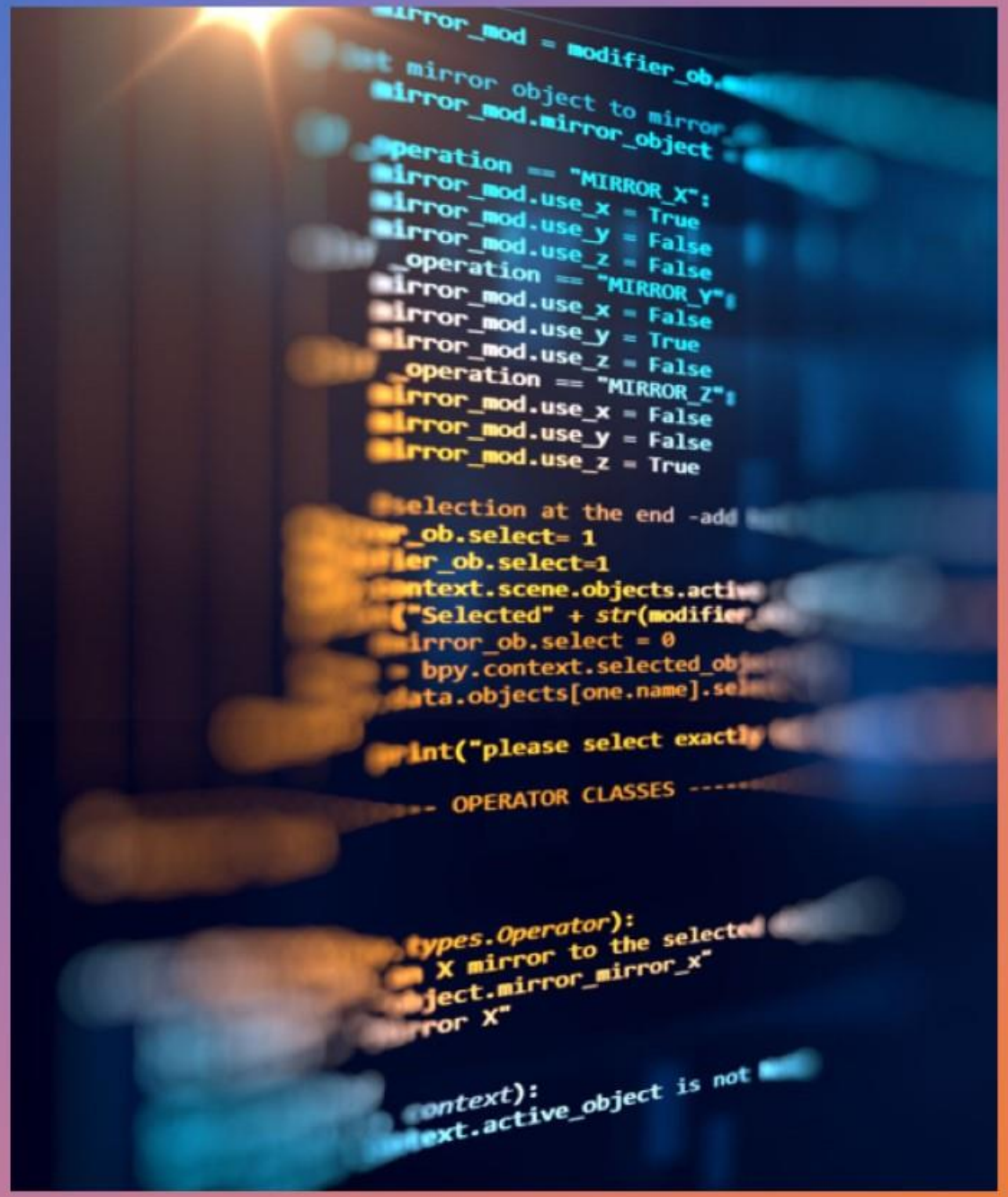
Bases de datos NoSQL

Diego Iván Oliveros Acosta



Agenda

- Contexto y conceptos
- Big Data
- NoSQL
- **MongoDB**
- Instalación
- Uso
- Comandos comunes
- Servicios Web **Atlas**

La creación de datos, a punto de explotar

Cantidad real y prevista de datos generados en todo el mundo (en zettabytes)

Contexto

CADA DÍA CREAMOS 2,5 QUINTILLONES DE BYTES DE DATOS. (2,5 Exabytes)

1 zettabyte equivale a **1.000 mill. terabytes**.

