

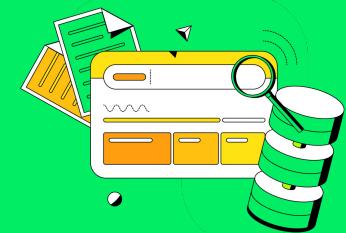


# MongoDB Search & Vector Search for use with Enterprise Server



**Genevieve Broadhead**

Global Lead, Retail Solutions, MongoDB





```
{"name": "Genevieve Broadhead",
"company": "MongoDB",
"title": "Global Lead, Retail Solutions",
"joinedDate": { "$date": "2020-01-02T09:00:00.000Z" },
"tenure": {"duration": 5.5, "unit": "years"},
"email": "genevieve.broadhead@mongodb.com",
"linkedIn": "https://www.linkedin.com/in/genevieve-broadhead-271757bb/",
"location": "Barcelona, Spain"
}
```



# Agenda

The Evolution of the MongoDB Data Platform

MongoDB Search & Vector Search Public Preview  
with MongoDB Enterprise Server

Getting Started

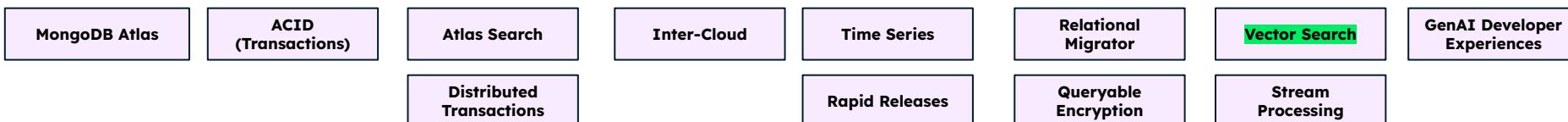
Architecture Diagram and Demo

Recap



# The evolution of MongoDB

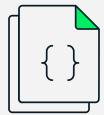
All roadmap promises  
delivered



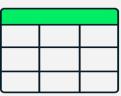
# MongoDB Data Platform



MongoDB Database



JSON



Tabular



Key-Value



Text



Geospatial



Graph



Time Series



Events



Vector &  
Search



MongoDB®



# MongoDB Search & Vector Search Public Preview with MongoDB Enterprise Server

“

“Our enterprise customers have told us they want to harness the power of generative AI **on their own proprietary data**, but the architectural complexity of bolting on separate search and vector databases has been a major barrier, by bringing our proven Atlas Search capabilities to our self-managed customers, we are giving them the tools to begin innovating faster on their own terms.”



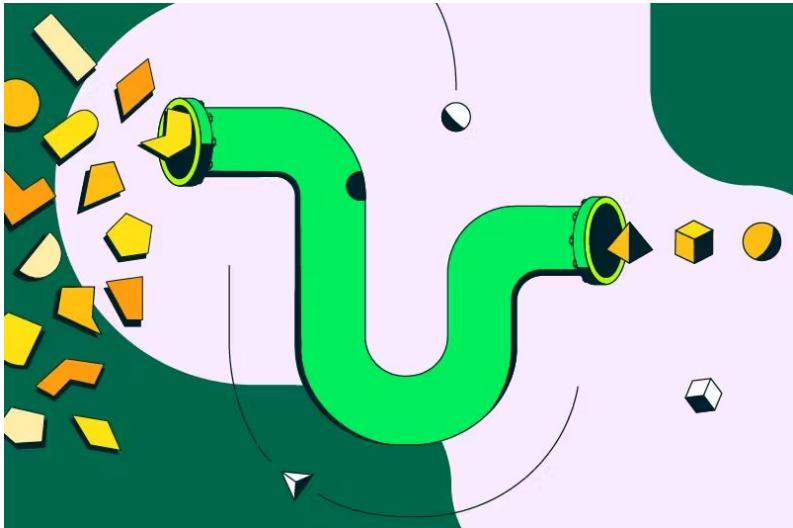
JIM SCHARF

Chief Technology Officer  
MongoDB





# Key Pain Points Addressed



- Complexity of maintaining separate search engines
- Inability to use Atlas Search due to regulatory requirements
- Limited search capabilities in local development
- Fragmented development experience between local and production environments
- Risk of investing in architecture that might not align with final product



# MongoDB Search and Vector Search with Enterprise Server will enable you to

- Build next-generation AI applications on your own infrastructure.
- Eliminate the architectural complexity and operational overhead of separate systems.
- Accelerate development and reduce costs.
- Deploy the same application code across multiple environments.



With MongoDB deliver faster, more innovative, and engaging user experiences.



