

# NoSQL

MONGODB CASSANDRA REDIS

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# INTRODUCCIÓN

Características, NoSQL vs SQL,  
pros y contras

01

# NoSql

Las bases de datos NoSQL son estructuras de almacenamiento y recuperación de datos que **no utilizan** los esquemas fijos de tablas de las bases de datos relacionales.

# #NoSQL



**Emil Eifrem**  
@emileifrem



Follow

@samj @jeremyday Who are those people?  
Honestly want to know. I for one have tried  
REALLY HARD to emphasize that #nosql =  
Not Only SQL.



Eventbrite Eventbrite for event and ticket information

[The event has ended](#) [View event details for LACON](#)

### NOSQL meetup

Thursday, June 11, 2008 from 10:00 AM to 5:00 PM (PT)  
San Francisco, CA

Ticket Information			
TICKET	RESERVED	END	QUANTITY
Free ticket	Sold Out	Ended	Free
			Sold Out

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#### Event Details

##### Introduction

"This meetup is about 'open source, distributed, non-relational databases'."

Have you ever run into problems with traditional relational databases? Don't mind making a query in multiple languages? Or perhaps you just find the idea of NoSQL to be cool? Then you should join us in figuring out why these non-relational database systems and BigTable have become so popular lately. We have gathered speakers from the most interesting projects around to give us all an introduction to the field.

Presider: @mattkyle

#### When & Where

220 Second Street  
San Francisco, CA 94105

Thursday, June 11, 2008 from 10:00 AM to 5:00 PM (PT)

# NoSQL

## Ejemplo

Relational Database

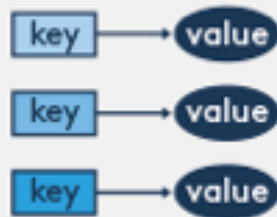
Student_Id	Student_Name	Age	College
1001	Chaitanya	30	Beginnersbook
1002	Steve	29	Beginnersbook
1003	Negan	28	Beginnersbook

MongoDB

```
{
  "_id": ObjectId("....."),
  "Student_Id": 1001,
  "Student_Name": "Chaitanya",
  "Age": 30,
  "College": "Beginnersbook"
}
{
  "_id": ObjectId("....."),
  "Student_Id": 1002,
  "Student_Name": "Steve",
  "Age": 29,
  "College": "Beginnersbook"
}
{
  "_id": ObjectId("....."),
  "Student_Id": 1003,
  "Student_Name": "Negan",
  "Age": 28,
  "College": "Beginnersbook"
}
```

# NoSQL- Tipos

Key-Value



Column-Family



Graph



Document



# NoSQL- Tipo Documental

```
{
  "_id" : ObjectId("57576f554778be749924ce3c"),
  "cliente" : {
    "tipo" : "Regular",
    "apellido" : "Carvajal",
    "nombre" : "John Alexander",
    "ciudad" : "Cali",
    "cuit" : 1324012234
  },
  "tipodePago" : "contado",
  "fechaEmision" : ISODate("2016-01-22T16:31:10Z"),
  "item" : [
    {
      "album" : "Peace Sells...But Who's Buying?",
      "año" : 1986,
      "cantidad" : 1,
      "precio" : 35000,
      "artista" : "Megadeth"
    },
    {
      "album" : "Black Sabbath",
      "año" : 1970,
      "cantidad" : 1,
      "precio" : 45000,
      "artista" : "Black Sabbath"
    }
  ],
  "nroFactura" : "DEP110",
  "intereses" : [
    "Metal",
    "Heavy Metal",
    "Tras Metal"
  ]
}
```

```
{
  "_id" : ObjectId("57576f6a4778be749924ce3d"),
  "cliente" : {
    "tipo" : "Regular",
    "apellido" : "Kudlow",
    "nombre" : "Steve",
    "ciudad" : "Cali",
    "cuit" : 4565543090
  },
  "tipodePago" : "TarjetaCredito",
  "fechaEmision" : ISODate("2016-03-12T16:31:10Z"),
  "item" : [
    {
      "album" : "Metal on Metal",
      "año" : 1982,
      "cantidad" : 1,
      "precio" : 65000,
      "artista" : "Anvil"
    }
  ],
  "nroFactura" : "DEP300"
}
```



