

MYSQL Database Service / NLB for Testing.

Quick HOWTO document to cover using MYSQL database service within OCI. This setup document covers accessing that database remotely – using a Network Load Balancer (NLB).

The access to the database is then proven using MYSQL Workbench.

Network Requirements

The assumptions on proving this are that a Virtual Cloud Network (VCN) exists and has public & private subnets.

Create MYQL Database.

Create a MYSQL database – using the database service.

The database can be placed into a private subnet – an NLB will be used within a public subnet to enable remote access.

The following screens show the mysql database creation.

The screenshot displays the Oracle Cloud 'Create DB System' interface. At the top, the Oracle Cloud logo and navigation tabs are visible. The main heading is 'Create DB System'. Below this, there are two tabs: 'Production' and 'Development or testing'. The 'Development or testing' tab is selected and highlighted in blue, with a checkmark indicating it is the chosen configuration. Below the tabs, the 'Provide DB system information' section is shown. It includes a 'Create in compartment' dropdown menu with 'MikeR' selected. The 'Name' field is filled with 'mysqlDB'. A description field contains 'mysqlDB - for development testing'. At the bottom, there are three tabs: 'Standalone', 'High availability', and 'HeatWave'. The 'Standalone' tab is selected and highlighted in blue. The interface is clean and modern, with a dark header bar and light-colored content area.

Standalone

Single-instance DB system

✓

High availability

Run a DB system with 3 MySQL instances providing automatic failover and zero data loss

HeatWave

DB system that allows you to enable HeatWave for accelerated query processing, suitable for running both OLTP and OLAP workloads

Create administrator credentials

Username ⓘ

admin

Password

••••••••

Confirm password

Confirm the administrator user password

These are needed later to access the database (Note these are for the database service – additional databases can be created within this ‘database’.

Create DB System

Configure networking

The VCN and subnet where the DB system endpoint will be attached. The DB system endpoint uses a private IP address and is not directly accessible from the internet. [How do I connect to a DB system?](#) If you do not have a VCN, [create a VCN](#).

Virtual cloud network in **MikeR** [\(Change compartment\)](#)

VCN1

Subnet in **MikeR** [\(Change compartment\)](#)

Private Subnet-VCN1 (Regional)

Configure placement

The [availability domain/fault domain](#) in which the DB system endpoint will be physically placed. It is recommended to allow Oracle to choose the best placement for the fault domain.

Availability domain

AD-1

PjBx:US-ASHBURN-AD-1

✓

AD-2

PjBx:US-ASHBURN-AD-2

AD-3

PjBx:US-ASHBURN-AD-3

☐ Choose a fault domain

Create DB System

Configure hardware

Select a shape

MySQL.VM.Standard.E4.2.32GB

CPU core count: 2

Memory size: 32 GB

Max network bandwidth: 2Gbps

Change shape

A shape determines the number of OCPUs, memory, and other resources allocated to a MySQL instance of a DB system. The performance of a DB system depends on the shape you select. A shape has associated configurations, which you can select in the Configuration tab under Show advanced options. [See supported shapes](#).

Data storage size (GB)

50

Storage allocated for data and log files. Storage size impacts IOPS and throughput. Data storage size must be an integer between 50 and 131,072.

Total IOPS: 3750

Total throughput: 29 MB

You can change the shape of the database system – assuming that a couple of OCPUs is sufficient for the database – then choose the highlighted change shape – decrease down to 2 OCPUs – show in the following screen :-

<input type="checkbox"/>	MySQL.VM.Standard.E4.1.8GB	No	1	8 GB	1Gbps
<input type="checkbox"/>	MySQL.VM.Standard.E4.1.16GB	No	1	16 GB	1Gbps
<input checked="" type="checkbox"/>	MySQL.VM.Standard.E4.2.32GB	No	2	32 GB	2Gbps
<input type="checkbox"/>	MySQL.VM.Standard.E4.4.64GB	No	4	64 GB	4Gbps

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US East (Ashburn) ▾

Create DB System

Total IOPS: 3750

Total throughput: 29 MB

Configure backup plan

☒ **Enable automatic backups**
Enables automatic backups. You must also specify a retention period, and select a backup window.

Backup retention period *Optional* ⓘ

7

The retention period defines how long to store the backups, in days.

☒ **Enable point in time restore** ⓘ
Enables you to restore from a DB system at a point in time.