EL 90% DE LOS DATOS DEL MUNDO DE HOY SE GENERARON EN LOS ÚLTIMOS 5 AÑOS @scalaapp

Fuente: Statista Digital Economy Compass 2019

JAN 2021

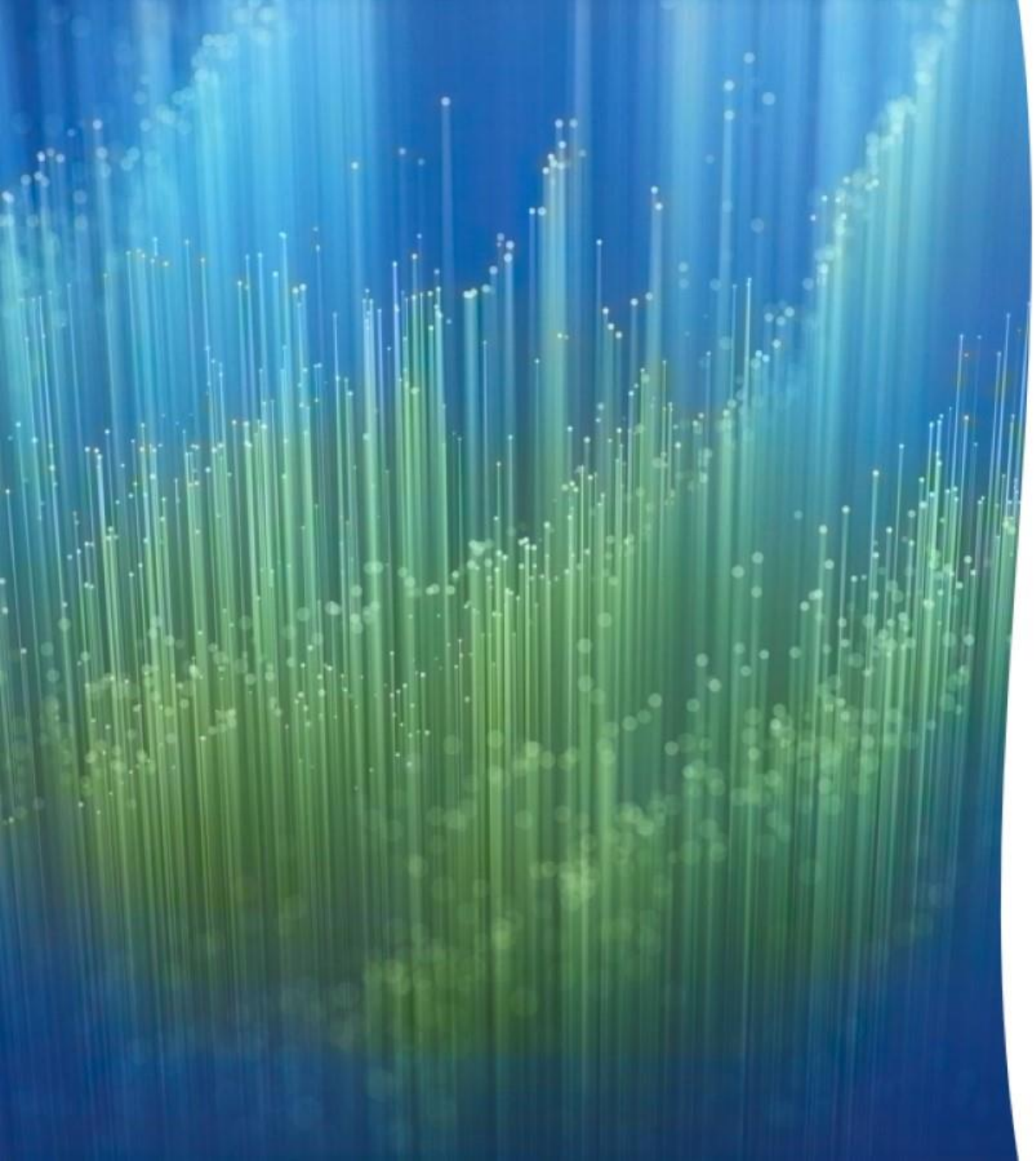
OVERVIEW OF GLOBAL INTERNET USE

A SNAPSHOT OF INTERNET USE AROUND THE WORLD

⚠ *INTERNET USER NUMBERS NO LONGER INCLUDE DATA SOURCED FROM SOCIAL MEDIA PLATFORMS, SO VALUES ARE NOT COMPARABLE WITH PREVIOUS REPORTS*

TOTAL NUMBER OF GLOBAL INTERNET USERS	INTERNET USERS AS A PERCENTAGE OF TOTAL GLOBAL POPULATION	ANNUAL CHANGE IN THE NUMBER OF GLOBAL INTERNET USERS	AVERAGE DAILY TIME SPENT USING THE INTERNET BY EACH INTERNET USER	PERCENTAGE OF USERS ACCESSING THE INTERNET VIA MOBILE DEVICES
				
4.66	**59.5%**	**+7.3%**	**6H 54M**	**92.6%**
BILLION		**+316 MILLION**		

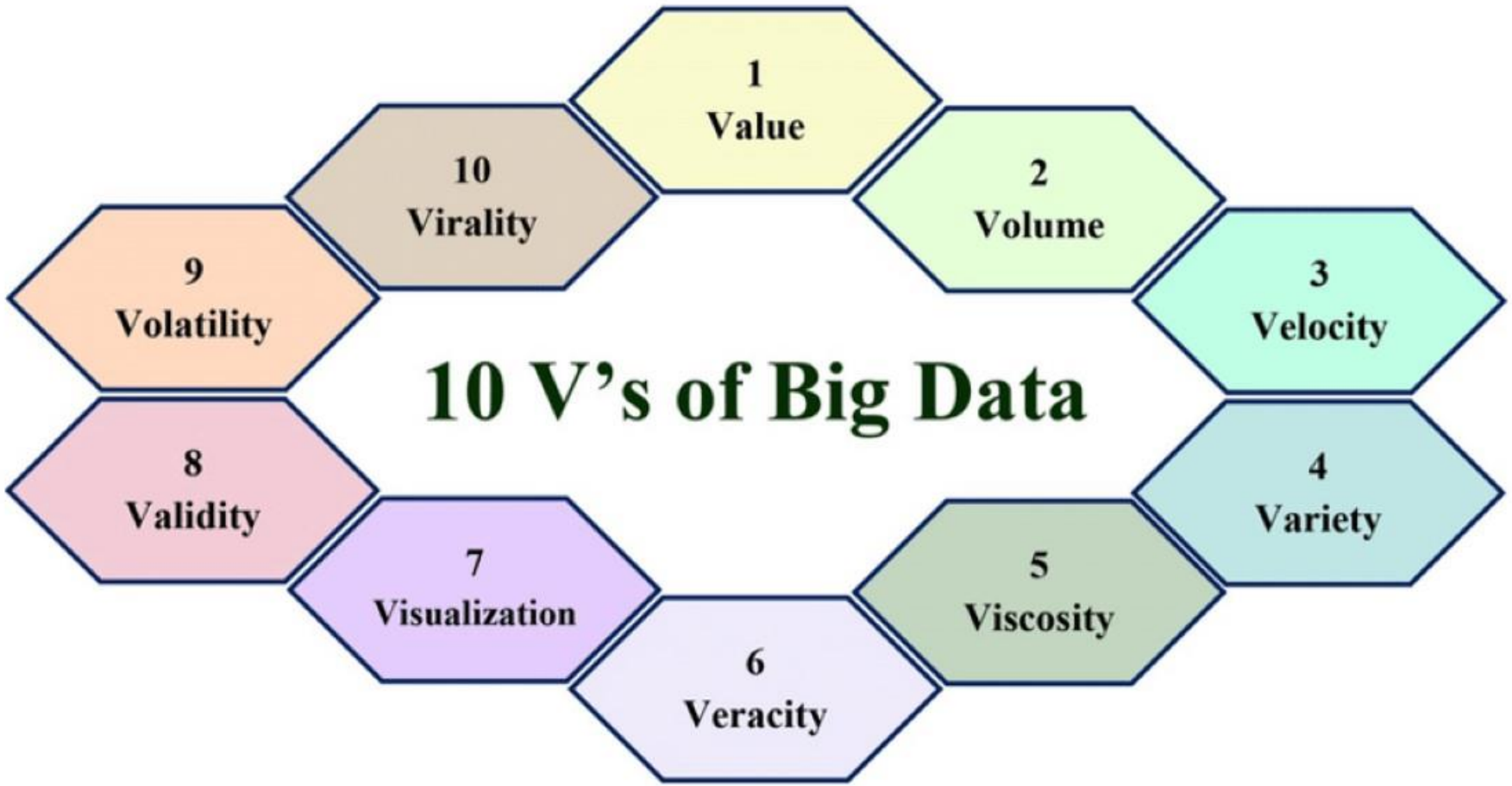
SOURCES: KEPIOS (JAN 2021) BASED ON EXTRAPOLATIONS OF DATA PUBLISHED BY: THE ITU; LOCAL GOVERNMENT BODIES; GWI; GSMA INTELLIGENCE; EUROSTAT; APJII; CNNIC; THE UNITED NATIONS. DATA FOR TIME SPENT AND MOBILE INTERNET SHARE FROM GWI (Q3 2020). SEE GLOBALWEBINDEX.COM FOR MORE DETAILS. ◈ **COMPARABILITY ADVISORY:** SOURCE AND BASE CHANGES. INTERNET USER NUMBERS NO LONGER INCLUDE DATA SOURCED FROM SOCIAL MEDIA PLATFORMS. FIGURES ARE NOT COMPARABLE WITH DATA PUBLISHED IN PREVIOUS REPORTS.



