

Guided Lab: Setting Up and Managing a Database on an Amazon EC2 Instance

Description

Amazon EC2 (Elastic Compute Cloud) provides a versatile and scalable environment for deploying various applications and services, including relational databases. When setting up a database, you have the option to deploy it directly on an EC2 instance or use Amazon RDS (Relational Database Service), a managed database solution provided by AWS.

Deploying a database on an EC2 instance offers full control over the database environment. This means you handle the installation, configuration, and management of the database software yourself. This approach is ideal for custom setups, advanced configurations, and scenarios where you require complete control over the database.

On the other hand, Amazon RDS abstracts much of the database management complexity. With RDS, AWS manages the underlying database software, including installation, patching, backups, and scaling. This allows you to focus more on using the database rather than managing its infrastructure, making it a great choice for many standard use cases.

In this guide, we'll walk you through the process of setting up a relational database on an EC2 instance. You'll learn how to launch an EC2 instance, install and configure one of the popular database software MySQL. We'll also briefly touch on how this approach differs from using Amazon RDS, helping you choose the best option for your needs.

Prerequisites

This lab assumes you have basic knowledge of Amazon EC2 instance (Linux), MySQL Relational Database and SSH client (e.g. GitBash, PuTTY, etc.)

If you find any gaps in your knowledge, consider taking the following lab:

- Creating an Amazon EC2 instance (Linux)
- Creating an Amazon RDS database

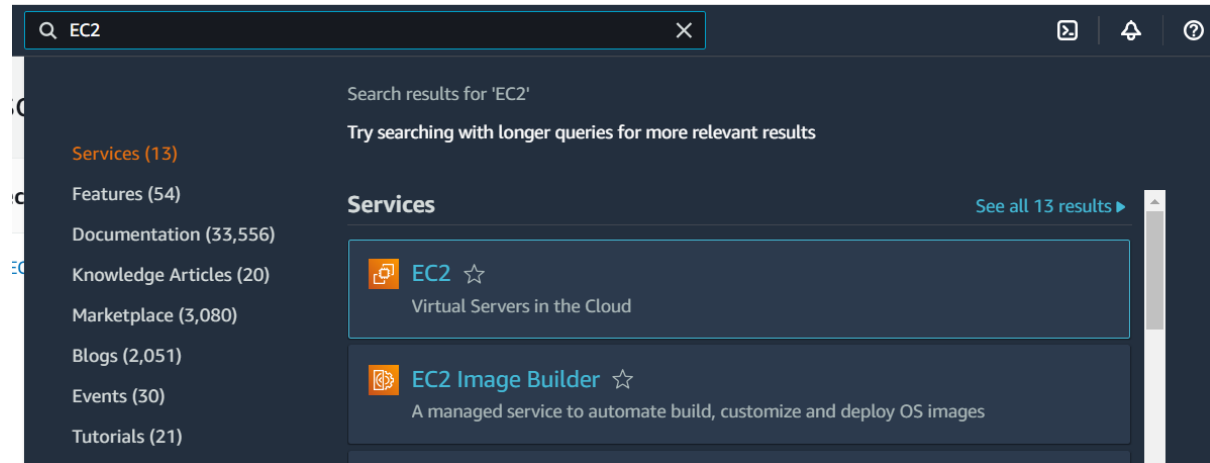
Objectives

In this lab, you will:

- Set up a relational database software MySQL on an EC2 instance.
- Optimize it for performance and security.
- Differentiate Amazon RDS from Self-managed Relational Database Installed in EC2 Instance

Launch your Instance

1. Navigate to EC2 Dashboard



2. Launch an EC2 Instance with the following configuration:

- **Name:** MyDatabaseServer
- **AMI:** Ubuntu Server 24.04 LTS

Name and tags [Info](#)

Name

MyDatabaseServer


[Add additional tags](#)

▼ Application and OS Images (Amazon Machine Image) [Info](#)


An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below

[Recents](#)


[Quick Start](#)




Amazon Linux




macOS




Ubuntu




Windows



Red Hat



SUSE Linux



[Browse more AMIs](#)

Including AMIs from AWS, Marketplace and the Community

Amazon Machine Image (AMI)

Ubuntu Server 24.04 LTS (HVM), SSD Volume Type
ami-04a81a99f5ec58529 (64-bit (x86)) / ami-0c14ff330901e49ff (64-bit (Arm))
Virtualization: hvm ENA enabled: true Root device type: ebs

Free tier eligible ▼

Description

Ubuntu Server 24.04 LTS (HVM),EBS General Purpose (SSD) Volume Type. Support available from Canonical (<http://www.ubuntu.com/cloud/services>).