☐ **Select backup window**
The backup window start time defines the start of the time period during which your DB system is backed up.

Show advanced options

Create

Save as stack

Cancel

Click on create and the database service will be created within a number of minutes.

Stopping (starting) the Database.

Using the MYSQL database service – when not needed stop the database – this will ensure that you are NOT consuming the credits for the running database (note some credits will be consumed as the database storage is persistent).

The screenshot shows the Oracle Cloud console interface. At the top, there's a navigation bar with the Oracle Cloud logo, a 'Cloud Classic >' button, and a search bar. Below the navigation bar, the breadcrumb trail reads 'MySQL > DB Systems > DB System Details'. The main content area displays the details for a database instance named 'mysqlDB'. On the left, there's a large green hexagon with 'DBS' in white, and below it, the word 'ACTIVE'. To the right of the hexagon, there's a row of buttons: 'Edit', 'Start', 'Stop', 'Restart', and 'More actions'. The 'Stop' button is highlighted with a red rectangular box. Below the buttons, there's a tabbed interface with 'DB System Information' and 'Tags' tabs. The 'DB System Information' tab is active, showing 'General Information' with fields for 'OCID', 'Description', 'Compartment', 'Created', and 'Last Updated'. To the right of the 'General Information' section, there's a list of tags: 'High Avail', 'High availability', 'HeatWave', 'HeatWave clust', and 'Networkir'.

To restart the database when required – use the Start button.

Network Configuration – Security Lists

Configure the VCN to allow Ingress for the MYSQL database service port (3306 plus if actually required 33060).

This can be done by the default security list for the private subnet (the network where you created your database service).

The screenshot displays the Oracle Cloud console interface for the 'Private Subnet-VCN1' resource. The top navigation bar includes the Oracle Cloud logo, 'Cloud Classic' tab, a search bar, and the region 'US East (Ashburn)'. The main content area is divided into a left sidebar with a green hexagonal icon containing a white 'S' and the word 'AVAILABLE', and a main panel. The main panel has tabs for 'Subnet Information' and 'Tags'. Below these, various subnet details are listed, including OCID, IPv4 CIDR Block, IPv6 Prefix, Virtual Router Mac Address, and Subnet Type. A 'Security Lists' section is highlighted with a red box, showing a table with one entry: 'Security List for Private Subnet-VCN1' in 'Available' state. The table has columns for Name, State, Compartment, and Created.

Name	State	Compartment	Created
Security List for Private Subnet-VCN1	Available	MikeR	Sun, May 9, 2023

Within the private subnet – click on the Security List

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Created: Sun, May 9, 2021, 11:13:54 UTC

Resources

Ingress Rules (5)

Egress Rules (1)

Add Ingress Rules Edit Remove

	Stateless	Source	IP Protocol	Source Port Range	Destination Port Range	Type and Code	Allows	Description
<input type="checkbox"/>	No	10.0.0.0/16	TCP	All	22		TCP traffic for ports: 22 SSH Remote Login Protocol	
<input type="checkbox"/>	No	0.0.0.0/0	ICMP			3, 4	ICMP traffic for: 3, 4 Destination Unreachable: Fragmentation Needed and Don't Fragment was Set	
<input type="checkbox"/>	No	10.0.0.0/16	ICMP			3	ICMP traffic for: 3 Destination Unreachable	
<input type="checkbox"/>	No	0.0.0.0/0	TCP	All	3306		TCP traffic for ports: 3306	mysqlDB access
<input type="checkbox"/>	No	0.0.0.0/0	TCP	All	33060		TCP traffic for ports: 33060	mysqlDb Access

0 selected Showing 5 items < 1 of 1

Add Ingress rules using the Add Ingress Rules – the 2 rules are shown in the screen above too.

Network Configuration – Network Security Group

The NLB requires a network security group – to enable lockdown of the public listener than is allowing traffic into your mysql database.