Enterprise  
Server

# Search & Vector Search on Self-Managed Clusters



Benefits

## Run your search workloads anywhere

You no longer have to run on MongoDB Atlas to get all the benefits of MongoDB Search and Vector Search. Build AI powered applications on-prem with ease.

## Avoid the synchronization tax

With Search and Vector Search, data is automatically and dynamically synced from the database to Search and Vector Search indexes.

## Superior Developer Experience

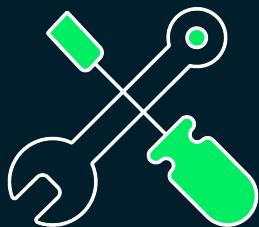
Use a single, unified API across database and search operations. Create a search index with a few clicks or a single API call.

# Getting Started



1

## Prerequisites



A running MongoDB Enterprise Server cluster

Version 8.0.10+ (for MCK 1.4) or version 8.2+ (for MCK 1.5+)



A Kubernetes environment

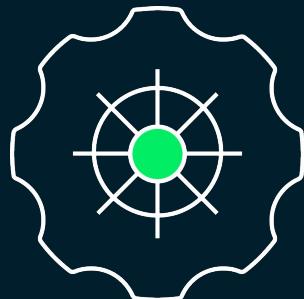


The MongoDB Controllers for Kubernetes (MCK) Operator installed in the Kubernetes cluster.



2

## Deploy Search Nodes on Kubernetes



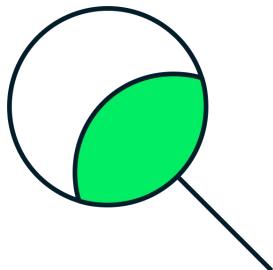
Creating a [Search custom resource \(CR\)](#) in Kubernetes. This CR tells the MCK Operator to deploy the required search nodes and connect them to your existing MongoDB cluster.

You can target MongoDB Enterprise Server instances deployed **outside or inside** Kubernetes.



3

## Create search indexes

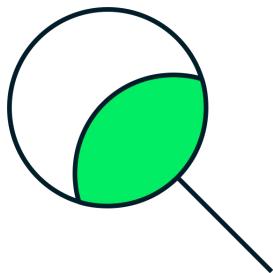


```
db.collection.createSearchIndex({  
  name: "full-text-index",  
  definition: {  
    "mappings": { "dynamic": true }  
  }  
});
```



3

## Create search indexes

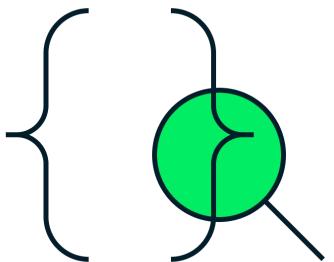


```
db.collection.createSearchIndex({  
  name: "vector-index",  
  definition: {  
    "mappings": {  
      "fields": {  
        "plot_embedding": {  
          "type": "vector",  
          "dimensions": 1536,  
          "similarity": "cosine"  
        }  
      }  
    }  
  }  
});
```



4

## Query your data

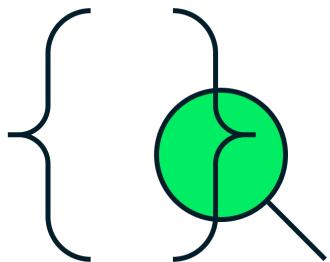


```
db.collection.aggregate([  
  { $search: {  
    index: "full-text-index",  
    text: {  
      query: "sci-fi",  
      path: "genres"  
    }  
  }]  
]);
```



4

## Query your data

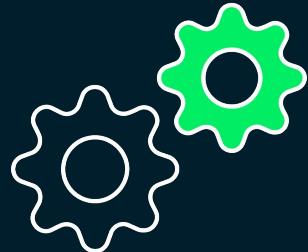


```
db.collection.aggregate([  
  { $vectorSearch: {  
    index: "vector-index",  
    queryVector: [0.1, ...],  
    path: "plot_embedding",  
    numCandidates: 100,  
    limit: 10 }  
  }  
]);
```