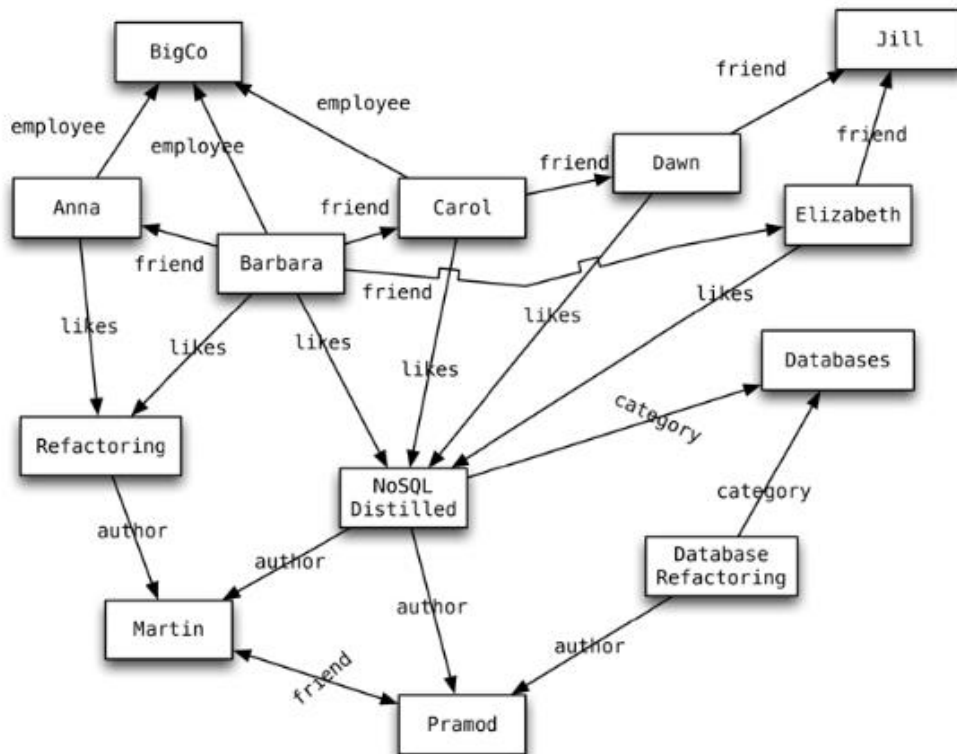
# NoSQL- Tipo Wide Column

Rows		Columns			
487s896-7d71-45e	Key Row	Column1	Column2	Column3	Column8
		Cuit: 456878893	Nombre : Larry Page	Edad: 43	Ciudad: Michigan
489s896-7d71-45e	Key Row	Column1	Column2	Column21	
		Cuit: AP985748	Nombre : Sergey Brin	Universidad: Universidad Stanford	

# NoSQL- Tipo Key - Value

<u>Key</u>	<u>Value</u>
12345222	Nombre: Reid Garrett Hoffman, Ciudad: California, Edad: 48
345645	Nombre: Lawrence Edward Page, Ciudad: East Lansing, Edad: 43
3242w34	Nombre: Jeff Bezos, Ciudad: Albuquerque, Edad: 52

# NoSQL- Grafos



# NoSql - Industrialización

€ Almacenamiento



Datos a almacenar



Flexibilidad



# SQL vs NoSQL

## SQL

- #1 relational 
- #2 vertically  $\updownarrow$
- #3 table based 
- #4 SQL 
- #5 multi row transactions 

## NoSQL

-  not relational #1
- $\leftrightarrow$  horizontally #2
-  documents key/value #3
-  dynamic #4
-  unstructured JSON #5