Architecture

64-bit (x86) ▼

AMI ID

ami-04a81a99f5ec58529

Verified provider

- **Instance type:** t2.micro
- **Key pair:** (Please create a new one.)
 - **Key pair name:** My-DBServer-key-pair
 - **Key pair type:** RSA
 - **Private key file format:** .pem

▼ **Instance type** [Info](#) | [Get advice](#)

Instance type

t2.micro

Free tier eligible

Family: t2 1 vCPU 1 GiB Memory Current generation: true
On-Demand Windows base pricing: 0.0162 USD per Hour
On-Demand SUSE base pricing: 0.0116 USD per Hour
On-Demand RHEL base pricing: 0.026 USD per Hour
On-Demand Linux base pricing: 0.0116 USD per Hour

☐ All generations

[Compare instance types](#)

Additional costs apply for AMIs with pre-installed software

▼ **Key pair (login)** [Info](#)

You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Key pair name - *required*

My-DBServer-key-pair

- **Network settings:** (Click on **Edit**)
 - Leave **VPC** and **Subnet** with the default
 - **Auto-assign public IP:** Select Enable
 - **Firewall (security groups):** (Select the radio button **Create security group**)
 - **Security group name – *required*:** My-DB-SG
 - **Description – *required*:** Security Group for my MyDatabaseServer Instance
 - **Allow SSH traffic from :** My IP

▼ Network settings

Info

VPC - required

Info

vpc-092f3b7dd98fe3bee

192.168.5.0/26

▼

↺

Subnet

Info

subnet-0a234fc2136c9af52

VPC: vpc-092f3b7dd98fe3bee Owner: 975050133651 Availability Zone: us-east-1b

IP addresses available: 11 CIDR: 192.168.5.16/28

▼

↺

Create new subnet

↗

Auto-assign public IP

Info

Enable

▼

Additional charges apply when outside of free tier allowance

Firewall (security groups)

Info

A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.

☒ Create security group

☐ Select existing security group

Security group name - required

My-DB-SG

▼

This security group will be added to all network interfaces. The name can't be edited after the security group is created. Max length is 255 characters. Valid characters: a-z, A-Z, 0-9, spaces, and _-./()#,@[]+=&;()!\$*

Description - required

Info

Security Group for my MyDatabaseServer Instance

▼

Inbound Security Group Rules

▼ Security group rule 1 (TCP, 22, 49.150.111.121/32)

Remove

Type

Info

ssh

▼

Protocol

Info

TCP

▼

Port range

Info

22

▼

Source type

Info

My IP

▼

Name

Info

🔍 Add CIDR, prefix list or security group

49.150.111.121/32

✕

Description - optional

Info

e.g. SSH for admin desktop

▼

Add security group rule

► Advanced network configuration

- Click **Launch instance**

Installing MySQL Database Software

1. After launching the instance, connect to it via SSH.
2. Use the following command to connect:
 - Navigate where you downloaded your key-pair.pem