5

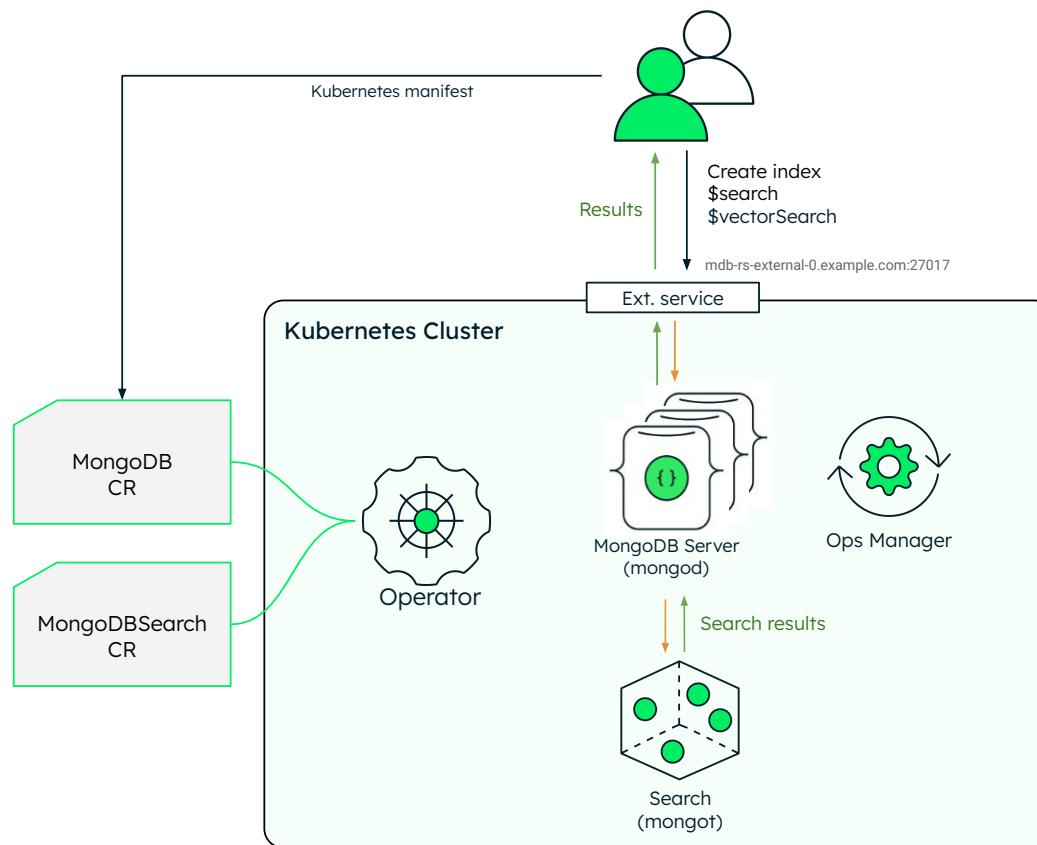
## Monitor Search Nodes



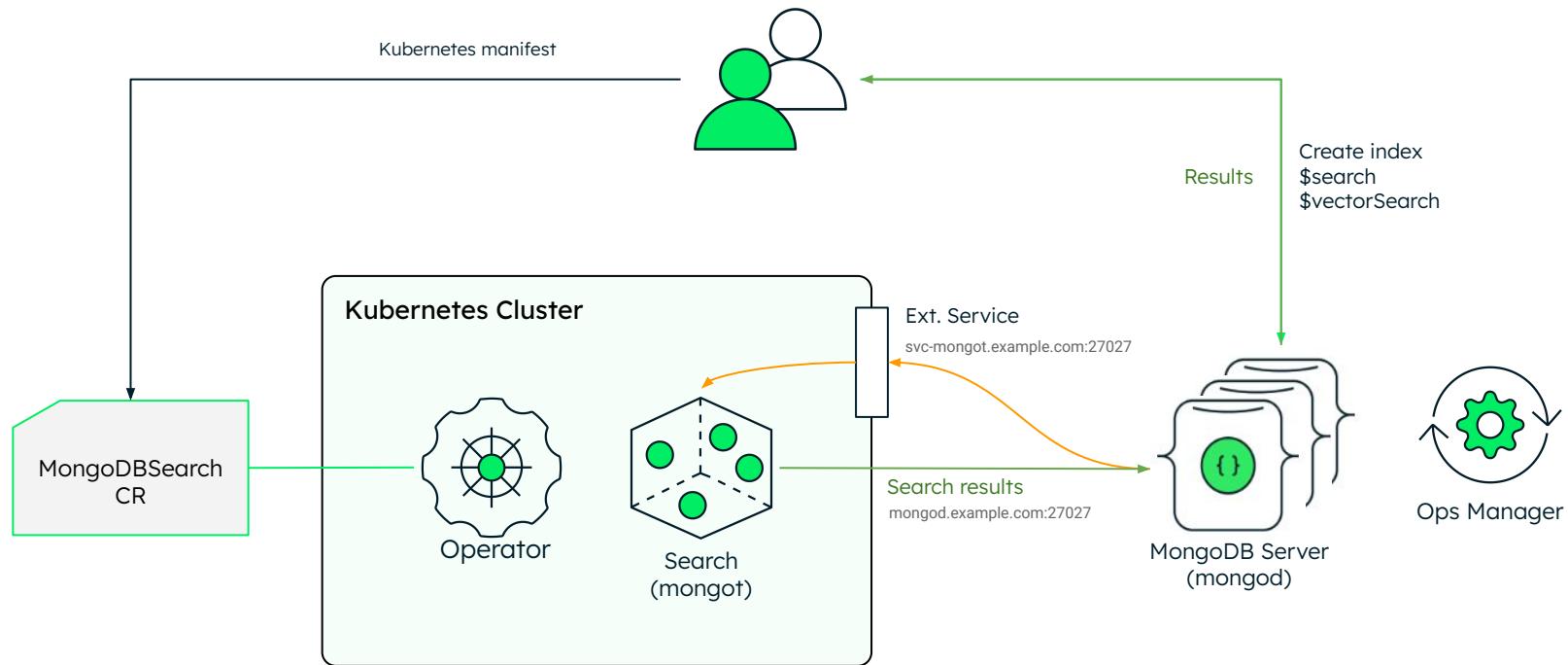
You can **monitor** the health and status of the search node pods using **standard Kubernetes tooling**.