# SQL vs NoSQL

CARACTERÍSTICA	SQL	NO SQL
<u>RENDIMIENTO</u>	BAJO	BUENO
<u>DISPONIBILIDAD</u>	BUENO	BUENO
<u>CONSISTENCIA</u>	BUENO	BAJO
<u>ALMACENAMIENTO DATOS</u>	MEDIO - GRANDE	MASIVO
ESCALABILIDAD	ALTO (+ COSTE)	ALTO

# SQL vs NoSQL

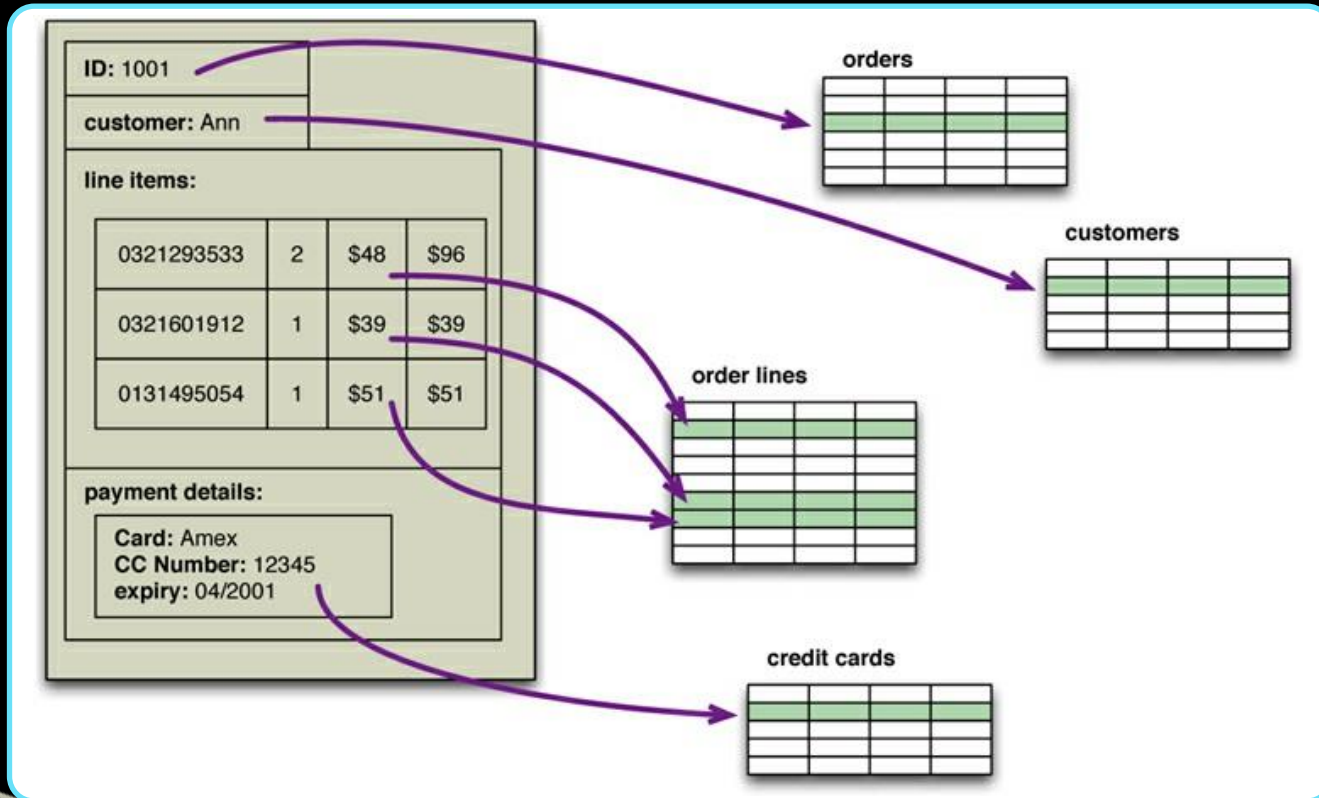
## ¿Cuándo debería utilizar SQL?