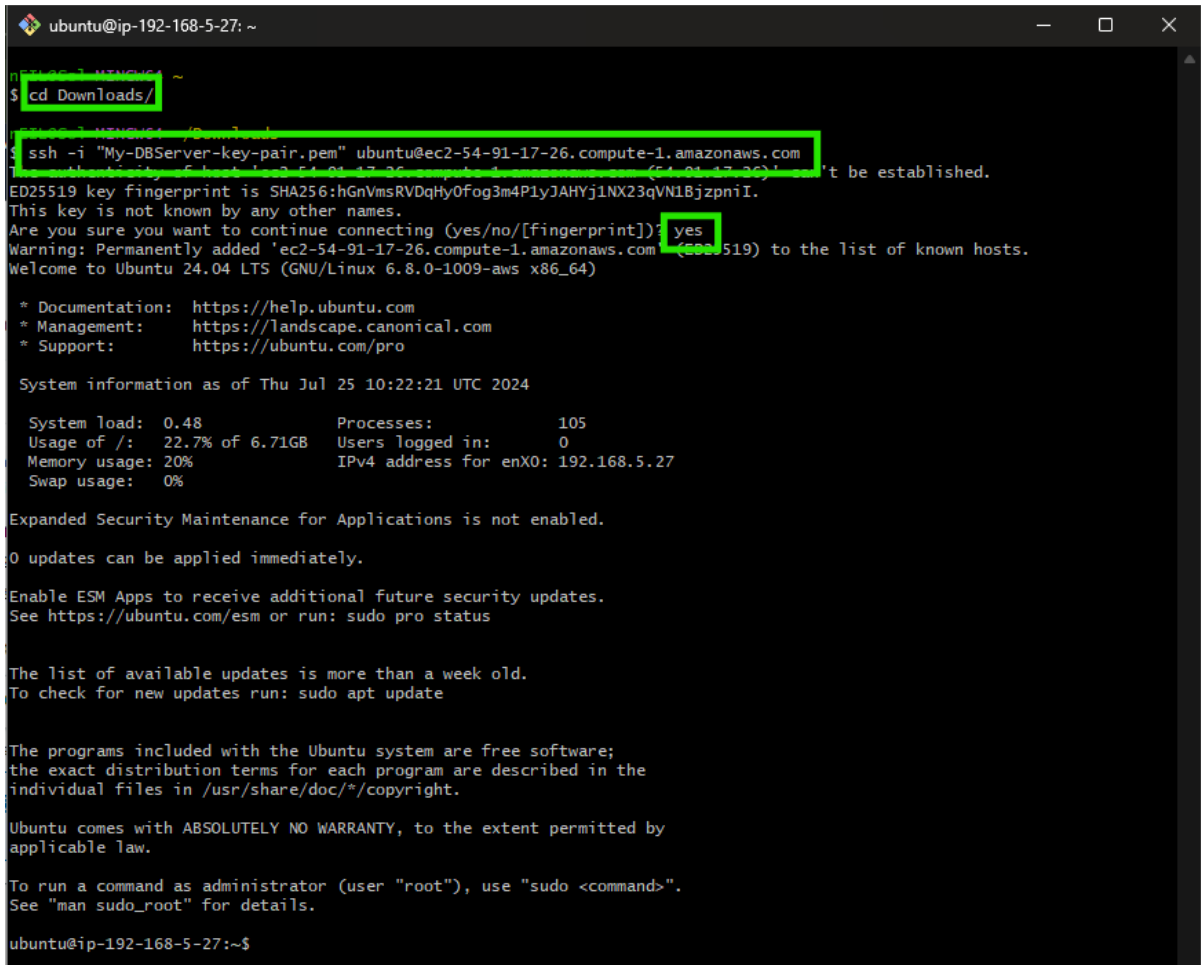
Do not forget to change the <placeholders>

cd <directory-of-the-key-pair>

- Paste the following command and response yes when question prompted

Do not forget to change the <placeholders>

ssh -i <your-key.pem> <ec2-user@your-ec2-public-dns>



```
ubuntu@ip-192-168-5-27: ~  
$ cd Downloads/  
$ ssh -i "My-DBServer-key-pair.pem" ubuntu@ec2-54-91-17-26.compute-1.amazonaws.com  
Warning: Permanently added 'ec2-54-91-17-26.compute-1.amazonaws.com' (ec2-54-91-17-26) to the list of known hosts.  
ED25519 key fingerprint is SHA256:hGnVmsRVDqHy0Fog3m4P1yJAHYj1NX23qVN1BjzpnI.  
This key is not known by any other names.  
Are you sure you want to continue connecting (yes/no/[fingerprint]): yes  
Warning: Permanently added 'ec2-54-91-17-26.compute-1.amazonaws.com' (ec2-54-91-17-26) to the list of known hosts.  
Welcome to Ubuntu 24.04 LTS (GNU/Linux 6.8.0-1009-aws x86_64)  
  
* Documentation:  https://help.ubuntu.com  
* Management:    https://landscape.canonical.com  
* Support:        https://ubuntu.com/pro  
  
System information as of Thu Jul 25 10:22:21 UTC 2024  
  
System load:  0.48      Processes:    105  
Usage of /:   22.7% of 6.71GB   Users logged in:  0  
Memory usage: 20%      IPv4 address for enX0: 192.168.5.27  
Swap usage:   0%  
  
Expanded Security Maintenance for Applications is not enabled.  
  
0 updates can be applied immediately.  
  
Enable ESM Apps to receive additional future security updates.  
See https://ubuntu.com/esm or run: sudo pro status  
  
The list of available updates is more than a week old.  
To check for new updates run: sudo apt update  
  
The programs included with the Ubuntu system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*/copyright.  
  
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by  
applicable law.  
  
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo_root" for details.  
  
ubuntu@ip-192-168-5-27:~$
```

