are always collected by the profiler.

Comparing to the `sampleRate` option

The `sampleRate` option (= slowOpSampleRate config file option) is a similar concept to `rateLimit`. But it works at different profile level, completely ignores operations faster than `slowOpsThresholdMs` (a.k.a. `slowMs`), and affects the log file printing, too.

	sampleRate	rateLimit
Affects profiling level 1	yes	no
Affects profiling level 2	no	yes
Discards/filters slow ops	yes	no
Discards/filters fast ops	no	yes
Affects log file	yes	no
Example value of option	0.02	50

`rateLimit` is a better way to have continuous profiling for monitoring or live analysis purposes. `sampleRate` requires setting slowOpsThresholdMs to zero if you want to sample all types of operations. `sampleRate` has an effect on the log file which may either decrease or increase the log volume.

Enabling the rate limit

To enable rate limiting, set the profiler mode to `2` and specify the value of the rate limit. Optionally, you can also change the default threshold for slow queries, which will not be sampled by rate limiting.

For example, to set the rate limit to `100` (profile every 100th *fast* query) and the slow query threshold to `200` (profile all queries slower than 200 milliseconds), run the `mongod` instance as follows:

```
$ mongod --profile 2 --slowms 200 --rateLimit 100
```

To do the same at runtime, use the `profile` command. It returns the *previous* settings and `"ok" : 1` indicates that the operation was successful:

```
> db.runCommand( { profile: 2, slowms: 200, ratelimit: 100 } );
{ "was" : 0, "slowms" : 100, "ratelimit" : 1, "ok" : 1 }
```

To check the current settings, run `profile: -1`:

```
> db.runCommand( { profile: -1 } );
{ "was" : 2, "slowms" : 200, "ratelimit" : 100, "ok" : 1 }
```

If you want to set or get just the rate limit value, use the `profilingRateLimit` parameter on the `admin` database:

```
> db.getSiblingDB('admin').runCommand( { setParameter: 1, "profilingRateLimit":
100 } );
{ "was" : 1, "ok" : 1 }
> db.getSiblingDB('admin').runCommand( { getParameter: 1, "profilingRateLimit": 1
} );
{ "profilingRateLimit" : 100, "ok" : 1 }
```

If you want rate limiting to persist when you restart `mongod`, set the corresponding variables in the MongoDB configuration file (by default, `/etc/mongod.conf`):

```
operationProfiling:
  mode: all
  slowOpThresholdMs: 200
  rateLimit: 100
```

Note

The value of the `operationProfiling.mode` variable is a string, which you can set to either `off`, `slowOp`, or `all`, corresponding to profiling modes `0`, `1`, and `2`.

Profiler collection extension

Each document in the `system.profile` collection includes an additional `rateLimit` field. This field always has the value of `1` for *slow* queries and the current rate limit value for *fast* queries.

Log redaction

Percona Server for MongoDB can prevent writing sensitive data to the diagnostic log by redacting messages of events before they are logged.

To enable log redaction, run `mongod` with the `--redactClientLogData` option.

> **Note**
>
> Metadata such as error or operation codes, line numbers, and source file names remain visible in the logs.

Log redaction is important for complying with security requirements, but it can make troubleshooting and diagnostics more difficult due to the lack of data related to the log event. For this reason, debug messages are not redacted even when log redaction is enabled. Keep this in mind when switching between log levels.

You can permanently enable log redaction by adding the following to the configuration file:

```
security:
  redactClientLogData: true
```

To enable log redaction at runtime, use the `setParameter` command as follows:

```
> db.adminCommand(
  { setParameter: 1, redactClientLogData : true }
)
```

> **Note**
>
> If you enable the profiler, the query is still logged to the `system.profile` collection without any redaction.

Example

This is an example of a log entry with redaction enabled:

```
{
  "t": {
    "$date": "2025-02-11T15:37:16.902+00:00"
  },
  "s": "I",
  "c": "COMMAND",
  "id": 51803,
  "svc": "S",
  "ctx": "conn1592",
  "msg": "Slow query",
  "attr": {
    "type": "command",
    "isFromUserConnection": true,
    "ns": "admin.mytestcol",
    "collectionType": "admin",
    "appName": "mongosh 2.3.2",
    "command": {
      "insert": "###",
      "documents": [
        {
          "a": "###",
          "b": "###",
          "c": "###",
          "_id": "###"
        }
      ],
      "ordered": "###",
      "lsid": {
        "id": "###"
      },
      "txnNumber": "###",
      "$clusterTime": {
        "clusterTime": "###",
        "signature": {
          "hash": "###",
          "keyId": "###"
        }
      },
      "$readPreference": {
        "mode": "###"
      },
      "$db": "###"
    }
...
```


As you can see, the field names are still visible but the values are hidden. Some other fields like the `readPreference` are also hidden.

Additional text search algorithm - ngram

The ngram text search algorithm is useful for searching text for a specific string of characters in a field of a collection. This feature can be used to find exact sub-string matches, which provides an alternative to parsing text from languages other than the list of European languages already supported by MongoDB Community's full text search engine. It may also turn out to be more convenient when working with the text where symbols like dash('-'), underscore('_'), or slash("/") are not token delimiters.

Unlike MongoDB full text search engine, *ngram* search algorithm uses only the following token delimiter characters that do not count as word characters in human languages:

- Horizontal tab
- Vertical tab
- Line feed
- Carriage return
- Space

The *ngram* text search is slower than MongoDB full text search.

Usage

To use *ngram*, create a text index on a collection setting the `default_language` parameter to **ngram**:

```
> db.collection.createIndex({name:"text"}, {default_language: "ngram"})
```

ngram search algorithm treats special characters like individual terms. Therefore, you don't have to enclose the search string in escaped double quotes (`\\"`) to query the text index. For example, to search for documents that contain the date `2021-02-12`, specify the following:

```
> db.collection.find({ $text: { $search: "2021-02-12" } })
```

However, both *ngram* and MongoDB full text search engine treat words with the hyphen-minus `-` sign in front of them as negated (e.g. "-coffee") and exclude such words from the search results.

Administration

Percona Server for MongoDB parameter tuning guide

Percona Server for MongoDB includes several parameters that can be changed in one of the following ways:

Configuration file

Use the `setParameter` admonitions in the configuration file for persistent changes in production:

```
setParameter:
  <parameter>: <value>
```

Command line

Use the `--setParameter` command line option arguments when running the `mongod` process for development or testing purposes:

```
$ mongod \
 --setParameter <parameter>=<value>
```

The `setParameter` command

Use the `setParameter` command on the `admin` database to make changes at runtime:

```
> db = db.getSiblingDB('admin')
> db.runCommand( { setParameter: 1, <parameter>: <value> } )
```

Parameters

See what parameters you can define in the parameters list.

Configure a systemd unit file for `mongos`

`mongos` provides the entry point for an application to connect to a sharded cluster. To automate the `mongos` process management, you can use a system unit file. This file defines how the `mongos` service should behave when the system boots, shuts down, or encounters an issue.

This document provides a sample configuration for a `mongos` systemd unit file that you can use and/or modify to meet your specific needs. For security considerations, cluster components use a keyfile for internal authentication.

Before you start

1. Ensure you have a working config server replica set and shards. Refer to the deployment documentation for guidelines
2. Check that you have fulfilled all prerequisites in your system:
   - /var/log/mongo directory is created
   - If SELinux is in use, /var/run/mongos.pid is added to the policy so mongos process can create it
3. Get the shared key file from any existing member of the cluster. Refer to the MongoDB documentation for how to create keyfiles.

Procedure

The steps are the following:

1. Create a `mongos` user and a group. This user will own the `mongos` process. Use the following command:

```
$ groupadd mongos && sudo useradd -r -s /bin/false -g mongos mongos
```

2. Create the environment file at the path `/etc/sysconfig/mongos` and specify the following environment variables within:

/etc/sysconfig/mongos

```
OPTIONS="-f /etc/mongos.conf"
STDOUT="/var/log/mongo/mongos.stdout"
STDERR="/var/log/mongo/mongos.stderr"
```

3. Create a `mongos` configuration file at the path `/etc/mongos.conf`. In the following example configuration, replace the `security.keyfile` with the path to your keyfile and specify the name of the config server replica set and its members in the format `hostname:port`:

/etc/mongos.conf

```
# where to write logging data.
systemLog:
  destination: file
  logAppend: true
  path: /var/log/mongo/mongos.log

processManagement:
  fork: true
  pidFilePath: /var/run/mongos.pid

# network interfaces
net:
  port: 27017
  bindIp: 127.0.0.1

security:
  keyFile: /etc/mongos.key

sharding:
  configDB:
configRS/cfg1.example.com:27017,cfg2.example.com:27017,cfg3.example.com:27017
```

4. Create the systemd unit file at the path `/usr/lib/systemd/system/mongos.service`. Specify the following configuration:

```
$ tee /usr/lib/systemd/system/mongos.service <<EOF
[Unit]
Description=High-performance, schema-free document-oriented database
After=time-sync.target network.target

[Service]
Type=forking
User=mongos
Group=mongos
PermissionsStartOnly=true
LimitFSIZE=infinity
LimitCPU=infinity
LimitAS=infinity
LimitNOFILE=64000
LimitNPROC=64000
EnvironmentFile=/etc/sysconfig/mongos
ExecStart=/usr/bin/env bash -c "/usr/bin/mongos $OPTIONS > ${STDOUT} 2>
${STDERR}"
PIDFile=/var/run/mongos.pid

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

5. Grant read/write access for the `mongos` user to the following directories and files:

```
$ sudo chown -R mongos:mongos /var/log/mongo \
/var/run/mongos.pid \
/etc/mongos.conf \
/etc/sysconfig/mongos \
<path-to-keyfile>
```

6. Reload the systemd daemon to apply the changes:

```
$ sudo systemctl daemon-reload
```

6. Start the `mongos` service:

```
$ sudo systemctl start mongos
```

Upgrade

Upgrading from Percona Server for MongoDB 5.0 to 6.0

Considerations

1. To upgrade Percona Server for MongoDB to version 6.0, you must be running version 5.0. Upgrades from earlier versions are not supported.
2. Before upgrading your production Percona Server for MongoDB deployments, test all your applications in a testing environment to make sure they are compatible with the new version. For more information, see Compatibility Changes in MongoDB 6.0
3. If you are using data-at-rest-encryption with KMIP server, check the upgrade considerations

4. If you run Amazon Linux 2023, consider the following:

   We build and test Percona Server for MongoDB only on the latest versions of Amazon Linux 2023. Because of the way Amazon Linux updates their libraries, Percona Server for MongoDB works only on specific Amazon Linux versions.

   The following table shows Percona Server for MongoDB versions that are supported on specific versions of Amazon Linux 2023:

Percona Server for MongoDB version	Amazon Linux 2023 version
6.0.20-17	2023.6.x and earlier
6.0.21-18	2023.7.x

   To upgrade Percona Server for MongoDB, make sure that you run a compatible version of Amazon Linux 2023. Use the update instructions to update the operating system.

We recommend to upgrade Percona Server for MongoDB from official Percona repositories using `percona-release` repository management tool and the corresponding package manager for your system.

This document describes this method for the in-place upgrade (where your existing data and configuration files are preserved).

Warning

Perform a full backup of your data and configuration files before upgrading.

Upgrade on Debian and Ubuntu

1. Stop the `mongod` service:

```
$ sudo systemctl stop mongod
```

2. Enable Percona repository for Percona Server for MongoDB 6.0:

```
$ sudo percona-release enable psmdb-60
```

3. Update the local cache:

```
$ sudo apt update
```

4. Install Percona Server for MongoDB 6.0 packages:

```
$ sudo apt install percona-server-mongodb
```

5. Start the `mongod` instance:

```
$ sudo systemctl start mongod
```

For more information, see Installing Percona Server for MongoDB on Debian and Ubuntu.

Upgrade on Red Hat Enterprise Linux and derivatives

1. Stop the `mongod` service:

```
$ sudo systemctl stop mongod
```

2. Enable Percona repository for Percona Server for MongoDB 6.0:

```
$ sudo percona-release enable psmdb-60
```

3. Install Percona Server for MongoDB 6.0 packages:

```
$ sudo yum install percona-server-mongodb
```

4. Start the `mongod` instance:

```
$ sudo systemctl start mongod
```

After the upgrade, Percona Server for MongoDB is started with the feature set of 5.0 version. Assuming that your applications are compatible with the new version, enable 6.0 version features. Run the following command against the `admin` database:

```
> db.adminCommand( { setFeatureCompatibilityVersion: "6.0" } )
```

See also

MongoDB Documentation:

- Upgrade a Standalone
- Upgrade a Replica Set
- Upgrade a Sharded Cluster

Upgrade from MongoDB Community Edition to Percona Server for MongoDB

This document provides instructions for an in-place upgrade from MongoDB Community Edition to Percona Server for MongoDB.

An in-place upgrade is done by keeping the existing data in the server and replacing the MongoDB binaries. Afterwards, you restart the `mongod` service with the same `dbpath` data directory.

An in-place upgrade is suitable for most environments except the ones that use ephemeral storage and/or host addresses.

Procedure

Note

MongoDB creates a user that belongs to two groups, which is a potential security risk. This is fixed in Percona Server for MongoDB: the user is included only in the `mongod` group. To avoid problems with current MongoDB setups, existing user group membership is not changed when you migrate to Percona Server for MongoDB. Instead, a new `mongod` user is created during installation, and it belongs to the `mongod` group.

This procedure describes an in-place upgrade of a `mongod` instance. If you are using data at rest encryption, refer to the Upgrading to Percona Server for MongoDB with data at rest encryption enabled section.

Important

Before starting the upgrade, we recommend to perform a full backup of your data.

Upgrade on Debian and Ubuntu

1. Save the current configuration file as the backup:

```
$ sudo mv /etc/mongod.conf /etc/mongod.conf.bkp
```

2. Stop the `mongod` service:

```
$ sudo systemctl stop mongod
```

3. Check for installed packages:

```
$ sudo dpkg -l | grep mongod
```

Output:

```
ii  mongodb-org                      6.0.2                       amd64
MongoDB open source document-oriented database system (metapackage)
ii  mongodb-org-database             6.0.2                       amd64
MongoDB open source document-oriented database system (metapackage)
ii  mongodb-org-database-tools-extra 6.0.2                       amd64
Extra MongoDB database tools
ii  mongodb-org-mongos               6.0.2                       amd64
MongoDB sharded cluster query router
ii  mongodb-org-server               6.0.2                       amd64
MongoDB database server
ii  mongodb-org-shell                6.0.2                       amd64
MongoDB shell client
ii  mongodb-org-tools                6.0.2                       amd64
MongoDB tools
```

4. Remove the installed packages:

```
$ sudo apt remove \
  mongodb-org \
  mongodb-org-mongos \
  mongodb-org-server \
  mongodb-org-shell \
  mongodb-org-tools
```

5. Install Percona Server for MongoDB. If you a Percona Customer, you can install Percona Server for MongoDB Pro

6. Verify that the configuration file includes correct options:

- Copy the required configuration options like custom dbPath/system log path, additional security/replication or sharding options from the backup configuration file (`/etc/mongod.conf`) to the current one `/etc/mongodb.conf` .
- Make sure that the `mongod` user has access to your custom paths. If not, provide it as follows:

```
$ sudo chown -R mongod:mongod <custom-dbPath>
$ sudo chown -R mongod:mongod <custom-systemLog.path>
```

- Make sure the configuration file includes the following configuration:

```
processManagement:
   fork: true
   pidFilePath: /var/run/mongod.pid
```

Troubleshooting tip: The `pidFilePath` setting in `mongod.conf` must match the `PIDFile` option in the `systemd mongod` service unit. Otherwise, the service will kill the `mongod` process after a timeout.

7. Restart the `mongod` service:

```
$ sudo systemctl start mongod
```

Upgrade on Red Hat Enterprise Linux and derivatives

1. Stop the `mongod` service:

```
$ sudo systemctl stop mongod
```

2. Check for installed packages:

```
$ sudo rpm -qa | grep mongo
```

Output:

```
mongodb-org-shell-6.0.2-1.el8.x86_64
mongodb-org-database-6.0.0-1.el8.x86_64
mongodb-org-6.0.0-1.el8.x86_64
mongodb-database-tools-100.4.1-1.x86_64
mongodb-org-server-6.0.2-1.el8.x86_64
mongodb-org-mongos-6.0.2-1.el8.x86_64
mongodb-org-tools-6.0.0-1.el8.x86_64
```

3. Remove the installed packages:

```
$ sudo yum remove \
mongodb-org-shell-6.0.2-1.el8.x86_64
mongodb-org-database-6.0.0-1.el8.x86_64
mongodb-org-6.0.0-1.el8.x86_64
mongodb-database-tools-100.4.1-1.x86_64
mongodb-org-server-6.0.2-1.el8.x86_64
mongodb-org-mongos-6.0.2-1.el8.x86_64
mongodb-org-tools-6.0.0-1.el8.x86_64
```

4. Install Percona Server for MongoDB. If you a Percona Customer, you can install Percona Server for MongoDB Pro

5. Verify that the configuration file includes correct options:

   - When you remove old packages, your existing configuration file is saved as `/etc/mongod.conf.rpmsave`. Copy the required configuration options like custom dbPath/system log path, additional security/replication or sharding options from the backup configuration file (`/etc/mongod.conf.rpmsave`) to the current one `/etc/mongodb.conf`.
   - Make sure that the `mongod` user has access to your custom paths. If not, provide it as follows:

     ```
     $ sudo chown -R mongod:mongod <custom-dbPath>
     $ sudo chown -R mongod:mongod <custom-systemLog.path>
     ```

   - Make sure the configuration file includes the following configuration:

     ```
     processManagement:
        fork: true
        pidFilePath: /var/run/mongod.pid
     ```

     Troubleshooting tip: The `pidFilePath` setting in `mongod.conf` must match the `PIDFile` option in the `systemd mongod` service unit. Otherwise, the service will kill the `mongod` process after a timeout.

6. Restart the `mongod` service:

```
$ sudo systemctl start mongod
```

To upgrade a replica set or a sharded cluster, use the rolling restart method. It allows you to perform the upgrade with minimum downtime. You upgrade the nodes one by one, while the whole cluster / replica set remains operational.

See also

MongoDB Documentation:

- Upgrade a Replica Set
- Upgrade a Sharded Cluster

Upgrading to Percona Server for MongoDB with data at rest encryption enabled

Steps to upgrade from MongoDB 6.0 Community Edition with data encryption enabled to Percona Server for MongoDB are different. `mongod` requires an empty `dbPath` data directory because it cannot encrypt data files in place. It must receive data from other replica set members during the initial sync. Please refer to the Switching storage engines for more information on migration of encrypted data. Contact us for working at the detailed migration steps, if further assistance is needed.

Upgrade to Percona Server for MongoDB Pro

Are you a Percona Customer already and are you ready to enjoy all the benefits of Percona Server for MongoDB Pro?

This document provides instructions how you can upgrade from Percona Server for MongoDB to Percona Server for MongoDB Pro.

Get the access token to the Pro repository

As a Percona Customer, you have the access to the ServiceNow portal. To request the access token, do the following:

1. In **ServiceNow**, click **My Account** and select **Entitlements**.
2. Select your entitlement.
3. If you are entitled for Pro builds, you will see the **Token Management** widget. Click the **Get Percona Builds Token** button.

   If you don't see the widget, contact Percona Support.
4. Click **Request Token** button in the **Request a Percona Pro Builds Token** dialog window.
5. A token will be generated for you. You will also see the Customer ID. Copy both the Customer ID and the token as you will use them to configure the Pro repository and install the software.

Procedure

On Debian and Ubuntu

1. Stop the `mongod` service

```
$ sudo systemctl stop mongod
```

2. Install `percona-release`. If you have installed it before, upgrade it to the latest version
3. Enable the repository. Choose your preferable method:

Command line

Run the following command and pass your credentials to the Pro repository:

```
$ sudo percona-release enable psmdb-60-pro release --user_name=<Your Customer
ID> --repo_token=<Your PRO repository token>
```

Configuration file

a. Create the `/root/.percona-private-repos.config` configuration file with the following content:

/root/.percona-private-repos.config

```
[psmdb-60-pro]
USER_NAME=<Your Customer ID>
REPO_TOKEN=<Your PRO repository token>
```

b. Enable the repository

```
$ sudo percona-release enable psmdb-60-pro release
```

4. Install Percona Server for MongoDB Pro packages

```
$ sudo apt install -y percona-server-mongodb-pro
```

5. Start the server

```
$ sudo systemctl start mongod
```

On RHEL and derivatives

1. Stop the `mongod` service

```
$ sudo systemctl stop mongod
```

2. Install `percona-release`. If you have installed it before, upgrade it to the latest version.
3. Enable the repository. Choose your preferable method:

Command line

Run the following command and pass your credentials to the Pro repository:

```
$ sudo percona-release enable psmdb-60-pro release --user_name=<Your Customer
ID> --repo_token=<Your PRO repository token>
```

Configuration file

a. Create the `/root/.percona-private-repos.config` configuration file with the following content:

/root/.percona-private-repos.config

```
[psmdb-60-pro]
USER_NAME=<Your Customer ID>
REPO_TOKEN=<Your PRO repository token>
```

b. Enable the repository

```
$ sudo percona-release enable psmdb-60-pro release
```

4. Install Percona Server for MongoDB Pro packages

On RHEL 8+ and derivatives