- Tengo datos relacionados que cambian con frecuencia y en una NoSQL me llevaría a actualizar múltiples colecciones.
- Necesito un esquema estricto

## ¿Cuándo debería usar NoSQL?

- Los requisitos de los datos o los propios datos son desconocidos o están sujetos a cambiar o expandirse con facilidad.
- Necesito un alto rendimiento de lectura, pero no quiero modificar los datos tan a menudo.
- Necesito escalar mi base de datos horizontalmente.

# SQL vs NoSQL: Ejemplo





02

# BBDD NoSQL

MongoDB, Cassandra, Redis

<https://db-engines.com/en/ranking>

Rank			DBMS	Database Model	Score		
Nov 2021	Oct 2021	Nov 2020			Nov 2021	Oct 2021	Nov 2020
1.	1.	1.	Oracle	Relational, Multi-model	1272.73	+2.38	-72.27
2.	2.	2.	MySQL	Relational, Multi-model	1211.52	-8.25	-30.12
3.	3.	3.	Microsoft SQL Server	Relational, Multi-model	954.29	-16.32	-83.35
4.	4.	4.	PostgreSQL	Relational, Multi-model	597.27	+10.30	+42.22
5.	5.	5.	MongoDB	Document, Multi-model	487.35	-6.21	+33.52
6.	6.	↑ 7.	Redis	Key-value, Multi-model	171.50	+0.15	+16.08
7.	7.	↓ 6.	IBM Db2	Relational, Multi-model	167.52	+1.56	+5.90
8.	8.	8.	Elasticsearch	Search engine, Multi-model	159.09	+0.84	+7.54
9.	9.	9.	SQLite	Relational	129.80	+0.43	+6.48
10.	10.	10.	Cassandra	Wide column	120.88	+1.61	+2.13

Google



Microsoft Bing



Google Trends



StackExchange



stackoverflow

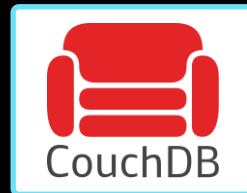


indeed®

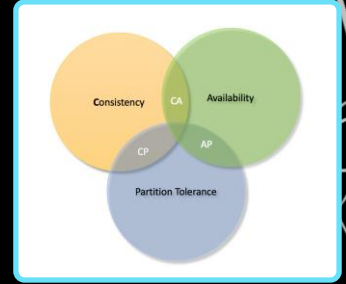
LinkedIn®

# DOCUMENT

Rank			DBMS	Database Model	Score		
Nov 2021	Oct 2021	Nov 2020			Nov 2021	Oct 2021	Nov 2020
1.	1.	1.	MongoDB	Document, Multi-model	487.35	-6.21	+33.52
2.	2.	2.	Amazon DynamoDB	Multi-model	76.99	+0.43	+8.09
3.	3.	3.	Microsoft Azure Cosmos DB	Multi-model	40.82	+0.54	+8.32



# MONGO DB



- Desarrollada en C++ (2009)
- BSON
- Escalabilidad horizontal
- Consultas dinámicas (Query): Javascript
- Desarrollo en la nube
- Alto rendimiento: bases de datos grandes y con cambios frecuentes
- Trabaja en Tiempo Real.
- CAP: Consistente y Tolerante a Partición.
- Usos: aplicaciones CRUD (create, read, update, delete)
- No usar: transacciones complejas
- Contra: no existen JOINS
- Empresas: EA, Ebay, Sega, Google, Adobe.



# KEY-VALUE

Rank			DBMS	Database Model	Score		
Nov 2021	Oct 2021	Nov 2020			Nov 2021	Oct 2021	Nov 2020
1.	1.	1.	Redis	Key-value, Multi-model	171.50	+0.15	+16.08
2.	2.	2.	Amazon DynamoDB	Multi-model	76.99	+0.43	+8.09
3.	3.	3.	Microsoft Azure Cosmos DB	Multi-model	40.82	+0.54	+8.32



redis



amazon  
DynamoDB



Azure Cosmos DB



Project Voldemort  
*A distributed database.*

# REDIS

- Desarrollada en C (2009)
- Acceso por clave primaria: gran rendimiento, rápidas, fácil escalabilidad.
- Amplia gama de estructuras de datos: hashes, Strings, listas, sets, bitmaps, etc.
- Admite 53 lenguajes de programación.
- Trabaja en Tiempo Real.
- CAP: Consistente y Tolerante a Partición.
- Usos: datos desestructurados o polimórficos. Caché de páginas web y BBDD.
- Empresas: Twitter, Github, Pinterest, Snapchat, Trello.