PRINCIPALES CAMBIOS QUE SE PRODUJERON EN LA TECNOLOGÍA (**últimos 20 años**)

- Los masificación uso de internet
- Surgimiento de las redes sociales
- Crecimiento exponencial de dispositivos móviles
- Interfaces de usuario más simples e intuitivas
- Cambios en las formas de procesamiento
- Reducción exponencial en el costo de almacenamiento

Big Data


1
Value
2
Volume
3
Velocity
4
Variety
5
Viscosity
6
Veracity
7
Visualization
8
Validity
9
Volatility
10
Virality
10 V's of Big Data

End to End Platform Builds

Business & Data Analysis | Tools & Technologies | DevOps & Cloud Computing | Automation

Advanced Analytics

Stanford NLP, AlchemyAPI, openNLP, rapidminer, Spark MLlib, SparkR

Data Visualization

tableau software, TIBCO Jaspersoft, Libraries – D3.js

Data Management

mongoDB, hadoop, elasticsearch

Data Integration/ Acquisition

Apache Tika, talend, alteryx, pentaho A Hitachi Group Company, Custom Apps

Cloud Compute

Infrastructure as a Service | Data as a Service | Software as a Service

amazon web services

NoSQL

- **Flexibilidad**
- **Escalabilidad**
- **Alto rendimiento**
- **Altamente funcional**

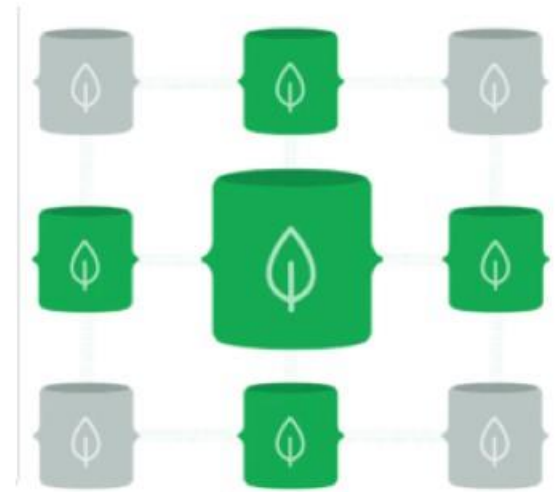
Trusted by thousands of companies, from startup to enterprise

InVision ebay Adobe Google

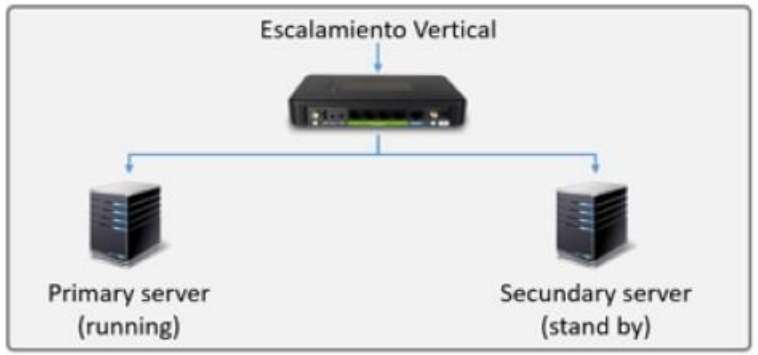
- De propósito general
- Open-source NoSQL
- Bases de datos mas populares
- Escalado horizontal
- Bases de datos de gran tamaño
- Datos no estructurados
- Para: app del día - día móviles y web

$$\text{Elasticidad (E)} = \frac{\%\ \text{variación de X}}{\%\ \text{variación de Y}}$$

Humongous /hjuːˈmʌŋgəs/



- Escalabilidad
- Elasticidad



Performance Charts.

Sidebar. Redesigned.

Visualize your Schema.

Build Geo Queries.

Interactive Document Editor.

Visual Explain Plans.

Index Management.

Schema Validation.

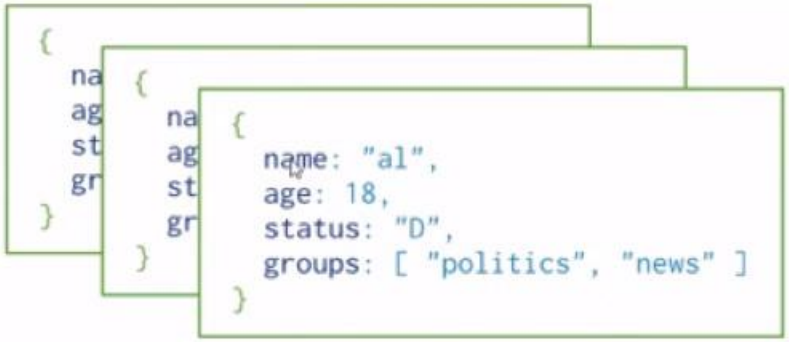
Improved CRUD

Deployment Awareness

Query History

Es orientado a documentos u objetos de java script
Sin esquemas
Json

Colecciones

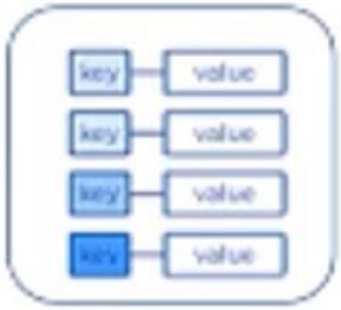


Documentos:

```
{
  name: "sue",                    <-- field: value
  age: 26,                        <-- field: value
  status: "A",                    <-- field: value
  groups: [ "news", "sports" ]    <-- field: value
}
```