```
$ sudo yum install -y percona-server-mongodb-pro --allowerasing
```

On RHEL 7 and derivatives

a. Back up the `/etc/mongod.conf` configuration file

```
$ sudo cp /etc/mongod.conf /etc/mongod.conf.bkp
```

b. Remove basic packages of Percona Server for MongoDB

```
$ sudo yum remove percona-server-mongodb*
```

c. Install Percona Server for MongoDB Pro packages

```
$ sudo yum install -y percona-server-mongodb-pro
```

d. Restore the configuration file from the backup

```
$ sudo cp /etc/mongod.conf.bkp /etc/mongod.conf
```

5. Start the server

```
$ sudo systemct start mongod
```

Downgrade considerations on RHEL and derivatives

The downgrade to the basic build of Percona Server for MongoDB of version **6.0.12 and higher** is done automatically by installing the basic packages.

If you wish to downgrade from Percona Server for MongoDB Pro to the basic build of Percona Server for MongoDB version **lower than 6.0.12**, do the following:

1. Remove the Pro packages

```
$ sudo yum remove percona-server-mongodb-pro*
```

2. Install Percona Server for MongoDB basic packages of the desired version

Minor upgrade of Percona Server for MongoDB

Upgrade considerations

1. If you are using data-at-rest-encryption with KMIP server, check the upgrade considerations
2. If you run Amazon Linux 2023, consider the following:

   We build and test Percona Server for MongoDB only on the latest versions of Amazon Linux 2023. Because of the way Amazon Linux updates their libraries, Percona Server for MongoDB works only on specific Amazon Linux versions.

   The following table shows Percona Server for MongoDB versions that are supported on specific versions of Amazon Linux 2023:

Percona Server for MongoDB version	Amazon Linux 2023 version
6.0.20-17	2023.6.x and earlier
6.0.21-18	2023.7.x

   To upgrade Percona Server for MongoDB, make sure that you run a compatible version of Amazon Linux 2023. Use the update instructions to update the operating system.

Procedure

To upgrade Percona Server for MongoDB to the latest version, follow these steps:

1. Stop the `mongod` service:

   ```
   $ sudo systemctl stop mongod
   ```

2. Install the latest version packages. Use the command relevant to your operating system.

3. Start the `mongod` service:

   ```
   $ sudo systemctl start mongod
   ```

To upgrade a replica set or a sharded cluster, use the rolling restart method. It allows you to perform the upgrade with minimum downtime. You upgrade the nodes one by one, while the whole cluster / replica set remains operational.

Uninstall Percona Server for MongoDB

To completely remove Percona Server for MongoDB you need to remove all the installed packages, data and configuration files. If you need the data, consider making a backup before uninstalling Percona Server for MongoDB.

Follow the instructions, relevant to your operating system:

Uninstall on Debian and Ubuntu

You can remove Percona Server for MongoDB packages with one of the following commands:

- `apt remove` will only remove the packages and leave the configuration and data files.
- `apt purge` will remove all the packages with configuration files and data.

Choose which command better suits you depending on your needs.

1. Stop the `mongod` server:

   ```
   $ sudo systemctl stop mongod
   ```

2. Remove the packages. There are two options.

   ##### Keep the configuration and data files

   ```
   $ sudo apt remove percona-server-mongodb*
   ```

   ##### Delete configuration and data files

   ```
   $ sudo apt purge percona-server-mongodb*
   ```

Uninstall on Red Hat Enterprise Linux and derivatives

1. Stop the `mongod` service:

   ```
   $ sudo systemctl stop mongod
   ```

2. Remove the packages:

   ```
   $ sudo yum remove percona-server-mongodb*
   ```

3. Remove the data and configuration files:

   ```
   $ sudo rm -rf /var/lib/mongodb
   $ sudo rm -f /etc/mongod.conf
   ```

> **Warning**
>
> This will remove all the packages and delete all the data files (databases, tables, logs, etc.). You might want to back up your data before doing this in case you need the data later.

Release notes

Percona Server for MongoDB 6.0 Release Notes

- Percona Server for MongoDB 6.0.24-19 (2025-06-12)
- Percona Server for MongoDB 6.0.21-18 (2025-04-22)
- Percona Server for MongoDB 6.0.20-17 (2025-02-19)
- Percona Server for MongoDB 6.0.19-16 (2024-11-28)
- Percona Server for MongoDB 6.0.18-15 (2024-11-05)
- Percona Server for MongoDB 6.0.17-14 (2024-09-18)
- Percona Server for MongoDB 6.0.16-13 (2024-07-30)
- Percona Server for MongoDB 6.0.15-12 (2024-04-30)
- Percona Server for MongoDB 6.0.14-11 (2024-03-26)
- Percona Server for MongoDB 6.0.13-10 (2024-02-20)
- Percona Server for MongoDB 6.0.12-9 (2023-12-14)
- Percona Server for MongoDB 6.0.11-8 (2023-10-19)
- Percona Server for MongoDB 6.0.9-7 (2023-09-14)
- Percona Server for MongoDB 6.0.8-6 (2023-08-08)
- Percona Server for MongoDB 6.0.6-5 (2023-05-25)
- Percona Server for MongoDB 6.0.5-4 (2023-03-29)
- Percona Server for MongoDB 6.0.4-3 (2023-01-30)

- Percona Server for MongoDB 6.0.3-2 (2022-12-07)
- Percona Server for MongoDB 6.0.2-1 (2022-10-31)

Percona Server for MongoDB 6.0.24-19 (2025-06-12)

Installation | Upgrade from MongoDB Community

Percona Server for MongoDB 6.0.24-19 is an enhanced, source-available, and highly-scalable database that is a fully-compatible, drop-in replacement for MongoDB Community Edition.

It is based on MongoDB 6.0.22 Community Edition through MongoDB 6.0.24 Community Edition and supports the upstream protocols and drivers of all these versions.

Release Highlights

Packaging changes

Regular builds of Percona Server for MongoDB 6.0.24-19 are no longer supported on Ubuntu 20.04 (Focal Fossa) as this operating system has reached end of life. However, if for some reason you're not yet able to upgrade to a newer Ubuntu OS and you'd like to still upgrade your Percona Server for MongoDB, contact us - we're here to make your databases run better!

Upstream Improvements

The bug fixes, provided by MongoDB Community Edition and included in Percona Server for MongoDB, are the following:

- SERVER-93120 - Fixed the issue with blocking Full Time Diagnostic Data Capture (FTDC) collection when checking the state of the bacupCursor by using atomic mode instead of a lock
- SERVER-82037 - Fixed the issue with exceeding the amount of memory allocated for index creation by limiting the number of file iterators a sorter can create
- SERVER-88400 - Fixed the issue with the `shardedDataDistribution` aggregation stage returning null value for timeseries when executed against bucket collections by computing metrics based on `timeseries.bucketCount` and `timeseries.avgBucketSize`
- SERVER-92806 - Tracked nested paths through MatchExpression trees while encoding indexability for plan cache entries
- SERVER-95976 - Introduced the "matchCollectionUUIDForUpdateLookup" parameter to enforce `updateLookup` to only return a document from the correct collection in the changestream stage

- WT-13283 - Fixed the bug where WiredTiger “cache aggressive mode” for better cache usage showed the “garbage values” by applying the compare-and-swap operation to the code to avoid the value dropping to -1(which is `int_max` as `evict_aggressive_score` is an unsigned int)

Find the full list of changes in the release notes of MongoDB 6.0.22 Community Edition through MongoDB 6.0.24 Community Edition.

Percona Server for MongoDB 6.0.21-18 (2025-04-22)

Installation | Upgrade from MongoDB Community

Percona Server for MongoDB 6.0.21-18 is an enhanced, source-available, and highly-scalable database that is a fully-compatible, drop-in replacement for MongoDB Community Edition.

It is based on MongoDB 6.0.21 Community Edition and supports the upstream protocols and drivers.

Release Highlights

Improved compatibility for data-at-rest encryption using KMIP between Percona Server for MongoDB with MongoDB Enterprise Advanced

We have added the `security.kmip.useLegacyProtocol` configuration option to improve compatibility of Percona Server for MongoDB with MongoDB Enterprise Edition. This enables you to migrate from MongoDB Enterprise Advanced to Percona Server for MongoDB without having to modify the configuration file. Since Percona Server for MongoDB uses KMIP protocol version 1.0 by default, it ignores this option and prints the log message about it.

Audit log improvements

Enjoy a better user experience with these improvements to audit logging:

- You can output logging information either to a syslog, a file or to print in the console. Now Percona Server for MongoDB correctly parses the specified destination and creates a logging file only if you explicitly defined the `file` as its value. This helps keep the system clean from unnecessary files
- By default, Percona Server for MongoDB saves the log file at the server’s configured log path or to a directory from where `mongod` was started if the server’s log path is undefined. You can also set a custom path to output a log file. For both cases, Percona Server for MongoDB checks if the audit log file can be opened for writing to ensure that logging information is written and available.

Debug symbols added in Percona Server for MongoDB Pro binaries

With this release, Percona Server for MongoDB Pro packages and binary tarballs include binaries that contain debug symbols. This changes makes Percona Server for MongoDB Pro compatible for runtime instrumentation to collect more detailed telemetry data and have improved monitoring.

By integrating Percona Server for MongoDB Pro with advanced monitoring tools that use debug symbols, you have a deeper visibility into the server and receive detailed diagnostic data and logs.

Compatibility with Amazon Linux 2023

We build and test Percona Server for MongoDB only on the latest versions of Amazon Linux 2023. Because of the way Amazon Linux updates their libraries, Percona Server for MongoDB 6.0.21-18 is compatible only with Amazon Linux 2023.7.x and won't work on Amazon Linux 2023.6.x and older.

To upgrade to 6.0.21-18, make sure that you run Amazon Linux 2023.7.x. Use the update instructions

Upstream Improvements

The bug fixes, provided by MongoDB Community Edition and included in Percona Server for MongoDB, are the following:

- SERVER-94405 - Re-enable autosplitting on the sessions collection when downgrading to version 5.0.x and setting the Feature Compatibility Version (FCV) to 5.0
- SERVER-96252 - Fixed the issue with upgrading to a new FCV when there are range deletion tasks and no hashed shard key index by setting the number of orphan documents to zero
- SERVER-98720 - Added redaction of the BSON command for "Plan executor error" warning logs to prevent the entire command text (possibly including PII) to end up in the logs
- SERVER-100594 - Limited JSON recursion to 200 levels
- SERVER-101298 - Removed acquisition of database and collection locks when acquiring the global lock in compaction
- SERVER-97842 - Fixed the issue with MongoDB CPU usage spikes with a newer version of OpenSSL on RHEL 9

Find the full list of changes in the MongoDB 6.0.21 Community Edition release notes.

Changelog

New Features

- PSMDB-1282 - Add the `security.kmip.useLegacyProtocol` config file option to simplify migration from MongoDB Enterprise Edition to Percona Server for MongoDB

Improvements

- PSMDB-1620 - Do not create an empty audit log file if the log destination is not `file`
- PSMDB-1621 - Check if an audit log file can be opened for writing at default path

Bugs Fixed

- PSMDB-118 - Fixed the audit log file extension to be created based on the specified audit log format.
- PSMDB-121 - Fixed the issue with the server failing to create an audit log file at the user provided path when the process is forked and the relative path is given by converting it to an absolute path
- PSMDB-1227 - Allowed setting a Distinguished Name(DN) value in attributes part of the LDAP query
- PSMDB-1392 - Ensured that `$backupCursor` returns `oplogEnd` without holes (Thank you MingTotti Guoming He for reporting this issue)
- PSMDB-1614 - Replaced a hard-coded port number with a placeholder in percona-server-enable-authentication.sh
- PSMDB-1617 - Improved error messages when there are insufficient permissions to access client/CA certificates for KMIP authentication

Percona Server for MongoDB 6.0.20-17 (2025-02-19)

Installation | Upgrade from MongoDB Community

Percona Server for MongoDB 6.0.20-17 is an enhanced, source-available, and highly-scalable database that is a fully-compatible, drop-in replacement for MongoDB Community Edition.

It is based on MongoDB 6.0.20 Community Edition and supports the upstream protocols and drivers.

Release Highlights

Improved security for Docker images

Percona Server for MongoDB Docker image is now based on Universal Base Image (UBI) version 9, which includes the latest security fixes. This makes the image compliant with the Red Hat certification and ensures the seamless work of containers on Red Hat OpenShift Container Platform.

Amazon Linux 2023 support

Percona Server for MongoDB is now available and fully supported on Amazon Linux 2023 (AL23), simplifying its AWS deployment. You can safely run Percona Server for MongoDB on AL23 to build a secure, stable, high-performance environment for developing and running cloud applications, with seamless integration with various AWS services and development tools. You can download tarballs from our Percona Software Downloads page. Navigate to the Percona Server for MongoDB page, select the latest version, and `Generic` Platform.

Upstream Improvements

The bug fixes, provided by MongoDB and included in Percona Server for MongoDB, are the following:

- SERVER-93205 - Exposed number of prepareUnique indexes in serverStatus
- SERVER-94144 - Fixed the behavior for the $documents pipeline by ensuring that enabled query stats don't change the validation rules.
- SERVER-94592 - Checked that a sharded explain command with a value set for the lsid's uid field in the inner command invocation will ignore the lsid field and succeed so long as the user is authorized to run the command being explained
- SERVER-94635 - Made session refresh parameters configurable
- SERVER-95445 - Enable CRL (Certificate Revocation List) checking for the entire certificate chain when establishing an SSL connection.

Find the full list of changes in the MongoDB 6.0.20 Community Edition release notes.

Changelog

Bugs Fixed

- PSMDB-1243 - Fixed the issue with starting Percona Server for MongoDB Docker container with data-at-rest encryption configured via the configuration file
- PSMDB-1573 - Added escaping of special characters when building LDAP queries
- PSMDB-1567 - Fixed the issue with the crashing server during LDAP authentication when the LDAP server is down

2024 (versions 6.0.13-10 through 6.0.19-16)

Percona Server for MongoDB 6.0.19-16 (2024-11-28)

Installation | Upgrade from MongoDB Community

Percona Server for MongoDB 6.0.19-16 is an enhanced, source-available, and highly-scalable database that is a fully-compatible, drop-in replacement for MongoDB Community Edition.

It is based on MongoDB 6.0.19 Community Edition and supports the upstream protocols and drivers.

Release Highlights

Important

This release of Percona Server for MongoDB includes a fix for a security vulnerability CVE-2024-10921. This vulnerability allowed an authorized user to trigger server crashes or receive the contents of the buffer over-reads of the server memory by sending specially crafted requests that constructed malformed BSON in MongoDB. The issue is fixed and included in Percona Server for MongoDB 6.0.19-16. If you wish to upgrade to the following major version, the fix is also included in Percona Server for MongoDB 7.0.15-9.

Users running any minor version of Percona Server for MongoDB 6.0.x before 6.0.19-16 should upgrade to this version as soon as possible.

Upstream Improvements

The bug fixes, provided by MongoDB and included in Percona Server for MongoDB, are the following:

- SERVER-96419 - Fixed the issue with improper neutralization of null bytes that may have led to buffer over-reads in MongoDB Server.
- SERVER-95279 - Use a new C++ type for BSON field names to ensure validity.

Find the full list of changes in the MongoDB 6.0.19 Community Edition release notes.

Percona Server for MongoDB 6.0.18-15 (2024-11-05)

Installation

Percona Server for MongoDB 6.0.18-15 is an enhanced, source-available, and highly-scalable database that is a fully-compatible, drop-in replacement for MongoDB Community Edition 6.0.18.

It is based on MongoDB 6.0.18 Community Edition and supports the upstream protocols and drivers.

Release Highlights

Prevent master encryption key loss on the Vault server

Before Percona Server for MongoDB puts a new master encryption key to the Vault server as the versioned secret, it now checks if the secret's version reached the defined maximum (10 by default). This prevents the loss of the old secret and the master encryption key it stores on the Vault server.

Make sure Percona Server for MongoDB has read permissions for the secret's metadata and the secrets engine configuration. To learn more, refer to the documentation.

Join Percona Squad

Participate in monthly SWAG raffles, get an early access to new product features and invite-only "ask me anything" sessions with database performance experts. Interested? Fill in the form at squad.percona.com/mongodb.

Upstream Improvements

- SERVER-70508 - Added current thread count to extra_info in serverStatus on Linux
- SERVER-94166 - Disabled slot-based query execution engine (SBE query engine) in v6.0
- SERVER-74072 - Ensured that JournalFlusher is run on ServiceContext it is bound to

Changelog

Improvements

- PSMDB-1441 - Fixed the issue with master encryption keys getting lost when the number of created secrets exceeds the threshold by preventing a new secret creation and alerting users about it.

Percona Server for MongoDB 6.0.17-14 (2024-09-18)

Installation

Percona Server for MongoDB 6.0.17-14 is an enhanced, source-available, and highly-scalable database that is a fully-compatible, drop-in replacement for MongoDB Community Edition 6.0.17.

It is based on MongoDB 6.0.17 Community Edition and supports the upstream protocols and drivers.

Release Highlights

Reduce mean time to resolve (MTTR) compromised encryption key incidents in KMIP

Starting with this release, Percona Server for MongoDB automatically activates all new master encryption keys at startup and periodically checks (polls) their status in a KMIP server. If a master encryption key for a node transitions to the state other than Active, the node reports an error and shuts down. This method allows security engineers to quickly identify which nodes require out-of-schedule master key rotation, such as in the case of compromised keys, without needing to rotate keys for the entire cluster.

Learn more about key state polling from the documentation

Upstream Improvements

Improvements and bug fixes, provided by MongoDB and included in Percona Server for MongoDB are the following:

- SERVER-85892 - Fixed the error in the `$merge` operation produced by the pipeline after the `$documents` stage by correcting the namespace for pipeline validation
- SERVER-91195 - Provided a generic backportable solution not to miss top-level timeseries collection options
- SERVER-91362 - Fixed performance issues by not copying a JavaScript “scope” object if a cached JsExecution object already exists in a query thread
- SERVER-91406 - Allowed the `$match` aggregation stage to move ahead of mongoS change stream stages

- WT-12708 - Fixed the issue with ineffective queuing of the pages by the eviction server in WoredTiger by introducing retries to find the ref in memory and thus avoiding returning NULL from the random descent function.

Find the full list of new features and improvements in the release notes for MongoDB 6.0.17 Community Edition.

Packaging Notes

- Percona Server for MongoDB 6.0.17-14 is no longer supported for Ubuntu 18.04 (Bionic Beaver), Debian 10 and Red Hat Enterprise 7 and derivatives as these operating systems reached End-Of-Life.

Changelog

Improvements

- PSMDB-1283 - Add the ability to activate master encryption keys in KMIP server and check their state.

Percona Server for MongoDB 6.0.16-13 (2024-07-30)

Installation

Percona Server for MongoDB 6.0.16-13 is an enhanced, source-available, and highly-scalable database that is a fully-compatible, drop-in replacement for MongoDB Community Edition 6.0.16.

It is based on MongoDB 6.0.16 Community Edition and supports the upstream protocols and drivers.

Release Highlights

- This release of Percona Server for MongoDB includes the enhanced telemetry feature and provides comprehensive information about how telemetry works, its components and metrics as well as updated methods how to disable telemetry. Read more in Telemetry on Percona Server for MongoDB
- Tarballs are now available for each supported operating system individually and no longer include built-in libraries. This change reduces the tarball download size and increases their security by simplifying updates for required dependencies.

Improvements and bug fixes, provided by MongoDB and included in Percona Server for MongoDB are the following:

- SERVER-79637 - Fixed the issue with the aggregation pipeline in MongoDB when using the `$lookup stage` with a time series foreign collection using a correlated predicate

- SERVER-86474 - Fixed the bug with the replaying oplog updates during mongosync by preserving the zero-valued timestamps.
- SERVER-89625 - Improve handling of directoryPerDb and wiredTigerDirectoryForIndexes to not insert directories as key when reporting namespaces and UUIDs during a backup