# WIDE COLUMN

Rank			DBMS	Database Model	Score		
Nov 2021	Oct 2021	Nov 2020			Nov 2021	Oct 2021	Nov 2020
1.	1.	1.	Cassandra	Wide column	120.88	+1.61	+2.13
2.	2.	2.	HBase	Wide column	45.01	-0.19	-2.10
3.	3.	3.	Microsoft Azure Cosmos DB	Multi-model	40.82	+0.54	+8.32



cassandra



APACHE  
HBASE



Azure Cosmos DB



Elassandra



Google Cloud  
Bigtable

# APACHE CASSANDRA



- Desarrollada en Java (2008)
- CAP: Disponibilidad y Tolerante a Partición.
- Múltiples nodos master
- Altamente escalable
- Manejar datos masivos (ej: series de tiempo)
- Estructuras de datos: Maps, sets y listas
- Cassandra Query Lenguaje: fácil y similar a SQL.
- Contra: Si los datos se eliminan con frecuencia, su rendimiento se degrada
- Empresas: Twitter, Facebook, Netflix, Apple, Google, Amazon etc.





# MongoDB

# 03

Instalación

# MongoDB en Local



Instalar Robo 3T



Instalar MongoDB Community Server

# MongoDB en la nube



Crear cuenta en Mongo Atlas



Robo 3T

Download

Blog



Account

# Simplicity Meets Power

Download the latest version of Robo 3T

## Robo 3T: the hobbyist GUI

Robo 3T 1.4 brings support for MongoDB 4.2, and a mongo shell upgrade from 4.0 to 4.2, with the ability to manually specify visible databases.

Download Robo 3T

## Studio 3T: the professional IDE for MongoDB

- Preferred by over 100,000 professional developers and DBAs because it saves time
- Build queries fast, generate instant code, import/export in multiple formats, and much more
- Available for Windows, macOS, and Linux

Download Studio 3T

<https://robomongo.org/download>



Robo 3T - 1.4

File View Options Window Help

Localhost (4)

- System
- config
- test
  - Collections (1)
    - football
  - Functions
  - Users

Welcome x db.getCollection('football').find(... x

Localhost localhost:27017 test


```
db.getCollection('football').find({})
```

football 0.034 sec.


Key	Value	Type
(1) ObjectId("61882f307955f0b8586fbd58")	{ 4 fields }	Object
_id	ObjectId("61882f307955f0b8586fbd58")	ObjectId
team	Atlético	String
foundation_year	1903	String
position	4	Int32




## Choose which type of deployment is best for you

 **Atlas**  
MongoDB as a service

 **On-premises**  
MongoDB locally

 **Tools**  
Boost productivity

 **Mobile & Edge**  
Realm Datastore

MongoDB Enterprise Server

### MongoDB Community Server

The Community version of our distributed database offers a flexible document data model along with support for ad-hoc queries, secondary indexing, and real-time aggregations to provide powerful ways to access and analyze your data.

The database is also offered as a fully-managed service with [MongoDB Atlas](#). Get access to advanced functionality such as auto-scaling, serverless instances (in preview), full-text search, and data distribution across regions and clouds. Deploy in minutes on AWS, Google Cloud, and/or Azure, with no downloads necessary.

Give it a try with a free, highly-available 512 MB cluster.