Base de datos:

Document Store



Key-Value Store

Wide-Column Store

Graph Store

Características de MongoDB

- Podemos hacer búsqueda por campos, consultas de rangos y expresiones regulares. Además, estas consultas pueden devolver un campo específico del documento, pero también puede ser una función JavaScript definida por el usuario.

- Replicación . Del mismo modo, la replicación es un proceso básico en la gestión de bases de datos. MongoDB soporta el tipo de replicación primario-secundario. Mientras podemos realizar consultas con el primario, el secundario actúa como réplica de datos en solo lectura a modo copia de seguridad con la particularidad de que los nodos secundarios tienen la habilidad de poder elegir un nuevo primario en caso de que el primario actual deje de responder.

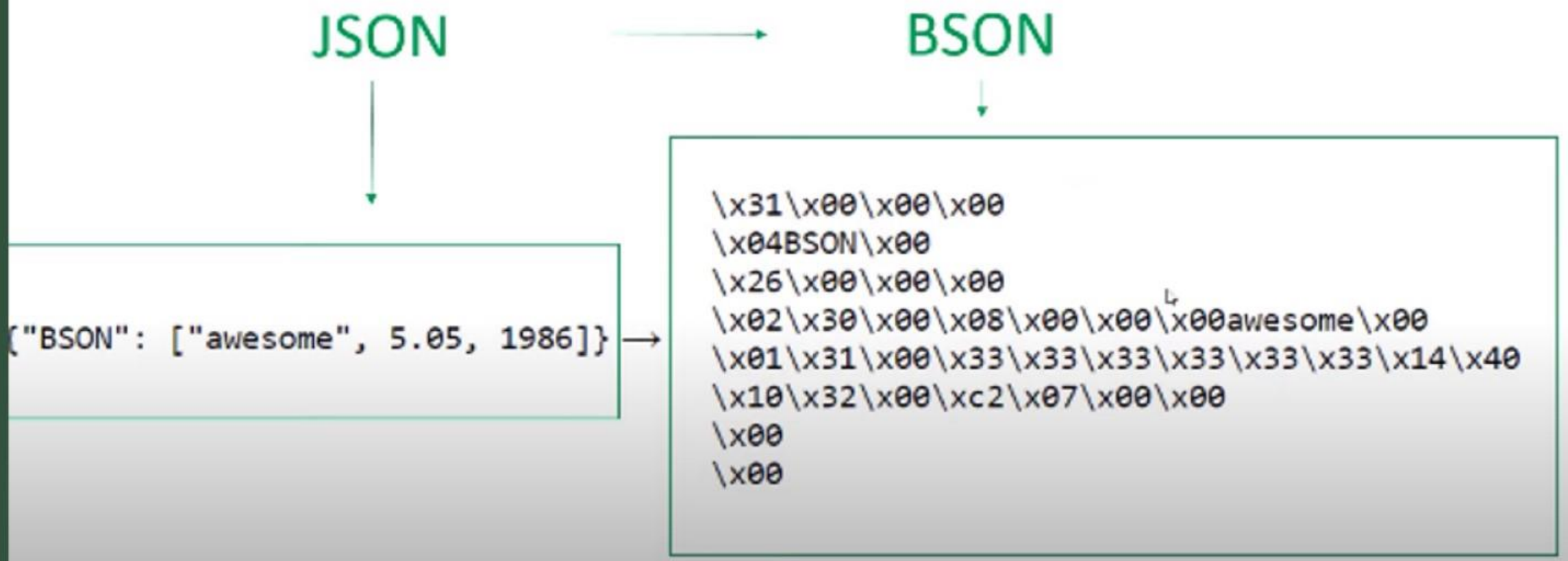
- Balanceo de carga . Resulta muy interesante cómo MongoDB puede escalar la carga de trabajo. MongoDB tiene la capacidad de ejecutarse de manera simultánea en múltiples servidores, ofreciendo un balanceo de carga o servicio de replicación de datos, de modo que podemos mantener el sistema funcionando en caso de un fallo del hardware.

- Ejecución de JavaScript del lado del servidor. MongoDB tiene la capacidad de realizar consultas utilizando JavaScript, haciendo que estas sean enviadas directamente a la base de datos para ser ejecutadas.

Consideraciones:

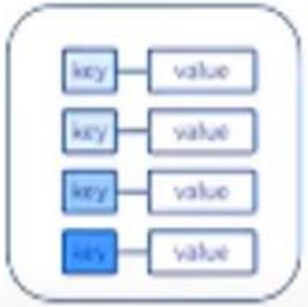
- ¿Tiene cargas de trabajo de gran volumen que requieren gran escala?
- ¿Los datos son dinámicos y cambian con frecuencia ?
- ¿Los datos se pueden expresar sin relaciones?
- ¿Necesita escrituras rápidas y la seguridad de escritura no es critica?
- ¿La recuperación de datos es sencilla ?
- ¿Los datos requieren una distribución geográfica amplia?

Estructura de los datos



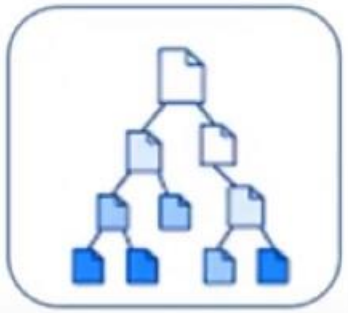
Administración de los datos

mongoDB.