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Networking > Virtual cloud networks > Virtual Cloud Network Details

VCN1

Move resource Add tags Delete

VCN Information Tags

Compartment: MikeR OCID: ...obm4a Show Copy

Created: Sun, May 9, 2021, 11:13:52 UTC DNS Resolver: VCN1

IPv4 CIDR Block: 10.0.0.0/16 Default Route Table: Default Route Table for VCN1

IPv6 Prefix: No value DNS Domain Name: vcn1.oraclevcn.com

Resources

Subnets (2)

CIDR Blocks/Prefixes (1)

Route Tables (2)

Internet Gateways (1)

Dynamic Routing Gateways Attachments (0)

Network Security Groups (1)

Subnets in MikeR Compartment

Create Subnet

Name	State	IPv4 CIDR Block	IPv6 Prefixes	Subnet Access	Created
Private Subnet-VCN1	Available	10.0.1.0/24	-	Private (Regional)	Sun, May 9, 2021, 11:13:54 UTC
Public Subnet-VCN1	Available	10.0.0.0/24	-	Public (Regional)	Sun, May 9, 2021, 11:13:53 UTC

Showing 2 items < 1 of 1 >

Within the VCN that you are using – there is a requirement for a Network Security Group. This is used within the Network Load Balancer.

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Networking > Virtual cloud networks > VCN1 > Network Security Group Details

mysqlDb

Edit Move resource Add tags Terminate

Network Security Group Information Tags

OCID: ...2c3dmsa Show Copy Compartment: MikeR
Created: Tue, Apr 4, 2023, 09:37:01 UTC

Security Rules

These security rules apply to all VNICs in this network security group. You can filter the list by ingress or egress. There can be other security rules that apply to a given VNIC in this group: from any other network security groups the VNIC is in, and any security lists associated with the VNIC's subnet. [Learn more about security rules.](#)

Add Rules Edit Remove

<input type="checkbox"/>	Direction ⓘ	Source or Destination ⓘ	Protocol ⓘ	Details ⓘ	Description ⓘ
<input type="checkbox"/>	Direction: Ingress	Source Type: CIDR Source: 0.0.0.0/0	TCP	Source Port Range: All Destination Port Range: 3306 Allow: TCP tra... Show	mysqlDB access
<input type="checkbox"/>	Stateless: No				

0 selected Showing 1 item < 1 of 1 >

This screen and the following one demonstrate the settings required for the NSG – 3306

(Note the configuration for 33060 is not included within these screenshots -as it may not be needed.)

Add Security Rules

Optionally add one or more rules to the network security group. [Learn more about security rules.](#)

Rule

☐ Stateless ⓘ

Direction: Ingress

Source Type: CIDR

Source CIDR: 0.0.0.0/0
Specified IP addresses: 0.0.0.0-255.255.255.255 (All 294,967,296 IP addresses)

IP Protocol: TCP

Source Port Range: Optional: All

Destination Port Range: Optional: 3306

Allows:
Description: Optional
mysqlDB access
Maximum 255 characters

Create Network Load Balancer (NLB)

Now create an NLB which will be the public facing Load Balancer that will allow access from the Internet to the mysql database.

This follows the OCI documentation at :-

[https://docs.oracle.com/en-us/iaas/mysql-database/doc/network-load-balancer.html - GUID-A819A1B0-88E0-46DF-8E48-B233FF2B94C7](https://docs.oracle.com/en-us/iaas/mysql-database/doc/network-load-balancer.html-GUID-A819A1B0-88E0-46DF-8E48-B233FF2B94C7)

The screens for creating this to test are shown here :-

Select load balancer type

[Help](#)

☐ Load balancer

☒ Network load balancer

A network load balancer is a non-proxy layer-4 load balancing solution. It offers a scalable VIP to the customer and additionally provides the benefits of flow high availability, low latency, and source IP and port preservation.

Includes: layer-4 pass-through load balancing and client header preservation.

Create load balancer [Cancel](#)

Choose the Network Load Balancer – part of the free resources.

The following 4 screens show the input and the summary for NLB creation.

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Create network load balancer

1 Add details

2 Configure listener

3 Choose backends

4 Review and create

A network load balancer provides automated traffic distribution from one entry point to multiple servers in a backend set. The network load balancer ensures that your services remain available by directing traffic only to healthy servers in the backend set.

Load balancer name

mysqlbNLB

Choose visibility type

Public

You can use the assigned public IP address as a front end for incoming traffic.

✓

Private

You can use the assigned private IP address as a front end for internal incoming VCN traffic.

☐ Allow IPv6 address assignment

Enables a dual-stack IPv4/IPv6 implementation for your load balancer. Learn more about [IPv6 addresses](#).

Assign a public IP address

Ephemeral IPv4 address

Automatically assign an IPv4 address from the Oracle pool.