### Available Downloads

Version  
5.0.3 (current)

Platform  
Windows

Package  
msi

 **Download**

Copy Link

[Current releases & packages](#)  
[Development releases](#)  
[Archived releases](#)  
[Changelog](#)



<https://www.mongodb.com/try/download/community>

The screenshot shows the MongoDB Atlas 'Database Deployments' page for 'Project 0'. The sidebar on the left includes 'DEPLOYMENT' (with sub-items: Databases, Triggers, Data Lake) and 'SECURITY' (with sub-items: Database Access, Network Access, Advanced). The main content area is titled 'Database Deployments' and features a search bar and a '+ Create' button. Below this, a card for 'Cluster0' displays various metrics and a table of deployment details.

**Cluster0 Metrics:**

- Connections:** 0 (Last 6 hours: 100.0)
- I/O:** In: 0.0 B/s, Out: 0.0 B/s (Last 6 hours: 100.0 B/s)
- Data Size:** 56.5 KB (Last 5 days: 512.0 MB)


**Cluster0 Details Table:**

VERSION	REGION	CLUSTER TIER	TYPE	BACKUPS	LINKED REALM APP	ATLAS SEARCH
4.4.10	AWS / Frankfurt (eu-central-1)	M0 Sandbox (General)	Replica Set - 3 nodes	Inactive	None Linked	<a href="#">Create Index</a>

Additional elements include an 'Enhance Your Experience' section with an 'Upgrade' button and a '+ Create' button in the top right.

<https://account.mongodb.com/account/login>


# Desplegar BBDD en la nube con Atlas

  
MONGODB ATLAS

Deploy a cloud database

Experience the best of MongoDB on AWS, Azure, and Google Cloud. Choose a deployment option to get started.

PREVIEW


 Serverless

For serverless applications that aren't critical with variable traffic. Minimal configuration required.

- ✓ Pay only for the operations you run
- ✓ Resources scale seamlessly to meet your workload
- ✓ Always-on security and backups

Create

Starting at  
\$0.30/1M reads

 Dedicated


For production applications with sophisticated workload requirements. Advanced configuration controls.

- ✓ Network isolation and fine-grained access controls
- ✓ On-demand performance advice
- ✓ Multi-region and multi-cloud options available

Create

Starting at  
\$0.08/hr\*  
\*estimated cost \$06.94/month

FREE

 Shared

For learning and exploring MongoDB in a cloud environment. Basic configuration options.

- ✓ No credit card required to start
- ✓ Explore with sample datasets
- ✓ Upgrade to dedicated clusters for full functionality

Create

Starting at  
FREE

Welcome to MongoDB Atlas! We've recommended some of our most popular options, but feel free to customize your cluster to your needs. For more information, check our [documentation](#).

PREVIEW

Serverless

Dedicated

FREE

Shared

For learning and exploring MongoDB in a sandbox environment. Basic configuration controls.


No credit card required to start. Upgrade to dedicated clusters for full functionality. Explore with sample datasets. Limit of one free cluster per project.

Cluster Tier

M0 Sandbox (Shared RAM, 512 MB Storage) Encrypted

Base hourly rate is for a MongoDB replica set with 3 data bearing servers.

Shared Clusters for development environments and low-traffic applications

Tier	RAM	Storage	vCPU	Base Price
 M0 Sandbox	Shared	512 MB	Shared	Free forever
M0 clusters are best for getting started, and are not suitable for production environments.				
500 max connections   Low network performance   100 max databases   500 max collections				
M2	Shared	2 GB	Shared	\$9 / MONTH
M5	Shared	5 GB	Shared	\$25 / MONTH