- WT-10807 - Fixed the issue with performance regression by skipping in-memory deleted pages as part of the tree walk on each execution.
- WT-12609 - Improved checkpoint cleanup and page eviction logic to prevent their unnecessary slowdown by evicting the internal pages read by the checkpoint like a regular page.

Find the full list of new features and improvements in the release notes for MongoDB 6.0.16 Community Edition.

Packaging notes

- Percona Server for MongoDB 6.0.16-13 is available on Ubuntu 24.04 (Noble Numbat)

Percona Server for MongoDB 6.0.15-12 (2024-04-30)

Installation

Percona Server for MongoDB 6.0.15-12 is an enhanced, source-available, and highly-scalable database that is a fully-compatible, drop-in replacement for MongoDB Community Edition 6.0.15

It is based on MongoDB 6.0.15 Community Edition and supports the upstream protocols and drivers.

Release Highlights

A number of issues with sharded multi-document transactions in sharded clusters of 2 or more shards have been identified that result in returning incorrect results and missing reads and writes. The issues occur when the transactions' metadata is being concurrently modified by using the following operations: `moveChunk`, `moveRange`, `movePrimary`, `renameCollection`, `drop`, and `reshardCollection`.

The data is affected when using the following functionalities:

- Sharded multi-document transactions
- Queryable encryption

The issues are fully fixed in MongoDB 4.4.29, 5.0.25, 6.0.14, 7.0.8, and are included in Percona Server for MongoDB 4.4.29-28, 5.0.26-22,6.0.14-11 and 7.0.8-5. If you are using sharded multi-document transactions or queryable encryption, upgrade to Percona Server for MongoDB 6.0.14-11 or later versions as soon as possible. Please follow closely the upstream recommendations for mitigation and remediation outlined in Sharded multi-document transactions may perform operations using inconsistent sharding metadata alert.

Improvements and bug fixes, provided by MongoDB and included in Percona Server for MongoDB are the following:

- SERVER-72703 - Changed the requirement to use exclusive write lock to intent exclusive write lock that doesn't prevent reading from a collection during the $out stage when running the rename collection command.
- SERVER-78556 - Fixed the issue with the replication lag by changing the `internalInsertMaxBatchSize` default value to 64.
- SERVER-83602 - Fixed the issue with the match expression optimization for the $or to an $in rewrite by avoiding creating directly nested $or.
- SERVER-80363 - Explicitly stated that the missing w field from write concern object will be filled with default write concern value

Find the full list of new features and improvements in the release notes for MongoDB 6.0.15 Community Edition.

Bugs Fixed

- PSMDB-1528 - Fixed the issue with the server crash when using LDAP authentication by ensuring that LDAP connections borrowed by a client thread are not disposed.

Percona Server for MongoDB 6.0.14-11 (2024-03-26)

Installation

Percona Server for MongoDB 6.0.14-11 is an enhanced, source-available, and highly-scalable database that is a fully-compatible, drop-in replacement for MongoDB Community Edition 6.0.14

It is based on MongoDB 6.0.14 Community Edition and supports the upstream protocols and drivers.

Warning

Due to CVE-2024-1351, in all MongoDB versions prior to 4.4.29, the `mongod` server allows incoming connections to skip peer certificate validation which results in untrusted connections to succeed. This issue occurs when the `mongod` is started with TLS enabled (`net.tls.mode` set to `allowTLS`, `preferTLS`, or `requireTLS`) and without a `net.tls.CAFile` configured. For details, see SERVER-72839.

The issue is fixed upstream in versions 4.4.29, 5.0.25, 6.0.14 and 7.0.6 and in Percona Server for MongoDB 4.4.29-28, 5.0.25-22, 6.0.14-11 and 7.0.7-4. Now, configuring MongoDB to use TLS requires specifying the value for the `--tlsCAFile` flag, the `net.tls.CAFile` configuration option, or the `tlsUseSystemCA` parameter.

If you are using TLS in your deployment, it is strongly recommended to upgrade to the latest versions of Percona Server for MongoDB.

Release Highlights

Improvements and bug fixes, provided by MongoDB and included in Percona Server for MongoDB are the following:

- SERVER-72839 - Fixed the issue with missing peer certificate validation if neither CAFile nor clusterCAFile is provided.
- SERVER-82353 - Fixed the issue with multi-document transactions missing documents when the movePrimary operation runs concurrently by detecting placement conflicts in multi-document transactions.
- SERVER-83119 - Allow a clustered index scan in a clustered collection if a notablescan option is enabled.
- SERVER-83145 - Fixed tracking memory usage in SharedBufferFragment to prevent out of memory issues in the WiredTiger storage engine.
- SERVER-83564 - Add an index on the process field for the `config.locks` collection to ensure update operations on it are completed even in heavy loaded deployments.
- WT-12077 - Fixed the Incorrect hardware checksum calculation on zSeries for buffers on stack.

Find the full list of new features and improvements in the release notes for MongoDB 6.0.14 Community Edition.

Bugs Fixed

- PSMDB-1434 - Fixed the auditing behavior by removing excessive logging for CRUD operations

Percona Server for MongoDB 6.0.13-10 (2024-02-20)

Installation

Percona Server for MongoDB 6.0.13-10 is an enhanced, source-available, and highly-scalable database that is a fully-compatible, drop-in replacement for MongoDB Community Edition 6.0.13

It is based on MongoDB 6.0.13 Community Edition and supports the upstream protocols and drivers.

Release Highlights

- Percona Server for MongoDB packages are available for ARM64 architectures, enabling users to install it on premises. The ARM64 packages are available for the following operating systems:
- Ubuntu 20.04 (Focal Fossa)
- Ubuntu 22.04 (Jammy Jellyfish)
- Red Hat Enterprise Linux 8 and compatible derivatives
- Red Hat Enterprise Linux 9 and compatible derivatives

Improvements and bug fixes, provided by MongoDB and included in Percona Server for MongoDB are the following:

- SERVER-33494 - Removed size storer entries upon collection drop
- SERVER-50792 - Improved shard key index error messages by adding detailed information about an invalid index.
- SERVER-70155 - Improved slow query logging by adding the duration between a write operation getting a commit timestamp and actually committing. This helps identify issues where operations are committing slowly and are slowing down replication.
- SERVER-77506 - Fixed the issue with data and ShardVersion mismatch on sharded multi-document transactions by exposing the maxValidAfter timestamp alongside the shardVersion
- SERVER-83091 - Fixed the issue with infinite loop during plan enumeration triggered by the `$or` queries

Find the full list of new features and improvements in the release notes for MongoDB 6.0.13 Community Edition.

Packaging changes

Percona Server for MongoDB 6.0.13-10 is no longer available on Ubuntu 18.04 (Bionic Beaver).

2023 (versions 6.0.5-4 through 6.0.12-9)

Percona Server for MongoDB 6.0.12-9 (2023-12-14)

Installation

Percona Server for MongoDB 6.0.12-9 is an enhanced, source-available, and highly-scalable database that is a fully-compatible, drop-in replacement for MongoDB Community Edition 6.0.12

It is based on [MongoDB 6.0.12 Community Edition and supports the upstream protocols and drivers.

Release Highlights

- AWS IAM authentication is now generally available, enabling you to use this functionality in production environments.
- Percona Server for MongoDB now includes telemetry that fills in the gaps in our understanding of how you use Percona Server for MongoDB to improve our products. Participation in the anonymous program is optional. You can opt-out if you prefer not to share this information. Read more about Telemetry.

Improvements and bug fixes, provided by MongoDB and included in Percona Server for MongoDB are the following:

- SERVER-80203 - Fixed the routing issue with sharded time series collections which could result in metadata inconsistency. The issue occurred when the documents that have the shard key containing the embedded object composed of multiple fields are routed to an incorrect shard and become orphanated. As a result orphanated documents may not be returned when queried through the mongos

and/or may be deleted. The issue affects time series sharded collections starting in MongoDB version 5.0.6 through versions 5.0.21, 6.0.11 and 7.0.2.

If you are using time series collections, upgrade to MongoDB 6.0.12 or Percona Server for MongoDB 6.0.12-9 as soon as possible. Please follow closely the upstream recommendations to identify and preserve orphanated documents.

- SERVER-69244 - Fixed the behaviour of the `$merge` aggregation stage on sharded clusters when the default read concern has been set to “majority”
- SERVER-81295 - Fixed the issue with the migration of change stream pipelines to use v2 resume tokens instead of v1
- SERVER-81966 - Fixed the issue that caused the modification of the original ChunkMap vector during the chunk migration and that could lead to data loss. The issue affects MongoDB versions 4.4.25, 5.0.21, 6.0.10 through 6.0.11 and 7.0.1 through 7.0.2. Requires stopping all chunk merge activities and restarting all the binaries in the cluster (both `mongod` and `mongos`).
- WT-11564 - Fixed the rollback-to-stable behavior to read the newest transaction value only when it exists in the checkpoint.

Find the full list of new features and improvements in the release notes for MongoDB 6.0.12 Community Edition.

Percona Server for MongoDB 6.0.11-8 (2023-10-19)

Installation

Percona Server for MongoDB 6.0.11-8 is an enhanced, source-available, and highly-scalable database that is a fully-compatible, drop-in replacement for MongoDB 6.0.10 Community Edition and MongoDB 6.0.11 Community Edition.

It supports protocols and drivers of both MongoDB 6.0.10 and MongoDB 6.0.11

Warning

We don't recommend this version for production use due to the issue with routing sharding time series collections SERVER-80203 which could result in metadata inconsistency. The routing issue is observed when documents have the shard key containing the embedded object composed of multiple fields.

The issue affects time series sharded collections starting in MongoDB version 5.0.6 through versions 5.0.21, 6.0.11 and 7.0.2. It is fixed upstream in versions 5.0.22, 6.0.12 and 7.0.4 and included in Percona Server for MongoDB 5.0.22-19, 6.0.12-9 and 7.0.4-2.

If you are using time series collections, upgrade to the fixed version of MongoDB / Percona Server for MongoDB as soon as possible and follow closely the upstream recommendations outlined in SERVER-80203 for remediation steps.

Release Highlights

- You can now configure the retry behavior for Percona Server for MongoDB to connect to the KMIP server when using data-at-rest encryption.

Improvements and bug fixes, provided by MongoDB and included in Percona Server for MongoDB are the following:

- SERVER-71627 - Improved performance of updating the routing table and prevented blocking client requests during refresh for clusters with 1 million of chunks.
- SERVER-73394 - Removed the `operationBlockedByRefresh` metric from the `serverStatus` command output.
- SERVER-77183 - Fixed incorrect results when `$project` is followed by `$group` and the group doesn't require full document
- SERVER-79771 - Made Resharding Operation Resilient to NetworkInterfaceExceededTimeLimit
- SERVER-58534 - Collect the Feature Compatibility Version (FCV) in Full Time Diagnostic Data Capture (FTDC) to simplify diagnostics.
- SERVER-69244 - Fixed the issue with the `$merge` operation failing when used in sharding clusters with the read concern set to "majority".
- SERVER-79498 - Introduced `vectorSearch` aggregation stage
- SERVER-80021 - Fixed the conversion form string to doubleValue to not lose precision and be able to rountrip and retrieve the same value back.

Find the full list of new features and improvements in the release notes for MongoDB 6.0.10 Community Edition and [https://www.mongodb.com/docs/manual/release-notes/6.0/#6.0.11—oct-11–2023).

New Features

- PSMDB-1241 - Implement the `connectRetries` and the `connectTimeoutMS` configuration file options

Percona Server for MongoDB 6.0.9-7 (2023-09-14)

Installation

Percona Server for MongoDB 6.0.9-7 is an enhanced, source-available, and highly-scalable database that is a fully-compatible, drop-in replacement for MongoDB 6.0.9 Community Edition.

It is based on MongoDB 6.0.9 Community edition and supports the upstream protocols and drivers.

Warning

We don't recommend this version for production use due to the issue with routing sharding time series collections SERVER-80203 which could result in metadata inconsistency. The routing issue is observed when documents have the shard key containing the embedded object composed of multiple fields.

The issue affects time series sharded collections starting in MongoDB version 5.0.6 through versions 5.0.21, 6.0.11 and 7.0.2. It is fixed upstream in versions 5.0.22, 6.0.12 and 7.0.4 and included in Percona Server for MongoDB 5.0.22-19, 6.0.12-9 and 7.0.4-2.

If you are using time series collections, upgrade to the fixed version of MongoDB / Percona Server for MongoDB as soon as possible and follow closely the upstream recommendations outlined in SERVER-80203 for remediation steps.

Release Highlights

Improvements and bug fixes, provided by MongoDB and included in Percona Server for MongoDB are the following:

- SERVER-60466 - Fixed the flow for converting a replica set into a sharded cluster b adding support for the drivers to communicate the signed $clusterTimes to shardsvr replica set before and after the `addShard` command is run
- SERVER-74954 - Fixed the issue with the incorrect output for the query where the $or operator rewrites the $elemMatch extra condition.
- SERVER-79136 - Blocked the $group min/max rewrite in timestamp if there is a non-meta filter.
- WT-10759 - During reconciliation do not retry to forcibly evict the page.

Find the full list of new features and improvements in the release notes for MongoDB 6.0.9 Community edition.

Percona Server for MongoDB 6.0.8-6 (2023-08-08)

Release date	**August 8, 2023**
Installation	Installing Percona Server for MongoDB

Percona Server for MongoDB 6.0.8-6 is an enhanced, source-available, and highly-scalable database that is a fully-compatible, drop-in replacement for MongoDB 6.0.7 and 6.0.8 Community Edition.

It supports protocols and drivers of both MongoDB 6.0.7 and 6.0.8.

This release of Percona Server for MongoDB includes the improvements and bug fixes of MongoDB 6.0.7 Community edition and MongoDB 6.0.8 Community edition.

Warning

We don't recommend this version for production use due to the issue with routing sharding time series collections SERVER-80203 which could result in metadata inconsistency. The routing issue is observed when documents have the shard key containing the embedded object composed of multiple fields.

The issue affects time series sharded collections starting in MongoDB version 5.0.6 through versions 5.0.21, 6.0.11 and 7.0.2. It is fixed upstream in versions 5.0.22, 6.0.12 and 7.0.4 and included in Percona Server for MongoDB 5.0.22-19, 6.0.12-9 and 7.0.4-2.

If you are using time series collections, upgrade to the fixed version of MongoDB / Percona Server for MongoDB as soon as possible and follow closely the upstream recommendations outlined in SERVER-80203 for remediation steps.

Important

Changes to Chunk Management and Balancing

Several changes have been incrementally introduced within 6.0.x releases.

- The name of a subset of data has changed from a `chunk` to a `range`.
- The data size has changed from 64 MB for a chunk to 128 MB for a range.
- The balancer now distributes ranges based on the actual data size of collections. Formerly the balancer migrated and balanced data across shards based strictly on the number of chunks of data that exist for a collection across each shard. This, combined with the auto-splitter process could cause quite a heavy performance impact to heavy write environments.
- Ranges (formerly chunks) are no longer auto-split and will be split only when they move across shards for distribution purposes. The auto-splitter process is currently still available but it serves no purpose and does nothing active to the data. This also means that the Enable/Disable AutoSplit helpers should no longer be used.

The above changes are expected to lead to better performance overall going forward.

Release Highlights

- The ability to configure AWS STS endpoint improves authentication and connectivity with AWS services.

Improvements and bug fixes, provided by MongoDB and included in Percona Server for MongoDB are the following:

- SERVER-71985 - Automatically retry time series insert on DuplicateKey error.
- SERVER-73007 - Added the CURL_OPT_SEEKFUNCTION to resend the data during multi-pass authentication
- SERVER-74551 - Prevented unnecessary logging of `WriteConflictExceptions` during the execution of a `findAndModify` command.
- SERVER-77018 - Changed the index build behavior so that in-progress index builds are no longer accounted for `indexFreeStorageSize` when running dbStats.
- WT-10449 - Do not save update chain when there are no updates to be written to the history store.
- WT-11031 - Fixed the Rollback to Stable behavior to skip tables with no time window information in the checkpoint.
- SERVER-61127 - Retry multi-writes that hit StaleConfig due to critical section on the shard
- SERVER-77005 - Improve LDAP authentication by leaving authenticated users logged-in during LDAP server downtime.
- SERVER-78414 - Fixed the issue with lost writes that occurred if recipient shard in chunk migration skips changes by having recipient shard to run the transferMods command on the donor shard primary until it learns there are no further changes.
- SERVER-77169 - Fixed the issue with the server crash when restoring time series collection with authentication enabled by validating the `system.buckets.` namespace.

Find the full list of new features and improvements in the release notes for MongoDB 6.0.7 Community edition and MongoDB 6.0.8 Community edition.

New Features

- PSMDB-1291 - Add the ability to specify the AWS Security Token Service (STS) endpoint for authentication

Bugs Fixed

- PSMDB-1280 - Improve PSMDB behavior on client disconnect when the `$backupCursorExtend` is opened
- PSMDB-1289 - Fixed the issue with the server crash during LDAP authentication by retrying sending requests to the LDAP server and gracefully report errors.

Percona Server for MongoDB 6.0.6-5 (2023-05-25)

Release date	**May 25, 2023**
Installation	Installing Percona Server for MongoDB

Percona Server for MongoDB 6.0.6-5 is an enhanced, source-available, and highly-scalable database that is a fully-compatible, drop-in replacement for MongoDB 6.0.6 Community Edition.

It is based on MongoDB 6.0.6 Community edition and supports the upstream protocols and drivers.

Warning

We don't recommend this version for production use due to the issue with routing sharding time series collections SERVER-80203 which could result in metadata inconsistency. The routing issue is observed when documents have the shard key containing the embedded object composed of multiple fields.

The issue affects time series sharded collections starting in MongoDB version 5.0.6 through versions 5.0.21, 6.0.11 and 7.0.2. It is fixed upstream in versions 5.0.22, 6.0.12 and 7.0.4 and included in Percona Server for MongoDB 5.0.22-19, 6.0.12-9 and 7.0.4-2.

If you are using time series collections, upgrade to the fixed version of MongoDB / Percona Server for MongoDB as soon as possible and follow closely the upstream recommendations outlined in SERVER-80203 for remediation steps.

Release Highlights

Improvements and bug fixes, provided by MongoDB and included in Percona Server for MongoDB are the following:

- SERVER-51835 - Fixed the handling of the read preference tags to respect their order and ignore other tags when all eligible replica set members are found.
- SERVER-67105 - Allowed usage of clustered index in queries.
- SERVER-72774 - Prevented a node in quiesce mode to win election.
- SERVER-74930 - Fixed the issue with the `$avg` operator to return the sum instead of the average within a `$group` stage
- SERVER-75205 - Fixed deadlock between `stepdown` and `restoring` locks after yielding when all read tickets exhausted

- WT-10551 - Fixed the bug with WiredTiger failing to load the incremental backup change bitmap for a file. The issue affects MongoDB versions 4.4.8 through 4.4.21, 5.0.2 through 5.0.17, and 6.0.0 through 6.0.5 causing the server to crash with the checksum error if the affected incremental backup was restored and the affected data is accessed.

  If you are using incremental backups, upgrade to the fixed upstream version 6.0.6 / Percona Server for MongoDB 6.0.6-5 as soon as possible. Follow closely the upstream recommendations to remediate the negative impact.

Find the full list of new features and improvements in MongoDB 6.0.6 Community edition release notes.

Bugs Fixed

- PSMDB-1211: Improved the master key rotation handling in case of failure
- PSMDB-1231: Register a master key for data-at-rest encryption on the KMIP server in the raw-bytes form
- PSMDB-1239: Fixed the issue with PSMDB failing to restart when wrong data-at-rest encryption options were used during the previous start

Percona Server for MongoDB 6.0.5-4 (2023-03-29)

Release date	**March 29, 2023**
Installation	Installing Percona Server for MongoDB