3. It's always a good practice to update your package lists and upgrade existing packages. Copy and Paste the following command:

sudo apt update

```
ubuntu@ip-192-168-5-27: ~  
ubuntu@ip-192-168-5-27:~$ sudo apt update  
Hit:1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble InRelease  
Get:2 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates InRelease [126 kB]  
Get:3 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-backports InRelease [126 kB]  
Get:4 http://security.ubuntu.com/ubuntu noble-security InRelease [126 kB]  
Get:5 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/universe amd64 Packages [15.0 MB]  
Get:6 http://security.ubuntu.com/ubuntu noble-security/main amd64 Packages [253 kB]  
Get:7 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/universe Translation-en [5982 kB]  
Get:8 http://security.ubuntu.com/ubuntu noble-security/main Translation-en [60.4 kB]  
Get:9 http://security.ubuntu.com/ubuntu noble-security/main amd64 c-n-f Metadata [2680 B]  
Get:10 http://security.ubuntu.com/ubuntu noble-security/universe amd64 Packages [239 kB]  
Get:11 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/universe amd64 Components [3871 kB]  
Get:12 http://security.ubuntu.com/ubuntu noble-security/universe Translation-en [105 kB]  
Get:13 http://security.ubuntu.com/ubuntu noble-security/universe amd64 Components [8632 B]  
Get:14 http://security.ubuntu.com/ubuntu noble-security/universe amd64 c-n-f Metadata [4564 B]  
Get:15 http://security.ubuntu.com/ubuntu noble-security/restricted amd64 Packages [204 kB]  
Get:16 http://security.ubuntu.com/ubuntu noble-security/restricted Translation-en [39.8 kB]  
Get:17 http://security.ubuntu.com/ubuntu noble-security/restricted amd64 c-n-f Metadata [420 B]  
Get:18 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 Packages [10.6 kB]  
Get:19 http://security.ubuntu.com/ubuntu noble-security/multiverse Translation-en [2808 B]  
Get:20 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 Components [208 B]  
Get:21 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 c-n-f Metadata [344 B]  
Get:22 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/universe amd64 c-n-f Metadata [301 kB]  
Get:23 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/multiverse amd64 Packages [269 kB]  
Get:24 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/multiverse Translation-en [118 kB]  
Get:25 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/multiverse amd64 Components [35.0 kB]  
Get:26 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/multiverse amd64 c-n-f Metadata [8328 B]  
Get:27 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 Packages [297 kB]  
Get:28 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main Translation-en [76.9 kB]  
Get:29 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 c-n-f Metadata [4076 B]  
Get:30 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/universe amd64 Packages [304 kB]  
Get:31 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/universe Translation-en [129 kB]  
Get:32 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/universe amd64 Components [45.0 kB]  
Get:33 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/universe amd64 c-n-f Metadata [7208 B]  
Get:34 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/restricted amd64 Packages [204 kB]  
Get:35 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/restricted Translation-en [39.8 kB]  
Get:36 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/restricted amd64 c-n-f Metadata [416 B]  
Get:37 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/multiverse amd64 Packages [14.1 kB]  
Get:38 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/multiverse Translation-en [3608 B]  
Get:39 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/multiverse amd64 Components [212 B]  
Get:40 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/multiverse amd64 c-n-f Metadata [532 B]  
Get:41 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-backports/main amd64 Components [208 B]  
Get:42 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-backports/main amd64 c-n-f Metadata [112 B]  
Get:43 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-backports/universe amd64 Packages [11.4 kB]  
Get:44 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-backports/universe Translation-en [10.5 kB]  
Get:45 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-backports/universe amd64 Components [17.6 kB]  
Get:46 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-backports/universe amd64 c-n-f Metadata [988 B]  
Get:47 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-backports/restricted amd64 Components [216 B]  
Get:48 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-backports/restricted amd64 c-n-f Metadata [116 B]  
Get:49 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-backports/multiverse amd64 Components [212 B]  
Get:50 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-backports/multiverse amd64 c-n-f Metadata [116 B]  
Fetched 28.1 MB in 6s (4993 kB/s)  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
26 packages can be upgraded. Run 'apt list --upgradable' to see them.  
ubuntu@ip-192-168-5-27:~$
```