Key-Value Store

```
{
  name: "sue",                          ← field: value
  age: 26,                              ← field: value
  status: "A",                          ← field: value
  groups: [ "news", "sports" ]          ← field: value
}
```



Document
Store

```
{
  _id: <ObjectId1>,
  username: "123xyz",
  contact: {
             phone: "123-456-7800",
             email: "xyz@example.com"
           },
  access: {
             level: 5,
             group: "dev"
           }
}
```

Embedded sub-document

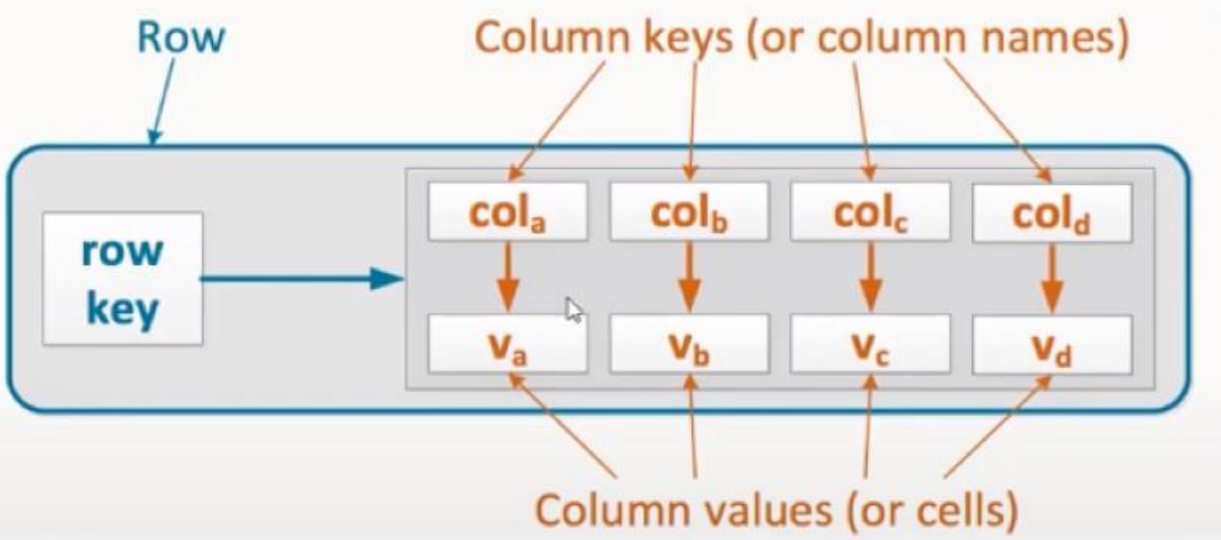
Embedded sub-document

Document store

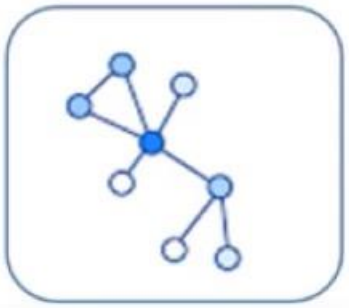
mongoDB.

Administración de los datos

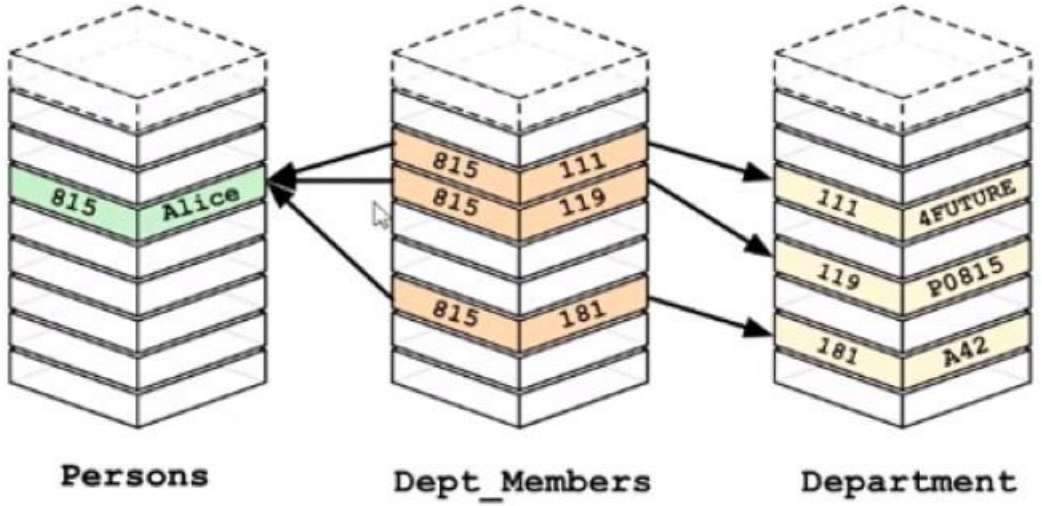
Wide-Column Store

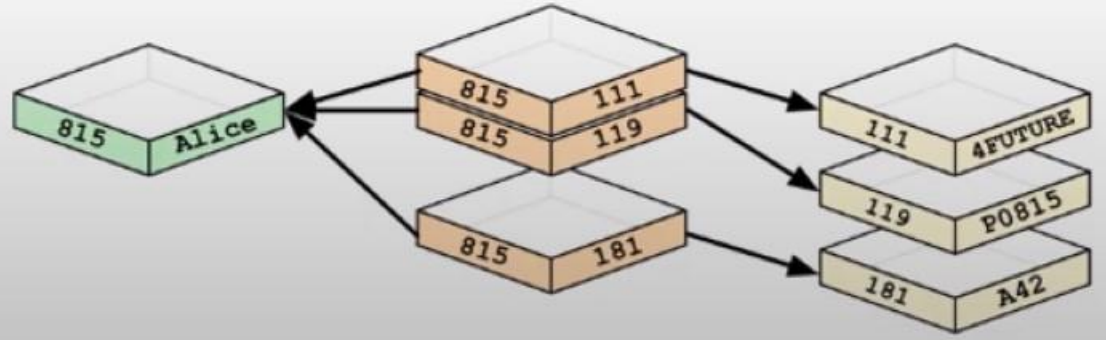


mongoDB.