✓

Reserved IPv4 address

Select an existing reserved IPv4 address or create a new one from one of your IP pools.

Choose networking

Virtual cloud network in **Mikael** [Change Compartment](#)

VCN1

Subnet in **Mikael** [Change Compartment](#)

Public Subnet-VCN1

☒ Use network security groups to control traffic [?](#)

Network security group in **Mikael** [Change Compartment](#)

mysqlb01

✕

+ Another network security group

[Show advanced options](#)

Next

Cancel

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Create network load balancer

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Enables a dual-stack IPv4/IPv6 implementation for your load balancer. Learn more about [IPv6 addresses](#).

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Automatically assign an IPv4 address from the Oracle pool.

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Select an existing reserved IPv4 address or create a new one from one of your IP pools.

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Virtual cloud network in **Mikael** [Change Compartment](#)

VCN1

Subnet in **Mikael** [Change Compartment](#)

Public Subnet-VCN1

☐ Use network security groups to control traffic [?](#)

[Show advanced options](#)

Next

Cancel

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US East (Ashburn) >

Create network load balancer

1 Add details

2 **Configure listener**

3 Choose backends

4 Review and create

A listener is a logical entity that checks for incoming traffic on the network load balancer's IP address. You must configure at least one listener for each traffic type in order to handle UDP, TCP, or UDP/TCP traffic. You can configure additional listeners after you create your network load balancer.

Listener name

Specify the type of traffic your listener handles

UDP

TCP ✓

UDP/TCP

Ingress traffic port

☐ Use any port
This will use a wildcard, or 0, as the port.

☒ Specify the port

This port will be used for the backend ports, if any, selected in the following step.

Previous

Next

Cancel

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Create network load balancer

1 Add details

2 Configure listener

3 **Choose backends**

4 Review and create

A network load balancer distributes traffic to backends within a backend set. A backend set is a logical entity defined by a load balancing policy, a health check policy, and a list of backends (compute instances).

Backend set name

Select backends

Add by compute instance Optional

No backends selected. Click add backends to select resources from a list of available compute instances. You can also add backends after you create the network load balancer.

Add backends

☐ Preserve source IP Optional

Specify health check policy

A health check is a test to confirm the availability of backends. A health check can be a request or a connection attempt. Based on a time interval you specify, the network load balancer applies the health check policy to continuously monitor backends.

Protocol

TCP

Port Optional

Use backend port

Interval in MS Optional

10000

Timeout in MS Optional

3000

Number of retries Optional

3

Request data Optional

This will be loaded success.

Response data Optional

This will be loaded success.

[Show advanced options](#)

The previous screens are showing the required settings.

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Create network load balancer

[Add details](#)
[Configure listener](#)
[Choose backends](#)
[Review and create](#)

Load balancer details

Name: mysqlNLB
VCN: VCN1
Subnet: Private Subnet VCN1
Address assignment: IPv4
NSG: mysqlDB

Listener details

Name: mysqlDBlistener
Traffic type: TCP
IP protocol version: IPv4
Port: 3306
Attached backend: mysqlDBBackendset

Backend set details

Name: mysqlDBBackendset
Source IP preservation: Disabled
IP protocol version: IPv4
Load balancing policy: Five tuple hash
Attached listener: mysqlDBlistener
Security lists: manual

Name	IP address	Availability domain	Compartment	Port	Weight
No items found.					

Health check policy

Protocol: Unknown
Interval in ms: 10000
Number of retries: 3
URL path (URI):
Port: Use backend port
Timeout in ms: 3000
Status code:
Response body (regular expression):

[Previous](#) [Create network load balancer](#) [Cancel](#)

A summary of the NLB to be created.
The creation takes a few minutes to complete.

NLB – final configuration – once created.