sudo apt upgrade -y

```

ubuntu@ip-192-168-5-27:~$ sudo apt upgrade -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
The following NEW packages will be installed:
  linux-aws-headers-6.8.0-1012 linux-aws-tools-6.8.0-1012 linux-headers-6.8.0-1012-aws linux-image-6.8.0-1012-aws
  linux-modules-6.8.0-1012-aws linux-tools-6.8.0-1012-aws
The following packages will be upgraded:
  apparmor bind9-dnsutils bind9-host bind9-libs chrony landscape-common libapparmor1 libnss-systemd libpam-systemd
  libsystemd-shared libsystemd0 libudev1 linux-aws linux-headers-aws linux-image-aws linux-tools-common lxd-installer
  openssh-client openssh-server openssh-sftp-server systemd systemd-dev systemd-resolved systemd-sysv udev xkb-data
26 upgraded, 6 newly installed, 0 to remove and 0 not upgraded.
10 standard LTS security updates
Need to get 86.0 MB of archives.
After this operation, 182 MB of additional disk space will be used.
Get:1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 libnss-systemd amd64 255.4-1ubuntu8.2 [159
kB]
Get:2 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 systemd-dev all 255.4-1ubuntu8.2 [104 kB]
Get:3 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 systemd-resolved amd64 255.4-1ubuntu8.2 [29
6 kB]
Get:4 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 libsystemd-shared amd64 255.4-1ubuntu8.2 [2
072 kB]
Get:5 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 libsystemd0 amd64 255.4-1ubuntu8.2 [433 kB]
Get:6 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 systemd-sysv amd64 255.4-1ubuntu8.2 [11.9 k
B]
Get:7 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 libpam-systemd amd64 255.4-1ubuntu8.2 [235
kB]
Get:8 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 systemd amd64 255.4-1ubuntu8.2 [3471 kB]
Get:9 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 udev amd64 255.4-1ubuntu8.2 [1873 kB]
Get:10 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 libudev1 amd64 255.4-1ubuntu8.2 [175 kB]
Get:11 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 libapparmor1 amd64 4.0.1really4.0.0-beta3-0ubun
tu0.1 [50.3 kB]
Get:12 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 openssh-sftp-server amd64 1:9.6p1-3ubuntu1
3.4 [37.4 kB]
Get:13 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 openssh-server amd64 1:9.6p1-3ubuntu13.4 [
509 kB]
Get:14 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 openssh-client amd64 1:9.6p1-3ubuntu13.4 [
905 kB]
Get:15 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 chrony amd64 4.5-1ubuntu4.1 [316 kB]
Get:16 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 xkb-data all 2.41-2ubuntu1.1 [397 kB]
Get:17 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 apparmor amd64 4.0.1really4.0.0-beta3-0ubu
ntu0.1 [638 kB]
Get:18 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 bind9-host amd64 1:9.18.28-0ubuntu0.24.04.
1 [50.4 kB]
Get:19 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 bind9-dnsutils amd64 1:9.18.28-0ubuntu0.24
.04.1 [155 kB]
Get:20 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 bind9-libs amd64 1:9.18.28-0ubuntu0.24.04.
1 [1249 kB]
Get:21 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 landscape-common amd64 24.02-0ubuntu5.1 [9
2.8 kB]
Get:22 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 linux-modules-6.8.0-1012-aws amd64 6.8.0-1
012.13 [37.4 MB]
Get:23 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 linux-image-6.8.0-1012-aws amd64 6.8.0-101
2.13 [14.6 MB]
Get:24 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 linux-aws amd64 6.8.0-1012.13 [1756 B]
Get:25 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 linux-image-aws amd64 6.8.0-1012.13 [6430
B]
Get:26 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 linux-aws-headers-6.8.0-1012 all 6.8.0-101
2.13 [13.5 MB]
Get:27 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 linux-headers-6.8.0-1012-aws amd64 6.8.0-1
012.13 [3430 kB]
Get:28 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 linux-headers-aws amd64 6.8.0-1012.13 [634
0 B]
Get:29 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 linux-tools-common all 6.8.0-39.39 [487 kB
]
Get:30 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 linux-aws-tools-6.8.0-1012 amd64 6.8.0-101
2.13 [3401 kB]

```

Wait for it to finished.