Graph
Store





Insertar Documentos

https://docs.mongodb.com/manual/tutorial/insert-documents/

`db.collection.insertOne()`	Inserts a single document into a collection.
`db.collection.insertMany()`	`db.collection.insertMany()` inserts multiple documents into a collection.
`db.collection.insert()`	`db.collection.insert()` inserts a single document or multiple documents into a collection.

```
db.inventory.insertOne(
                { item: "canvas", qty: 100, tags: ["cotton"], size: { h: 28, w: 35.5, uom: "cm" } }
)

db.inventory.insertMany([
        { item: "journal", qty: 25, size: { h: 14, w: 21, uom: "cm" }, status: "A" },
        { item: "notebook", qty: 50, size: { h: 8.5, w: 11, uom: "in" }, status: "A" },
        { item: "paper", qty: 100, size: { h: 8.5, w: 11, uom: "in" }, status: "D" },
        { item: "planner", qty: 75, size: { h: 22.85, w: 30, uom: "cm" }, status: "D" }, { item: "postcard", qty: 45, size: { h: 10, w: 15.25, uom: "cm" }, status: "A" }
])
```

`ObjectId(<hexadecimal>)`

Returns a new ObjectId value. The 12-byte ObjectId value consists of:

- a 4-byte timestamp value, representing the ObjectId's creation, measured in seconds since the Unix epoch
- a 5-byte random value
- a 3-byte incrementing counter, initialized to a random value

While the BSON format itself is little-endian, the timestamp and counter values are big-endian, with the most significant bytes appearing first in the byte sequence.

`ObjectId()` can accept the following parameter:

Field	Type	Description
`hexadecimal`	String	Optional. Hexadecimal string value for the new ObjectId.

Buscar Documentos

mongoDB

https://docs.mongodb.com/manual/reference/method/db.collection.find/index.html

```
db.inventory.find( {} )
```

→ SELECT * FROM inventory

```
{ "_id": "apples", "qty": 5 }
{ "_id": "bananas", "qty": 7 }
{ "_id": "oranges", "qty": { "in stock": 8, "ordered": 12 } }
{ "_id": "avocados", "qty": "fourteen" }
```

$gt = greater than

```
db.collection.find( { qty: { $gt: 4 } } )
```

```
{ "_id": "apples", "qty": 5 }
{ "_id": "bananas", "qty": 7 }
```

Buscar Documentos

mongoDB

https://docs.mongodb.com/manual/reference/method/db.collection.find/index.html

bios collection

```
{ "_id" : <value>,
"name" : { "first" : <string>, "last" : <string> }, // embedded document
"birth" : <ISODate>,
"death" : <ISODate>,
"contribs" : [ <string>, ... ], // Array of Strings
"awards" : [ { "award" : <string>, year: <number>, by: <string> } // Array of embedded documents ... ] }
```

```
db.bios.find( { _id: 5 } )
```

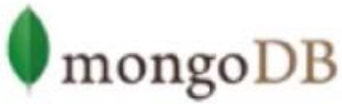
```
db.bios.find( { "name.last": "Hopper" } )
```

```
db.bios.find( { "name.last": { $regex: /^N/ } } )
```

```
db.bios.find( { _id: { $in: [ 5, ObjectId("507c35dd8fada716c89d0013") ] } } )
```

```
db.bios.find( {
        birth: { $gt: new ('1920-01-01') },
        death: { $exists: false }
} )
```

Buscar Documentos (con funciones)



- db.system.js.save({ _id: "markMapedItem", value : function(x) { return {...x, maped: true}; } })
- db.loadServerScripts()
- db.collection.find().map(markMapedItem)

Instalación

1. Instalar MongoDB

2. Actualizar variable Path

    - Buscar el directorio donde se instaló MongoDb (por ejemplo C:\Program Files\MongoDB\Server\3.2\bin)
    - Añadir MongoDb a la variable Path (Inicio > Equipo > Propiedades del Sistema > Opciones avanzadas)

3. Crear una carpeta (con los permisos adecuados) para guardar la base de datos

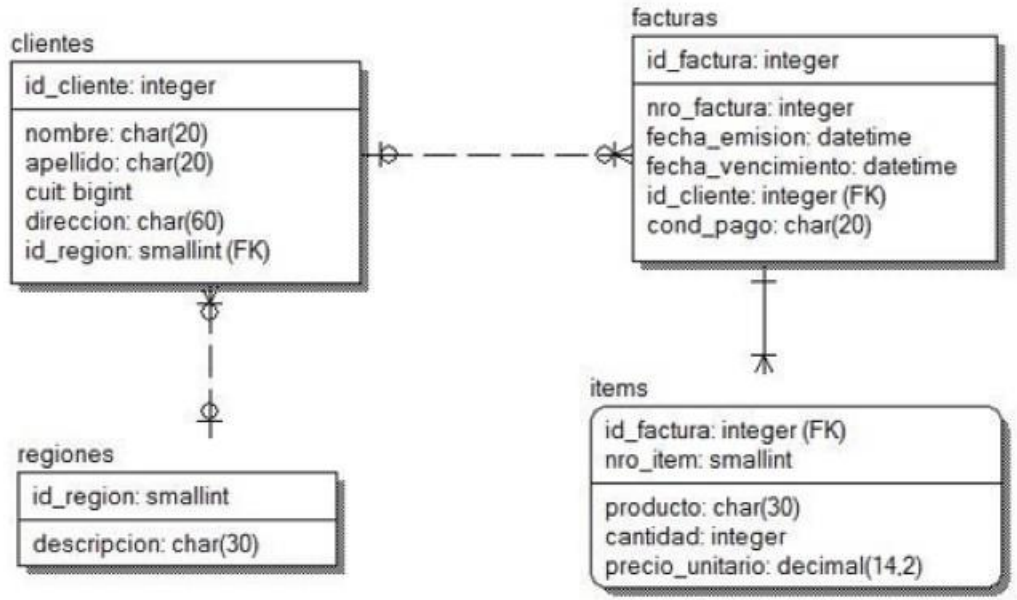
    - C:/Data/Db es la carpeta default para MongoDb
    - Si quisiéramos tener otro path debemos ejecutar desde consola: mongod --dbpath ruta/nueva-a/la-carpeta-db

4. Abrir conexión desde Consola de Windows (Símbolo del Sistema) ejecutando el comando mongod

5. Mantener la consola de conexión abierta y abrir una nueva consola para operar sobre la base

Uso

- **Armar un modelo que contenga la información de las facturas y todos sus ítems, detallando el nombre, apellido, ciudad y región del cliente al que se le emitió la factura, para poder realizar consultas desde un portal de facturas de la forma optima posible.**