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MySQL > DB Systems > DB System Details

mysqlDB

[Edit](#) [Start](#) [Stop](#) [Restart](#) [More actions](#)

DB System Information Tags

General Information

OCID: ...p1m5exmbaa Show Copy
Description: mysqlDB for testing / proving access Edit
Compartment: MikeR
Created: Tue, Apr 4, 2023, 08:59:33 UTC
Last Updated: Tue, Apr 4, 2023, 14:52:26 UTC

DB System Configuration

Shape: MySQL.VM.Standard.E4.2.32GB Edit
OCPU Count: 2
Memory: 32 GB
Storage Size: 50 GB Edit
MySQL version: 8.0.32
Configuration: MySQL.VM.Standard.E4.2.32GB.Standalone Edit
Crash Recovery: Enabled

Backup

Automatic backups: Enabled Edit
Backup Window: 08:38 UTC
Retention Days: 7

High Availability

High availability: Disabled

HeatWave

HeatWave cluster: Disabled Edit

Networking

Virtual Cloud Network: VCN1
Subnet: Private Subnet VCN1
Subnet Type: Regional

Placement

Availability Domain: PjBx:US-ASHBURN-AD-1
Fault Domain: FAULT-DOMAIN-3

Endpoint

Connect to the DB system using a MySQL client/connector via the endpoint below. [How do I connect?](#)
Private IP Address: 10.0.1.47 Copy
Internal FQDN: -
MySQL Port: 3306
MySQL X Protocol Port: 33060

The NLB now needs to be configured to point to your mysql database.
The IP address for the mysql database is shown within the endpoint information – screenshot above.

Load balancers provide automated traffic distribution from one entry point to multiple servers reachable from your virtual cloud network (VCN). They improve resource utilization, facilitate scaling, and help ensure high availability.

Name	Type	State	IP address	Shape	Overall health	Created
mysqlDBNLB <small>Active</small>	Network load balancer	Active	129.213.22.169 (public) 10.0.0.25 (private)	-	OK	Tue, Apr 4, 2023, 09:29:31 UTC

Showing 1 item < 1 of 1 >

Choose the NLB that has been created and go to the backendset.

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Networking > Load balancers > Load balancer details > Backend sets

mysqlDB_backendset

BS ACTIVE

Edit Update health check Delete

Backend set information

Backend set information

Created: Tue, Apr 4, 2023, 09:29:31 UTC

Policy: Five tuple hash

IP protocol version: IPv4

Network load balancer: [mysqlDBNLB](#)

Source header (IP, port) preservation: Disabled

Overall health

Unknown

Backends health

0 Critical

0 Warning

0 Unknown

0 OK

Traffic between this network load balancer and its backends is subject to the governing security lists and network security groups. [Learn more about network load balancers and security lists.](#)

Metrics

Start time: Apr 4, 2023 10:01:45 UTC End time: Apr 4, 2023 11:01:45 UTC Quick selects: Last hour

Number of healthy backends

Interval: Auto Statistic: Max

Number of unhealthy backends

Interval: Auto Statistic: Max

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Networking > Load balancers > Load balancer details > Backend sets

mysqlDB_backendset

BS ACTIVE

Edit Update health check Delete

Backend set information

Backend set information

Created: Tue, Apr 4, 2023, 09:29:31 UTC

Policy: Five tuple hash

IP protocol version: IPv4

Network load balancer: [mysqlDBNLB](#)

Source header (IP, port) preservation: Disabled

Overall health

Unknown

Backends health

0 Critical

0 Warning

0 Unknown

0 OK

Traffic between this network load balancer and its backends is subject to the governing security lists and network security groups. [Learn more about network load balancers and security lists.](#)

Backends

Add backends Edit Delete

Name	IP address	Availability domain	Port	Weight	Drain	Offline	Health
No items found.							

0 Selected Showing 0 items < 1 of 1 >

Once within the backend sets – a backend is required (this requires the IP of the mysql database service).

Add backends [Help](#)

Choose how to add backends by selecting compute instances or by entering IP addresses.

Backend type

☐ Compute instances ☒ IP addresses

Adding IP address backends will turn off source preservation in the backend set. Traffic header information will no longer be retained.

IP address

IP addresses can be added if client header preservation on the backend set is disabled.

IP address: Port: Weight:

[+ Another backend](#)

Update security list rules
After adding IP address backends, manually configure your security list rules to ensure proper traffic flow. Learn more about [configuring security lists](#).

[Add backends](#) [Cancel](#)

For the backend that you are adding – use the IP address radio button and use the IP Address of your mysql database service.

Load balancers provide automated traffic distribution from one entry point to multiple servers/resources from your virtual cloud network (VCN). They improve resource utilization, automate scaling, and help ensure high availability.