4. Install MySQL Server using the command below and wait for it to finished installing:

```
sudo apt install mysql-server -y
```



```

ubuntu@ip-192-168-5-27:~$ sudo apt install mysql-server -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  libcgi-fast-perl libcgi-pm-perl libclone-perl libencode-locale-perl libevent-pthreads-2.1-7t64 libfcgi-bin libfcgi-perl
  libfcgi0t64 libhtml-parser-perl libhtml-tagset-perl libhtml-template-perl libhttp-date-perl libhttp-message-perl libio-html-perl
  liblwp-mediatypes-perl libmecab2 libprotobuf-lite32t64 libtimedate-perl liburi-perl mecab-ipadic mecab-ipadic-utf8 mecab-utils
  mysql-client-8.0 mysql-client-core-8.0 mysql-common mysql-server-8.0 mysql-server-core-8.0
Suggested packages:
  libdata-dump-perl libipc-sharedcache-perl libio-compress-brotli-perl libbusiness-isbn-perl libregexp-ipv6-perl libwww-perl mailx
  tinycat
The following NEW packages will be installed:
  libcgi-fast-perl libcgi-pm-perl libclone-perl libencode-locale-perl libevent-pthreads-2.1-7t64 libfcgi-bin libfcgi-perl
  libfcgi0t64 libhtml-parser-perl libhtml-tagset-perl libhtml-template-perl libhttp-date-perl libhttp-message-perl libio-html-perl
  liblwp-mediatypes-perl libmecab2 libprotobuf-lite32t64 libtimedate-perl liburi-perl mecab-ipadic mecab-ipadic-utf8 mecab-utils
  mysql-client-8.0 mysql-client-core-8.0 mysql-common mysql-server mysql-server-8.0 mysql-server-core-8.0
0 upgraded, 28 newly installed, 0 to remove and 0 not upgraded.
Need to get 29.6 MB of archives.
After this operation, 242 MB of additional disk space will be used.
Get:1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 mysql-common all 5.8+1.1.0build1 [6746 B]
Get:2 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 mysql-client-core-8.0 amd64 8.0.37-0ubuntu0.24.04.1 [279
4 kB]
Get:3 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 mysql-client-8.0 amd64 8.0.37-0ubuntu0.24.04.1 [22.4 kB]
Get:4 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libevent-pthreads-2.1-7t64 amd64 2.1.12-stable-9ubuntu2 [7982 B]
Get:5 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libmecab2 amd64 0.996-14ubuntu4 [201 kB]
Get:6 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libprotobuf-lite32t64 amd64 3.21.12-8.2build1 [238 kB]
Get:7 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 mysql-server-core-8.0 amd64 8.0.37-0ubuntu0.24.04.1 [17.
5 MB]
Get:8 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 mysql-server-8.0 amd64 8.0.37-0ubuntu0.24.04.1 [1428 kB]
Get:9 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libhtml-tagset-perl all 3.20-6 [11.3 kB]
Get:10 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 liburi-perl all 5.27-1 [88.0 kB]
Get:11 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libhtml-parser-perl amd64 3.81-1build3 [85.8 kB]
Get:12 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libcgi-pm-perl all 4.63-1 [185 kB]
Get:13 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libfcgi0t64 amd64 2.4.2-2.1build1 [26.8 kB]
Get:14 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libfcgi-perl amd64 0.82+ds-3build2 [21.7 kB]
Get:15 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libcgi-fast-perl all 1:2.17-1 [10.3 kB]
Get:16 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libclone-perl amd64 0.46-1build3 [10.7 kB]
Get:17 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libencode-locale-perl all 1.05-3 [11.6 kB]
Get:18 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libfcgi-bin amd64 2.4.2-2.1build1 [11.2 kB]
Get:19 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libhtml-template-perl all 2.97-2 [60.2 kB]
Get:20 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libtimedate-perl all 2.3300-2 [34.0 kB]
Get:21 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libhttp-date-perl all 6.06-1 [10.2 kB]
Get:22 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libio-html-perl all 1.004-3 [15.9 kB]
Get:23 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 liblwp-mediatypes-perl all 6.04-2 [20.1 kB]
Get:24 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 libhttp-message-perl all 6.45-1ubuntu1 [78.2 kB]
Get:25 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 mecab-utils amd64 0.996-14ubuntu4 [4804 B]
Get:26 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 mecab-ipadic all 2.7.0-20070801+main-3 [6718 kB]
Get:27 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 mecab-ipadic-utf8 all 2.7.0-20070801+main-3 [4384 B]
Get:28 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 mysql-server all 8.0.37-0ubuntu0.24.04.1 [9524 B]
Fetched 29.6 MB in 1s (46.1 MB/s)
Preconfiguring packages ...
Selecting previously unselected package mysql-common.
(Reading database ... 98328 files and directories currently installed.)
Preparing to unpack .../0-mysql-common_5.8+1.1.0build1_all.deb ...
Unpacking mysql-common (5.8+1.1.0build1) ...
Selecting previously unselected package mysql-client-core-8.0.
Preparing to unpack .../1-mysql-client-core-8.0_8.0.37-0ubuntu0.24.04.1_amd64.deb ...
Unpacking mysql-client-core-8.0 (8.0.37-0ubuntu0.24.04.1) ...
Selecting previously unselected package mysql-client-8.0.
Preparing to unpack .../2-mysql-client-8.0_8.0.37-0ubuntu0.24.04.1_amd64.deb ...
Unpacking mysql-client-8.0 (8.0.37-0ubuntu0.24.04.1) ...
Selecting previously unselected package libevent-pthreads-2.1-7t64:amd64.
Preparing to unpack .../3-libevent-pthreads-2.1-7t64_2.1.12-stable-9ubuntu2_amd64.deb ...
Unpacking libevent-pthreads-2.1-7t64:amd64 (2.1.12-stable-9ubuntu2) ...
Selecting previously unselected package libmecab2:amd64.
Preparing to unpack .../4-libmecab2_0.996-14ubuntu4_amd64.deb ...
Unpacking libmecab2:amd64 (0.996-14ubuntu4) ...
Selecting previously unselected package libprotobuf-lite32t64:amd64.
Preparing to unpack .../5-libprotobuf-lite32t64_3.21.12-8.2build1_amd64.deb ...
Unpacking libprotobuf-lite32t64:amd64 (3.21.12-8.2build1) ...
Selecting previously unselected package mysql-server-core-8.0.
Preparing to unpack .../6-mysql-server-core-8.0_8.0.37-0ubuntu0.24.04.1_amd64.deb ...
Unpacking mysql-server-core-8.0 (8.0.37-0ubuntu0.24.04.1) ...