I'll do this later

Advanced Configuration Options

# Desplegar BBDD en la nube con Atlas

Cloud Provider & Region

AWS, Frankfurt (eu-central-1) ▾



★ Recommended region ⓘ ☑ Paid tier region ⓘ

## NORTH AMERICA

🇺🇸 Oregon (us-west-2) ★

🇺🇸 N. Virginia (us-east-1) ★

🇺🇸 Ohio (us-east-2) ★ ☑

🇺🇸 N. California (us-west-1) ☑

🇨🇦 Montreal (ca-central-1) ☑

## SOUTH AMERICA

🇧🇷 Sao Paulo (sa-east-1) ☑

## EUROPE

🇸🇪 Stockholm (eu-north-1) ★

🇮🇪 Ireland (eu-west-1) ★

🇩🇪 Frankfurt (eu-central-1) ★

🇬🇧 London (eu-west-2) ★ ☑

🇫🇷 Paris (eu-west-3) ★ ☑

🇮🇹 Milan (eu-south-1) ★ ☑

## MIDDLE EAST

🇧🇭 Bahrain (me-south-1) ★

## AFRICA

🇿🇦 Cape Town (af-south-1) ★ ☑

## AUSTRALIA

🇦🇺 Sydney (ap-southeast-2) ★

## ASIA

🇯🇵 Tokyo (ap-northeast-1) ★

🇸🇬 Singapore (ap-southeast-1) ★

🇮🇳 Mumbai (ap-south-1)

🇭🇰 Hong Kong (ap-east-1) ★ ☑

🇰🇷 Seoul (ap-northeast-2) ☑

🇯🇵 Osaka (ap-northeast-3) ★ ☑





# Desplegar BBDD en la nube con Atlas

Create a database user to grant an application or user, access to databases and collections in your clusters in this Atlas project. Granular access control can be configured with default privileges or custom roles. You can grant access to an Atlas project or organization using the corresponding [Access Manager](#).

## Authentication Method

Password

Certificate

AWS IAM  
(MongoDB 4.4 and up)

MongoDB uses [SCRAM](#) as its default authentication method.

## Password Authentication

admin

\*\*\*\*\*

SHOW

Autogenerate Secure Password

Copy

## Database User Privileges

Select a [built-in role](#) or [privileges](#) for this user.

Read and write to any database

## Restrict Access to Specific Clusters/Data Lakes

Enable to specify the resources this user can access. By default, all resources in this project are accessible.

OFF

## Temporary User

This user is temporary and will be deleted after your specified duration of 6 hours, 1 day, or 1 week.

OFF

Cancel

Add User

## Add IP Access List Entry

Atlas only allows client connections to a cluster from entries in the project's IP Access List. Each entry should either be a single IP address or a CIDR-notated range of addresses. [Learn more](#).

ADD CURRENT IP ADDRESS

ALLOW ACCESS FROM ANYWHERE

Access List Entry:

0.0.0.0/0

Comment:

Optional comment describing this entry

OFF

This entry is temporary and will be deleted in

6 hours

Cancel

Confirm



# Desplegar BBDD en la nube con Atlas

DEMO MONGO > PROJECT 0 > DATABASES

## Cluster0

VERSION 4.4.10 REGION AWS Frankfurt (eu-central-1) CLUSTER TIER M0 Sandbox (General)

Overview Real Time Metrics Collections Search Profiler Performance Advisor Online Archive Cmd Line Tools

SANDBOX NODES REPLICASET

CONNECT CONFIGURATION ...

REGION Frankfurt (eu-central-1)

- cluster0-shard-00-00.tzi1k... SECONDARY
- cluster0-shard-00-01.tzi1k... PRIMARY
- cluster0-shard-00-02.tzi1k... SECONDARY

**This is a Shared Tier Cluster**

If you need a database that's better for high-performance production applications, upgrade to a dedicated cluster.

[Upgrade](#)

Operations R: 0 W: 0 100.0/s

Last 6 Hours

Logical Size 0.0 B 512.0 MB max

Last 6 Hours

Connections 0 500 max

Last 6 Hours

DEMO MONGO > PROJECT 0 > CLUSTER0

**cluster0-shard-00-02.tzi1k.mongodb.net:27017**





04

# DEMO

Ejercicio de demostración

# Contenido Demo



## ROBO 3T

- Realizar conexión
- Crear BBDD
- Insertar, modificar y eliminar documentos



## SPRING BOOT


- Controlador
- Servicios
- Respositorio
- Peticiones HTTP

+



## ROBO 3T

- Visualización de las modificaciones con peticiones desde Postman



GRACIAS

POR VUESTRA ATENCIÓN