Percona Server for MongoDB 6.0.5-4 is an enhanced, source-available, and highly-scalable database that is a fully-compatible, drop-in replacement for MongoDB 6.0.5 Community Edition.

It is rebased on MongoDB 6.0.5 Community edition and supports the upstream protocols and drivers.

Warning

We don't recommend this version for production use due to the issue with routing sharding time series collections SERVER-80203 which could result in metadata inconsistency. The routing issue is observed when documents have the shard key containing the embedded object composed of multiple fields.

The issue affects time series sharded collections starting in MongoDB version 5.0.6 through versions 5.0.21, 6.0.11 and 7.0.2. It is fixed upstream in versions 5.0.22, 6.0.12 and 7.0.4 and included in Percona Server for MongoDB 5.0.22-19, 6.0.12-9 and 7.0.4-2.

If you are using time series collections, upgrade to the fixed version of MongoDB / Percona Server for MongoDB as soon as possible and follow closely the upstream recommendations outlined in SERVER-80203 for remediation steps.

Release Highlights

- Added support for authentication using AWS IAM enables you to natively integrate Percona Server for MongoDB with AWS services, increase security of your infrastructure by setting up password-less authentication and offload your DBAs from managing different sets of secrets. This is a technical preview feature
- Improved master key rotation for data at rest encrypted with HashiCorp Vault enables you to use the same secret key path on every server in your entire deployment thus significantly simplifying the secrets management and key rotation process.

Improvements and bug fixes, provided by MongoDB and included in Percona Server for MongoDB are the following:

- SERVER-61909 - Fixed a hang when inserting or deleting a document with large number of index entries
- SERVER-66469 - Fixed the issue with filtering time-series collections that contain the date values earlier than Unix epoch (1970)
- SERVER-68122 - Fixed the issue with adding a new unencrypted node into an encrypted replica set by removing options which might not apply for this node.
- SERVER-73232 - Changed the default log verbosity level for `_killOperations` to D2.
- SERVER-73266 - Fixed deadlock that can occur during index creation
- SERVER-73009 - Resolved the issue with the sort order on clustered collections where requested decreasing order returned returned results in increasing order
- SERVER-72512 - Fixed the issue with indexes reported as valid while being inconsistent by improving the validation of those indexes
- SERVER-71219 - Fixed the migration of distributed transactions by registering the migration source operation observer hook in all paths where transactions transition into the prepared state.

Find the full list of new features and improvements in MongoDB 6.0.5 Community edition release notes.

New Features

- PSMDB-1033: Add authentication with AWS IAM

Improvements

- PSMDB-1148: Improve the master key rotation when using a single master key for data-at-rest encryption with Vault in the entire deployment

Bugs Fixed

- PSMDB-1201: Improved the error message if the attempt to save an encryption key to a KMIP server failed
- PSMDB-1203: Gracefully terminate mongod if the master encryption key can't be saved to a KMIP server
- PSMDB-1204: Fixed the handling of attributes list for LDAP authentication with OpenLDAP during the user to DN mapping stage

2022 (versions 6.0.2-1 through 6.0.4-3)

Percona Server for MongoDB 6.0.4-3 (2023-01-30)

Release date	**January 30, 2023**
Installation	Installing Percona Backup for MongoDB

Percona Server for MongoDB 6.0.4-3 is an enhanced, source-available, and highly-scalable database that is a fully-compatible, drop-in replacement for MongoDB 6.0.4 Community Edition.

It is rebased on MongoDB 6.0.4 Community edition and supports the upstream protocols and drivers.

Warning

We don't recommend this version for production use due to the issue with routing sharding time series collections SERVER-80203 which could result in metadata inconsistency. The routing issue is observed when documents have the shard key containing the embedded object composed of multiple fields.

The issue affects time series sharded collections starting in MongoDB version 5.0.6 through versions 5.0.21, 6.0.11 and 7.0.2. It is fixed upstream in versions 5.0.22, 6.0.12 and 7.0.4 and included in Percona Server for MongoDB 5.0.22-19, 6.0.12-9 and 7.0.4-2.

If you are using time series collections, upgrade to the fixed version of MongoDB / Percona Server for MongoDB as soon as possible and follow closely the upstream recommendations outlined in SERVER-80203 for remediation steps.

Release Highlights

- Percona Server for MongoDB is now available on Red Hat Enterprise Linux 9 and compatible derivatives
- A Docker image for Percona Server for MongoDB (Release candidate) is now available for ARM64 architectures. The support of ARM64 will be extended in subsequent releases.

Improvements and bug fixes, provided by MongoDB and included in Percona Server for MongoDB are the following:

- SERVER-72416 - Fixed the issue with incorrect projection parsing when a collection level collation is specified
- SERVER-71759 - Changed the yielding policy of `dataSize` command to `YIELD_AUTO` for both when the command is called with `estimate:true` or `false`
- SERVER-70237 - Fixed the issue with a BSON object exceeding the max allowed size during chunks merge in a shard
- SERVER-72222 - Fixed the incorrect behavior of the `mapReduce` command with single reduce optimization in sharded clusters

Find the full list of new features and improvements in MongoDB 6.0.4 Community edition release notes.

Percona Server for MongoDB 6.0.3-2 (2022-12-07)

Release date	**December 7, 2022**
Installation	Installing Percona Backup for MongoDB

Percona Server for MongoDB 6.0.3-2 is an enhanced, source-available, and highly-scalable database that is a fully-compatible, drop-in replacement for MongoDB 6.0.3 Community edition.

Percona Server for MongoDB 6.0.3-2 fully supports MongoDB 6.0 protocols and drivers and does not require any code modifications.

> **Warning**
>
> We don't recommend this version for production use due to the issue with routing sharding time series collections SERVER-80203 which could result in metadata inconsistency. The routing issue is observed when documents have the shard key containing the embedded object composed of multiple fields.
>
> The issue affects time series sharded collections starting in MongoDB version 5.0.6 through versions 5.0.21, 6.0.11 and 7.0.2. It is fixed upstream in versions 5.0.22, 6.0.12 and 7.0.4 and included in Percona Server for MongoDB 5.0.22-19, 6.0.12-9 and 7.0.4-2.
>
> If you are using time series collections, upgrade to the fixed version of MongoDB / Percona Server for MongoDB as soon as possible and follow closely the upstream recommendations outlined in SERVER-80203 for remediation steps.

Release Highlights

Improvements and bug fixes, provided by MongoDB and included in Percona Server for MongoDB are the following:

- SERVER-66289 - Fixed the issue with how the server handles batches of writes when running $out with secondary read preference by updating write size estimation logic in `DocumentSourceWriter`
- SERVER-68371 - Allowed search queries to pass through query analysis when Client-Side Field Level Encryption is enabled for the MongoClient
- SERVER-68115 - Prevented dropping empty path component from `elemMatch` path during index selection
- SERVER-68394 - Prevented yielding strong locks upon startup recovery when `_id` index is missing

Find the full list of new features and improvements in MongoDB 6.0.3 Community edition release notes.

Improvements

- PSMDB-1181: Add backup cursor parameters to cursor's metadata

Bugs Fixed

- PSMDB-1175: Fixed Percona Server for MongoDB behavior when calling `$backupCursor` with `disableIncrementalBackup` option

Percona Server for MongoDB 6.0.2-1 (2022-10-31)

Release date	**October 31, 2022**
Installation	Installing Percona Backup for MongoDB

We are pleased to announce the availability of Percona Server for MongoDB (PSMDB) 6.0.2-1 – the new major version of the source available, drop-in replacement of MongoDB 6.0 Community edition. It is available for download from Percona website and for installation from Percona Software Repositories.

Percona Server for MongoDB 6.0.2-1 fully supports MongoDB 6.0 protocols and drivers and does not require any code modifications.

Warning

We don't recommend this version for production use due to the issue with routing sharding time series collections SERVER-80203 which could result in metadata inconsistency. The routing issue is observed when documents have the shard key containing the embedded object composed of multiple fields.

The issue affects time series sharded collections starting in MongoDB version 5.0.6 through versions 5.0.21, 6.0.11 and 7.0.2. It is fixed upstream in versions 5.0.22, 6.0.12 and 7.0.4 and included in Percona Server for MongoDB 5.0.22-19, 6.0.12-9 and 7.0.4-2.

If you are using time series collections, upgrade to the fixed version of MongoDB / Percona Server for MongoDB as soon as possible and follow closely the upstream recommendations outlined in SERVER-80203 for remediation steps.

Release Highlights

- Data-at-rest encryption using the Key Management Interoperability Protocol (KMIP) is generally available enabling you to use it in your production environment
- $backupCursor and $backupCursorExtend aggregation stages functionality is generally available, enabling your application developers to use it for building custom backup solutions.

  Note

  Percona provides Percona Backup for MongoDB - the open source tool for consistent backups and restores in MongoDB sharded clusters.

- Percona Server for MongoDB packages now include `mongosh` of the previous mongo shell. The previous legacy `mongo` shell was deprecated in MongoDB 5.0 and has been removed in version 6.0. Some older methods are unavailable or have been replaced with newer ones for the new `mongosh`. Please review any methods for compatibility.

If you install Percona Server for MongoDB from tarballs, you must install `mongosh` from a separate tarball.

Percona Server for MongoDB 6.0.2-1 includes all the features of MongoDB 6.0.2 Community Edition, among which are the following:

- Enhanced time series collections enable you to:
  - Get deeper data analysis insights by building compound and secondary indexes on time, metadata and measurement fields.
  - Distribute the load among nodes in the cluster by sharding new and existing time series collections.
  - Benefit from faster reads and improved performance by applying the sorting on the most recent entry instead of the whole collection.
- The following change streams optimizations help you enhance your event-driven solutions:
  - Improve in-app notifications, reference deleted documents or feed the updated version of the entire doc to the downstream system using the before and after states of a document that was changed.
  - React not only to data changes but also to database change events like creating or dropping of collections with the Data Definition Language (DDL) support.
- New aggregation stages like `$densify`, `$documents`, `$fill` and operators like `$bottom`, `$firstN`, `$lastN`, `$maxN` / `$minN` and others enable you to off load work from your developers to the database. These operators allow automating key commands, getting required data insights by combining individual operators into aggregation pipelines. As a result, your developers spend less time on writing complex code or manipulating data manually and can focus on other activities.
- Cluster-wide configuration parameters and commands save your DBAs' time on cluster administration.
- The Stable API (formerly known as versioned API) features the extended set of new database commands and aggregation operators which enables you to improve communication of your apps and MongoDB.
- Speed up data processing and save on storage costs with clustered collections. Clustered collections don't require secondary indexes and thus, result in faster queries. A single read/write for the index and the document improves performance for inserts, updates, deletes and queries. With less storage space required by clustered connections, bulk updates and inserts are performed faster. And by turning clustered indexes to TTL indexes with a single field, you benefit from simplified delete operations and reduced storage costs.

Percona Server for MongoDB also includes the following bug fixes and enhancements provided upstream:

- SERVER-68511 - Fixed the issue that caused inconsistency in sharding metadata when running the `movePrimary` command on the database that has the Feature Compatibility Version (FCV) set to 4.4 or earlier. Affects MongoDB versions 5.0.0 through 5.0.10 and MongoDB 6.0.0. Upgrade to the the fixed version of MongoDB 6.0.2 / Percona Server for MongoDB 6.0.2-1 as soon as possible.
- SERVER-66072 - Fixed dependency analysis for `$match` aggregation stage with aggregation expressions with the `$rand` operator

- SERVER-68130 - Fixed the AutoSplitVector's behavior to predict the BSON object size when generating the response
- WT-9870 - Fixed the global time window state before performing the rollback to stable operation by updating the pinned timestamp as part of the transaction setup.
- SERVER-68628 - Fixed the issue when retrying a failed resharding operation after a primary failover could lead to server crash or lost writes.
- SERVER-68925 - Detect and resolve table logging inconsistencies for WiredTiger tables at startup

Find the full list of new features and improvements in MongoDB 6.0 Community Edition release notes.

Percona Server for MongoDB 6.0.2-1 extends this feature set by providing enterprise-level enhancements for free.

To upgrade to PSMDB, see our upgrade instructions.

FAQ

How to check Percona Server for MongoDB version?

To see which version of Percona Server for MongoDB you are using, check the value of the `psmdbVersion` key in the output of the buildInfo database command. If this key does not exist, Percona Server for MongoDB is not installed on the server.

Where is the location of the configuration and data files?

By default, Percona Server for MongoDB stores data files in `/var/lib/mongodb/` and configuration parameters in `/etc/mongod.conf`.

Reference

Glossary

ACID

Set of properties that guarantee database transactions are processed reliably. Stands for Atomicity, Consistency, Isolation, Durability.

Atomicity

Atomicity means that database operations are applied following a “all or nothing” rule. A transaction is either fully applied or not at all.

Consistency

Consistency means that each transaction that modifies the database takes it from one consistent state to another.

Durability

Once a transaction is committed, it will remain so.

Foreign Key

A referential constraint between two tables. Example: A purchase order in the purchase_orders table must have been made by a customer that exists in the customers table.

Isolation

The Isolation requirement means that no transaction can interfere with another.

Jenkins

Jenkins is a continuous integration system that we use to help ensure the continued quality of the software we produce. It helps us achieve the aims of:

- no failed tests in trunk on any platform,
- aid developers in ensuring merge requests build and test on all platforms,
- no known performance regressions (without a damn good explanation).

Kerberos

Kerberos is an authentication protocol for client/server authentication without sending the passwords over an insecure network. Kerberos uses symmetric encryption in the form of tickets - small pieces of encrypted data used for authentication. A ticket is issued for the client and validated by the server.

Rolling restart

A rolling restart (rolling upgrade) is shutting down and upgrading nodes one by one. The whole cluster remains operational. There is no interruption to clients assuming the elections are short and all writes directed to the old primary use the retryWrite mechanism.# Glossary

Technical preview feature

Technical preview features are not yet ready for enterprise use and are not included in support via SLA. They are included in this release so that users can provide feedback on their experience with the feature prior to its full release in a future GA release (or removal of the feature if it is deemed not useful). This functionality can change (APIs, CLIs, etc.) from tech preview to GA.

Telemetry and data collection

Percona collects usage data to improve its software. The telemetry feature helps us identify popular features, detect problems, and plan future improvements.

Currently, telemetry is added only to the Percona packages for both basic and Pro builds and to Docker images.

What information is collected

Telemetry collects the following information:

- The information about the installation environment when you install the software.
- The information about the operating system such as OS name, the architecture, the list of Percona packages. See more in the Telemetry Agent section.
- The metrics from the database instance. See more in the Telemetry Subsystem section.

What is NOT collected

Percona protects your privacy and doesn't collect any personal information about you like database names, user names or credentials or any user-entered values.

All collected data is anonymous, meaning it can't be traced back to any individual user. To learn more about how Percona handles your data, read the Percona Privacy statement.

You control whether to share this information. Participation in this program is completely voluntary. If don't want to share anonymous data, you can disable telemetry.

Why telemetry matters

Benefits for Percona:

Advantages	Description
See how people use your software	Telemetry collects anonymous data on how users interact with our software. This tells developers which features are popular, which ones are confusing, and if anything is causing crashes.
Identify issues early	Telemetry can catch bugs or performance problems before they become widespread.

Benefits for users in the long run:

Advantages	Description
Faster bug fixes	With telemetry data, developers can pinpoint issues affecting specific users and prioritize fixing them quickly.
Improved features	Telemetry helps developers understand user needs and preferences. This allows them to focus on features that will be genuinely useful and improve your overall experience.
Improved user experience	By identifying and resolving issues early, telemetry helps create a more stable and reliable software experience for everyone.

Telemetry components

Percona collects information using the following components:

- Telemetry script that sends the information about the software and the environment where it is installed. This information is collected only once during the installation.
- The Telemetry Subsystem collects the necessary metrics directly from the database and stores them in a Metrics File.
- The Metrics File stores the metrics and is a standalone file located on the database host's file system.
- The Telemetry Agent is an independent process running on your database host's operating system and carries out the following tasks:
    - Collects OS-level metrics

- Reads the Metrics File, adds the OS-level metrics
- Sends the full set of metrics to the Percona Platform
- Collects the list of installed Percona packages using the local package manager

The telemetry also uses the Percona Platform with the following components:

- Telemetry Service - offers an API endpoint for sending telemetry. The service handles incoming requests. This service saves the data into Telemetry Storage.
- Telemetry Storage - stores all telemetry data for the long term.

Telemetry Subsystem

The Telemetry Subsystem extends the functionality of the database. It is built-in in Percona Server for MongoDB and is implemented separately for `mongod` and `mongos` instances. The Telemetry Subsystem is enabled by default during the initial database deployment.

The Telemetry Subsystem collects metrics from the database instance daily to the Metrics File. It creates a new Metrics File for each collection. Before generating a new file, the Telemetry Subsystem deletes the Metrics Files that are older than seven days. This process ensures that only the most recent week's data is maintained.

The Telemetry Subsystem creates a file in the local file system using a timestamp as the name with a `.json` extension.

Metrics File

The Metrics File is a JSON file with the metrics collected by the Telemetry Subsystem.

Locations

Percona stores the Metrics File in one of the following directories on the local file system. The location depends on the product.

- Telemetry root path - `/usr/local/percona/telemetry`
- Percona Server for MongoDB has two root paths since the telemetry Subsystem is enabled both for the `mongod` and `mongos` instances. The paths are the following:
  - `mongod` root path - `${telemetry root path}/psmdb/`
  - `mongos` root path - `${telemetry root path}/psmdbs/`
- PS root path - `${telemetry root path}/ps/`
- PXC root path - `${telemetry root path}/pxc/`

- PG root path - `${telemetry root path}/pg/`

Percona archives the telemetry history in `${telemetry root path}/history/`.

Metrics File format

The Metrics File uses the Javascript Object Notation (JSON) format. Percona reserves the right to extend the current set of JSON structure attributes in the future.

`mongod` Metrics File

The following is an example of the collected data generated by the `mongod` instance of the config server replica set of the sharded cluster:

```
{
    "source": "mongod",
    "pillar_version": "6.0.0",
    "pro_features": [],
    "db_instance_id": "65e9977d58deb2f66faa591c",
    "db_internal_id": "65e9977d58deb2f66faa591c",
    "db_cluster_id": "65e997cb58deb2f66faa5954",
    "shard_svr": "true",
    "config_svr": "true",
    "uptime": "102",
    "storage_engine": "wiredTiger",
    "db_replication_id": "65e997cb58deb2f66faa5944",
    "replication_state": "PRIMARY"
}
```

`mongos` Metrics File

The following is an example of the collected data generated by the `mongos` instance.

```
{
    "source": "mongos",
    "pillar_version": "6.0.0",
    "pro_features": [],
    "db_instance_id": "6690fea9066216c6d9d77044",
    "uptime": "4",
    "db_cluster_id": "6690fea65d86eb061c0bd728"
}
```

Telemetry Agent

The Percona Telemetry Agent runs as a dedicated OS daemon process `percona-telemetry-agent`. It creates, reads, writes, and deletes JSON files in the `${telemetry_root_path}`. You can find the agent's log file at `/var/log/percona/telemetry-agent.log`.

The agent does not send anything if there are no Percona-specific files in the target directory.

The following is an example of a Telemetry Agent payload:

```
{
  "reports": [
    {
      "id": "B5BDC47B-B717-4EF5-AEDF-41A17C9C18BB",
      "createTime": "2023-09-01T10:56:49Z",
      "instanceId": "B5BDC47B-B717-4EF5-AEDF-41A17C9C18BA",
      "productFamily": "PRODUCT_FAMILY",
      "metrics": [
        {
          "key": "OS",
          "value": "Ubuntu"
        },
        {
          "key": "pillar_version",
          "value": "6.0.0"
        }
      ]
    }
  ]
}
```

The agent sends information about the database and metrics.

Key	Description
“id”	A generated Universally Unique Identifier (UUID) version 4
“createTime”	UNIX timestamp
“instanceId”	The DB Host ID. The value can be taken from the `instanceId`, the `/usr/local/percona/telemetry_uuid` or generated as a UUID version 4 if the file is absent.
“productFamily”	The value from the file path
“metrics”	An array of key:value pairs collected from the Metrics File.

The following operating system-level metrics are sent with each check:

Key	Description
“OS”	The name of the operating system
“hardware_arch”	The type of process used in the environment
“deployment”	How the application was deployed. The possible values could be “PACKAGE” or “DOCKER”.
“installed_packages”	A list of the installed Percona packages.

The information includes the following:

- Package name
- Package version - the same format as Red Hat Enterprise Linux or Debian
- Package repository - if possible

The package names must fit the following pattern:

- `percona-*`
- `Percona-*`
- `proxysql*`
- `pmm`
- `etcd*`
- `haproxy`
- `patroni`
- `pg*`
- `postgis`
- `wal2json`

Disable telemetry

Telemetry is enabled by default when you install the software. It is also included in the software packages (Telemetry Subsystem and Telemetry Agent) and enabled by default.

If you don’t want to send the telemetry data, here’s how:

Disable the telemetry collected during the installation

If you decide not to send usage data to Percona when you install the software, you can set the `PERCONA_TELEMETRY_DISABLE=1` environment variable for either the root user or in the operating system prior to the installation process.

Debian-derived distribution

Add the environment variable before the installation process.