```

5. Secure MySQL Installation

While you can install MySQL without this step, it is best practice to add security measures when installing your MySQL server in the production environment.

a. Run the security script to improve the security of your MySQL installation:

```
sudo mysql_secure_installation
```

```
ubuntu@ip-192-168-5-27:~$ sudo mysql_secure_installation

Securing the MySQL server deployment.

Connecting to MySQL using a blank password.

VALIDATE PASSWORD COMPONENT can be used to test passwords
and improve security. It checks the strength of password
and allows the users to set only those passwords which are
secure enough. Would you like to setup VALIDATE PASSWORD component?

Press y|Y for Yes, any other key for No: |
```

b. Review and follow the prompts to set the root password and secure the installation.

The following response was chosen to simplify the lab. You can choose any response as you desired.

```
ubuntu@ip-192-168-5-27:~$ sudo mysql_secure_installation

Securing the MySQL server deployment.

Connecting to MySQL using a blank password.

VALIDATE PASSWORD COMPONENT can be used to test passwords
and improve security. It checks the strength of password
and allows the users to set only those passwords which are
secure enough. Would you like to setup VALIDATE PASSWORD component?

Press y|Y for Yes, any other key for No: y

There are three levels of password validation policy:

LOW Length >= 8
MEDIUM Length >= 8, numeric, mixed case, and special characters
STRONG Length >= 8, numeric, mixed case, special characters and dictionary file

Please enter 0 = LOW, 1 = MEDIUM and 2 = STRONG: 1

Skipping password set for root as authentication with auth_socket is used by default.
If you would like to use password authentication instead, this can be done with the "ALTER_USER" command.
See https://dev.mysql.com/doc/refman/8.0/en/alter-user.html#alter-user-password-management for more information.

By default, a MySQL installation has an anonymous user,
allowing anyone to log into MySQL without having to have
a user account created for them. This is intended only for
testing, and to make the installation go a bit smoother.
You should remove them before moving into a production
environment.

Remove anonymous users? (Press y|Y for Yes, any other key for No): N

... skipping.

Normally, root should only be allowed to connect from
'localhost'. This ensures that someone cannot guess at
the root password from the network.

Disallow root login remotely? (Press y|Y for Yes, any other key for No): y
Success.

By default, MySQL comes with a database named 'test' that
anyone can access. This is also intended only for testing,
and should be removed before moving into a production
environment.

Remove test database and access to it? (Press y|Y for Yes, any other key for No): N

... skipping.
Reloading the privilege tables will ensure that all changes
made so far will take effect immediately.

Reload privilege tables now? (Press y|Y for Yes, any other key for No): y
Success.

All done!
ubuntu@ip-192-168-5-27:~$ |
```