Comandos comunes

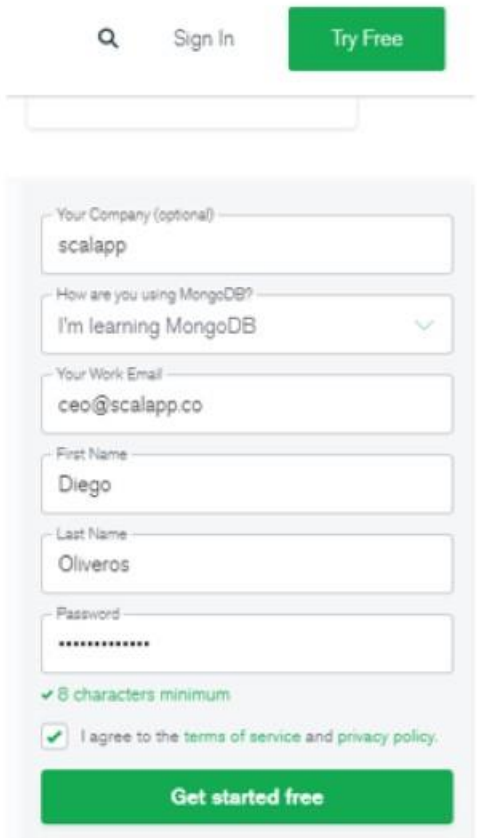
- C:>mongod
- C:>mongo
- show dbs
- show collections

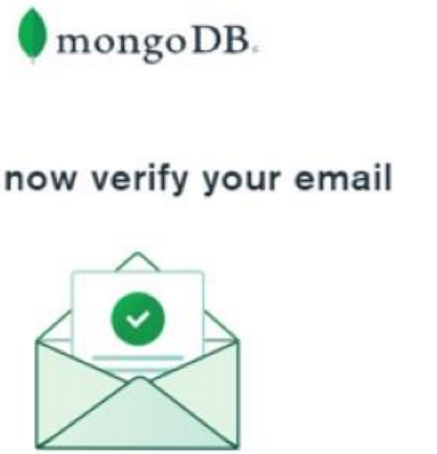
- db.facturas.help()
- db.facturas.find()
- db.facturas.count()
- db.facturas.dataSize()
- db.facturas.insert({“”:””})
- db.<collection_name>.remove({criterio_de_eliminación})
- **db.coleccion.update ()**

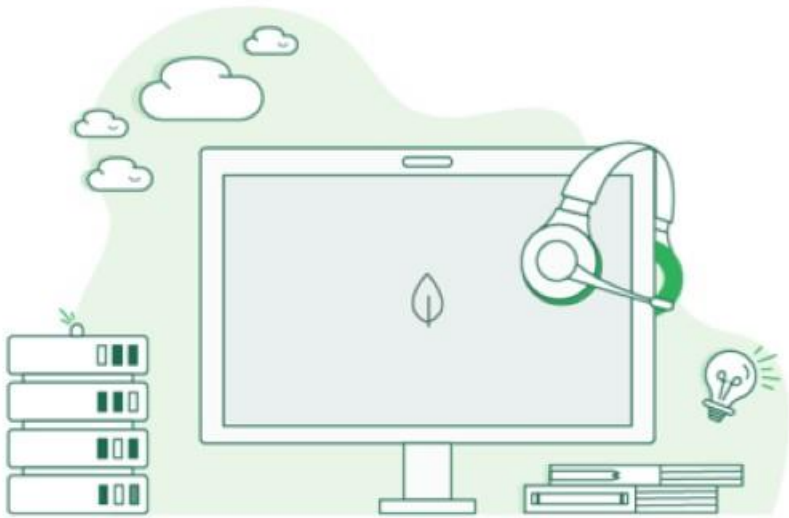
Servicios en la nube

- Local o desplegado
- Mlab
- Studio 3t
- Mongo DB Atlas
- NoSqlBooster

https://www.mongodb.com/cloud/atlas


Sign In
Try Free
Your Company (optional)
scalapp
How are you using MongoDB?
I'm learning MongoDB
Your Work Email
ceo@scalapp.co
First Name
Diego
Last Name
Oliveros
Password
8 characters minimum
I agree to the terms of service and privacy policy.
Get started free


mongoDB.
Great, now verify your email
Check your inbox at <ceo@scalapp.co> and click the verification link inside to complete your registration.
This link will expire shortly, so verify soon!
Don't see an email? Check your spam folder.
Link expired? Resend verification email



Welcome!

Use your account to deploy a **cloud database** with **MongoDB Atlas** and contact **Support**.

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 $56.94/month

FREE

Shared

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

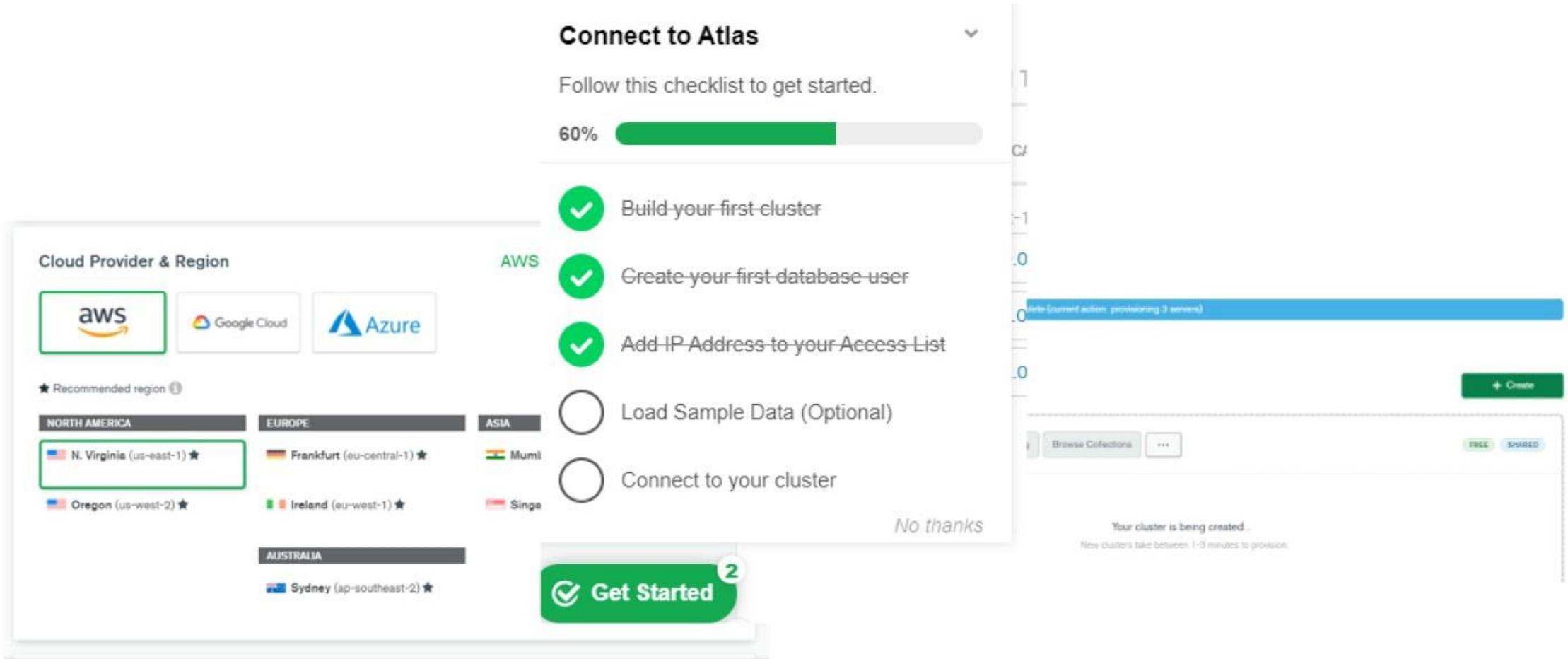
- No credit card required to start
- Explore with sample datasets
- Upgrade to dedicated clusters for full functionality