```
$ sudo PERCONA_TELEMETRY_DISABLE=1 apt install percona-server-mongodb
```

Red Hat-derived distribution

Add the environment variable before the installation process.

```
$ sudo PERCONA_TELEMETRY_DISABLE=1 yum install percona-server-mongodb
```

Docker

Add the environment variable when running a command in a new container.

```
$ docker run -d --name psmdb --restart always \
  -e PERCONA_TELEMETRY_DISABLE=1 \
  percona/percona-server-mongodb:<TAG>
```

The command does the following:

- `docker run` - This is the command to run a Docker container.
- `-d` - This flag specifies that the container should run in detached mode (in the background).
- `--name psmdb` - Assigns the name “psmdb” to the container.
- `--restart always` - Configures the container to restart automatically if it stops or crashes.
- `-e PERCONA_TELEMETRY_DISABLE=1` - Sets an environment variable within the container. In this case, it disables telemetry for Percona Server for MongoDB.
- `percona/percona-server-mongodb:<TAG>-multi` - Specifies the image to use for the container. For example, `6.0.24-19-multi`. The `multi` part of the tag serves to identify the architecture (x86_64 or ARM64) and use the respective image.

Disable telemetry for the installed software

Percona software you installed includes the telemetry feature that collects information about how you use this software. It is enabled by default. To turn off telemetry, you need to disable both the Telemetry Agent and the Telemetry Subsystem.

Disable Telemetry Agent

In the first 24 hours, no information is collected or sent.

You can either disable the Telemetry Agent temporarily or permanently.

Disable temporarily

Turn off Telemetry Agent temporarily until the next server restart with this command:

```
$ systemctl stop percona-telemetry-agent
```

Disable permanently

Turn off Telemetry Agent permanently with this command:

```
$ systemctl disable percona-telemetry-agent
```

Even after stopping the Telemetry Agent service, a different part of the software (Telemetry Subsystem) continues to create the Metrics File related to telemetry every day and saves that file for seven days.

Telemetry Agent dependencies and removal considerations

If you decide to remove the Telemetry Agent, this also removes the database. That's because the Telemetry Agent is a mandatory dependency for Percona Server for MongoDB.

On YUM-based systems, the system removes the Telemetry Agent package when you remove the last dependency package.

On APT-based systems, you must use the '–autoremove' option to remove all dependencies, as the system doesn't automatically remove the Telemetry Agent when you remove the database package.

The '–autoremove' option only removes unnecessary dependencies. It doesn't remove dependencies required by other packages or guarantee the removal of all package-associated dependencies.

Disable the Telemetry Subsystem

To disable the Telemetry Subsystem, set the `perconaTelemetry` server parameter to `false`. You can do this in one of the following ways:

Configuration file

Use the `setParameter.perconaTelemetry` parameter in the configuration file for persistent changes:

```
setParameter:
  perconaTelemetry: false
```

Command line

Use the `--setParameter` command line option arguments for both `mongod` and `mongos` processes. The server starts with the telemetry Subsystem disabled:

```
$ mongod \
  --setParameter perconaTelemetry=false
$ mongos \
  --setParameter perconaTelemetry=false
```

`setParameter` command

Use the `setParameter` command on the `admin` database to make changes at runtime. The changes apply until the server restart.

```
> db.adminCommand({setParameter: 1, "perconaTelemetry": false})
```

Tip

If you wish to re-enable the Telemetry Subsystem, set the `perconaTelemetry` to `true` for the `setParameter` command.

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