6. Access MySQL:

```
sudo mysql -u root -p
```

-
- -u root: The -u flag specifies the MySQL user you want to log in as. In this case, root is the user with administrative privileges in MySQL.
 - -p: This flag tells the MySQL client to prompt you for a password.
-

If prompted for a password type a password accordingly for example H@ppyL34rn1ng

```
ubuntu@ip-192-168-5-27:~$ sudo mysql -u root -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 10
Server version: 8.0.37-0ubuntu0.24.04.1 (Ubuntu)

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affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> |
```

7. Now, you can start creating your Database and User

Create a Database and User

1. Create a New Database

- Once you're logged in and at the MySQL prompt (mysql>), Replace mydatabase with your desired database name:

SHOW DATABASES;

```
MySQL [(none)]> SHOW DATABASES;
+-----+
| Database                |
+-----+
| information_schema      |
| mysql                   |
| performance_schema      |
| sys                     |
+-----+
4 rows in set (0.007 sec)

MySQL [(none)]>
```

- Create a new database using the CREATE DATABASE statement.

Do not forget to change the placeholder <database-name-desired> for the name of database you want.

Create DATABASE <database-name-desired>;

```
mysql> Create DATABASE EmployeesDB;
Query OK, 1 row affected (0.01 sec)

mysql>
```

- To check if this was created we can use the same command:

SHOW DATABASES;

```
mysql> SHOW DATABASES;
+-----+
| Database |
+-----+
| EmployeesDB |
| information_schema |
| mysql |
| performance_schema |
| sys |
+-----+
5 rows in set (0.03 sec)

mysql> |
```

2. Create a New User

- Lets check and display the list of default users, first, and review them:

SELECT User, Host FROM mysql.user;

```
mysql> SELECT User, Host FROM mysql.user;
+-----+-----+
| User | Host |
+-----+-----+
| debian-sys-maint | localhost |
| mysql.infoschema | localhost |
| mysql.session | localhost |
| mysql.sys | localhost |
| root | localhost |
+-----+-----+
5 rows in set (0.00 sec)

mysql> |
```

- Now, create a new user with the CREATE USER statement.

Do not forget to change the placeholder <user-name> and <password> with your preferences.

And do not forget to follow the password validation policy you set earlier (for example, if choose 1 = MEDIUM, it must have numeric, mixed case, and have special case)

CREATE USER '<user-name>'@'localhost' IDENTIFIED BY '<password>';

```
mysql> CREATE USER 'User-Jose'@'localhost' IDENTIFIED BY 'myPasswordis123!';
Query OK, 0 rows affected (0.02 sec)

mysql> |
```

- Check the list of users again, using the command:

SELECT User, Host FROM mysql.user;

```
mysql> SELECT User, Host FROM mysql.user;
```

User	Host
User-Jose	localhost
mysql.infoschema	localhost
mysql.session	localhost
mysql.sys	localhost
root	localhost

```
6 rows in set (0.00 sec)

mysql> ..
```

3. Grant the necessary privileges to the new user for the database. This example grants all privileges on the EmployeesDB database to User-Jose:

Do not forget to change the placeholders

GRANT ALL PRIVILEGES ON <user-name>.* TO '<user-name>'@'localhost';

```
mysql> GRANT ALL PRIVILEGES ON EmployeesDB.* TO 'User-Jose'@'localhost';
Query OK, 0 rows affected (0.01 sec)

mysql> |
```

4. To apply the changes, run the FLUSH PRIVILEGES command:

FLUSH PRIVILEGES;

```
mysql> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.00 sec)

mysql> |
```

5. To exit the MySQL prompt, use:

exit

```
mysql> exit
Bye
```

That's it! Congratulations! You have successfully set up a relational database on an EC2 instance by installing and configuring MySQL. This exercise provided a foundational understanding of deploying and managing a self-hosted database environment, including installation, security, and user management.

This lab highlighted the flexibility and control offered by a self-managed approach. However, it's important to note that this is just the beginning. There are many advanced configurations and optimizations available for self-managed databases, and comparing this with Amazon RDS can help you decide the best approach for your needs.