Name	Type	State	IP address	Shape	Overall health	Created
mysqlDBNLB <small>Always Free</small>	Network load balancer	Updating	129.213.22.169 (public) 10.0.0.25 (private)	-	Pending	Tue, Apr 4, 2023, 09:29:31 UTC

Showing 1 item < 1 of 1 >

All should be OK :-

Name	Type	State	IP address	Shape	Overall health	Created
mysqlDBNLB <small>Always Free</small>	Network load balancer	Active	129.213.22.169 (public) 10.0.0.25 (private)	-	OK	Tue, Apr 4, 2023, 09:29:31 UTC

Showing 1 item < 1 of 1 >

As a final check – ensure that the NLB listener has the NSG configured.

Networking > Load balancers > Load balancer details

mysqlDBNLB

[Edit](#) [Move resource](#) [Add tags](#) [Delete](#)

LB

ACTIVE

Load balancer information [Tags](#)

Load balancer information

OCID: ...pbu5hq [Show](#) [Copy](#)

Created: Tue, Apr 4, 2023, 09:29:31 UTC

IP address: 129.213.22.169 (public)

IP address: 10.0.0.25 (private)

Subnet: [Public Subnet-VCN1](#)

Network security groups: [mysqlDb](#) [Edit](#)

Type: Network load balancer

This screen shows the NLB listener – it is included to show the Network Security Groups for the listener to access port 3306

MYSQL Workbench.

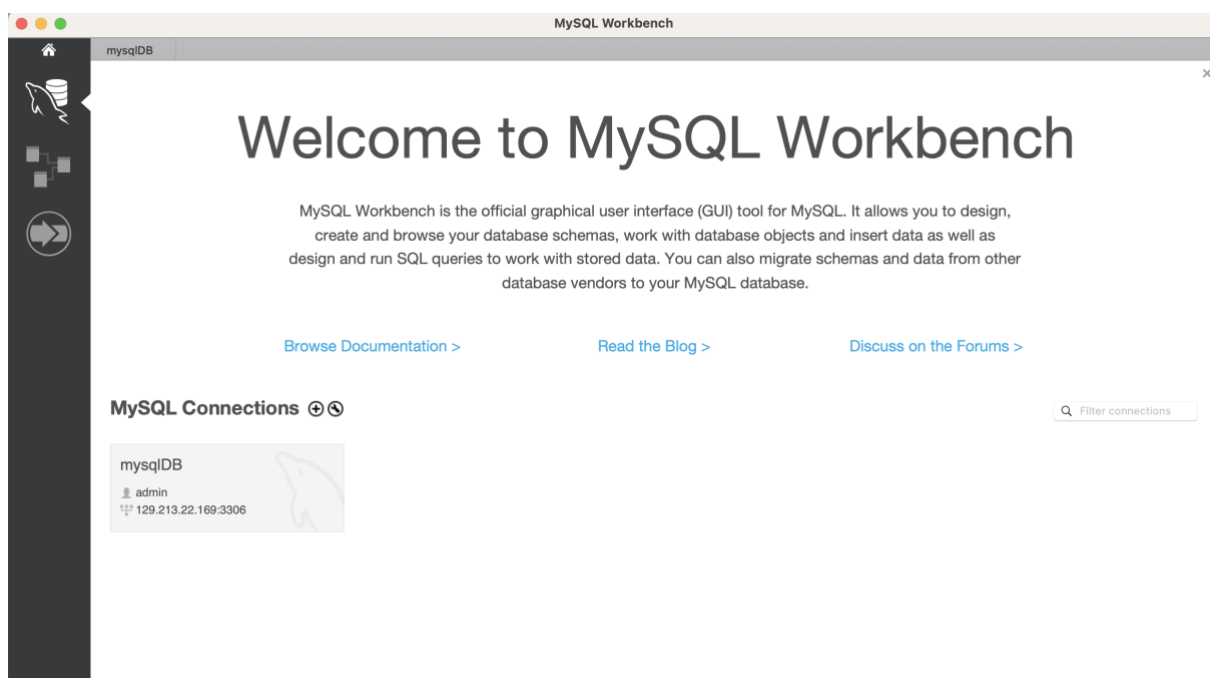
Download of MYSQL Workbench can be done using this URL. This can be used to prove connectivity to the database – other apps can obviously be used.

<https://dev.mysql.com/downloads/workbench/>

Download and install this software.

Running MYSQL Workbench.

The following screenshots show using MYSQL Workbench to access the MYSQL database.



Connection – manage your mysql connections.