Create

Starting at
FREE

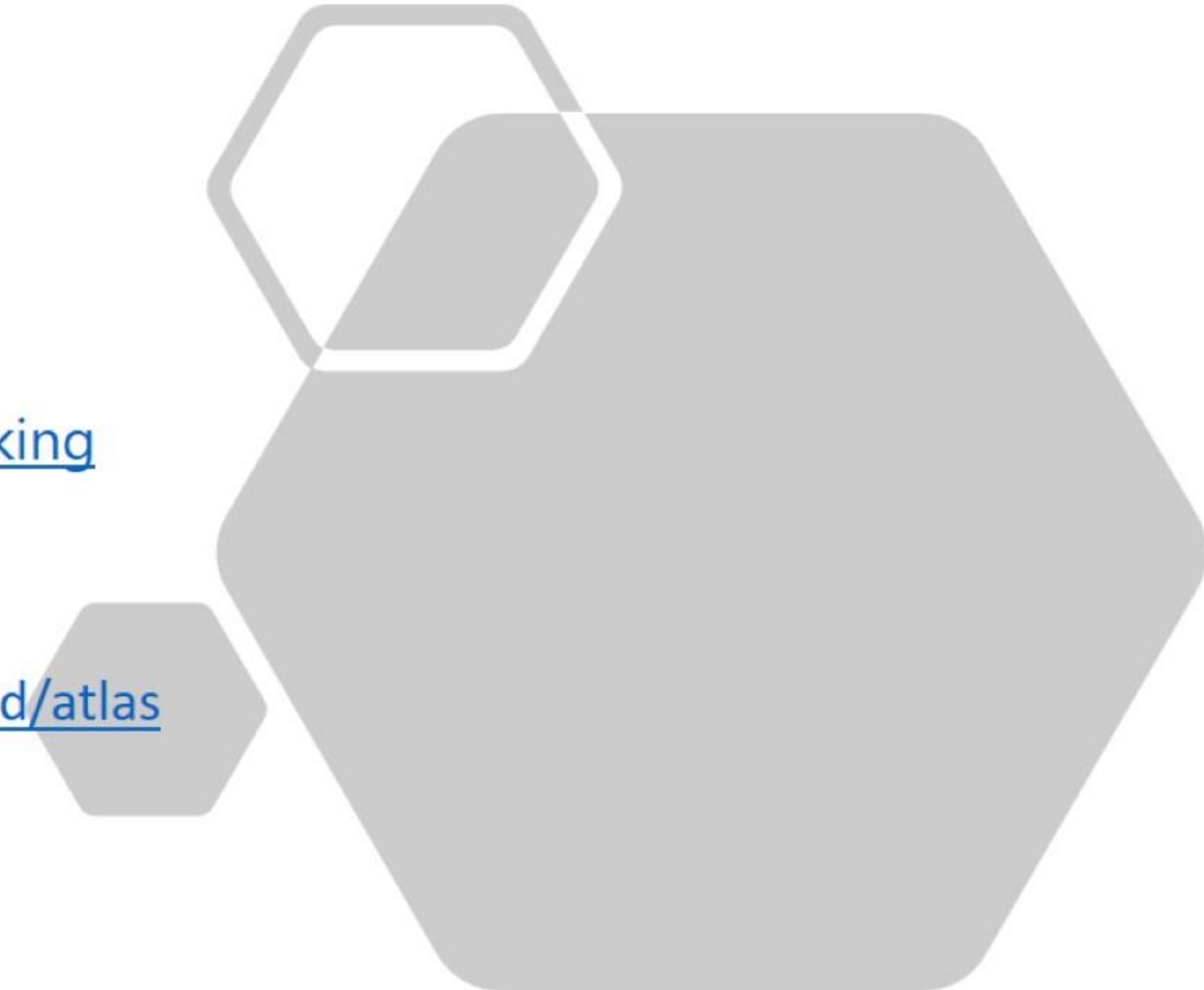
do this later

Advanced Configuration Options


Connect to Atlas
Follow this checklist to get started.
60%
Build your first cluster
Create your first database user
Add IP Address to your Access List
Load Sample Data (Optional)
Connect to your cluster
No thanks
Get Started
2
Cloud Provider & Region
AWS
aws
Google Cloud
Azure
Recommended region
NORTH AMERICA
N. Virginia (us-east-1)
Oregon (us-west-2)
EUROPE
Frankfurt (eu-central-1)
Ireland (eu-west-1)
ASIA
AUSTRALIA
Sydney (ap-southeast-2)
Create
Browse Collections
FREE
SHARED
Your cluster is being created.

Referencias

- https://www.mongodb.com/
- http://db-engines.com/en/ranking
- https://nosqlbooster.com/
- https://mlab.com/
- https://www.mongodb.com/cloud/atlas




Gracias