# Architecture Diagram

# MongoDB Server Inside Kubernetes



# MongoDB Server Outside Kubernetes



# Demo Time

Product Inventory

localhost:3000/product-inventory

Leafy Associate 🌿

# Product Inventory

Search for a product to view detailed inventory information

MongoDB Search 

Search product by name, SKU or description

Search 

Scan Product 

Enter a search term



Talk track!

MongoDB

Recent Activity:

The screenshot shows a web browser window titled "Product Inventory" at the URL "localhost:3000/product-inventory". The page has a header with the text "Leafy Associate" and a logo. Below the header is a main title "Product Inventory" and a subtitle "Search for a product to view detailed inventory information". There are three search-related buttons: "MongoDB Search", "Search product by name, SKU or description", and "Scan Product". A central search bar contains the placeholder text "Enter a search term". Below the search bar is a decorative graphic of a magnifying glass over a cloud with green leaves and a hash tag. At the bottom right is a MongoDB interface showing a collection named "Recent Activity".

.env

X

backend > advanced-search-ms > .env

```
1 # MongoDB Atlas settings
2
3 #ATLAS CONNECTION STRING
4 MONGODB_URI=mongodb+srv://[REDACTED]@ist-shared.n0kts.mongodb.net/?retryWrites=true&w=majority
5
6 # ENTERPRISE SERVER CONNECTION STRING
7 #MONGODB_URI=mongodb://[REDACTED]@mdb-rs-0.mdb-rs-svc.mongodb.svc.cluster.local:27017,mdb-rs-1.mdb-
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PROBLEMS 10

OUTPUT

DEBUG CONSOLE

TERMINAL

> ▾ TERMINAL

⌚ 2025-08-28 21:18:45,465 INFO advanced-search-ms.domain - [DOMAIN] Mapping MongoDB document to Product domain model  
⌚ 2025-08-28 21:18:45,465 INFO advanced-search-ms.domain - [DOMAIN] Mapping MongoDB document to Product domain model

.env

backend > advanced-search-ms > .env

```
1 # MongoDB Atlas settings
2
3 #ATLAS CONNECTION STRING
4 #MONGODB_URI=mongodb+srv://[REDACTED]@ist-shared.n0kts.mongodb.net/?retryWrites=true&w=majority
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6 # ENTERPRISE SERVER CONNECTION STRING
7 MONGODB_URI=mongodb://[REDACTED]@mdb-rs-0.mdb-rs-svc.mongodb.svc.cluster.local:27017,mdb-rs-1.mdb-r
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PROBLEMS 10

OUTPUT

DEBUG CONSOLE

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> ▾ TERMINAL

```
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.env

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backend > advanced-search-ms > .env

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6 # ENTERPRISE SERVER CONNECTION STRING
7 #MONGODB_URI=mongodb://[REDACTED]@mdb-rs-0.mdb-rs-svc.mongodb.svc.cluster.local:27017,mdb-rs-1.mdb-
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PROBLEMS 10

OUTPUT

DEBUG CONSOLE

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> ▾ TERMINAL

```
ψ 2025-08-28 21:18:45,465 INFO advanced-search-ms.domain - [DOMAIN] Mapping MongoDB document to Product domain model
ψ 2025-08-28 21:18:45,465 INFO advanced-search-ms.domain - [DOMAIN] Mapping MongoDB document to Product domain model
```

The screenshot shows a web browser window titled "Product Inventory" at the URL "localhost:3000/product-inventory". The page has a header with the text "Leafy Associate" and a green leaf icon. Below the header is a main title "Product Inventory" with a subtitle "Search for a product to view detailed inventory information". On the left, there is a "Back" button. On the right, there is a "Talk track!" button. Below the main title is a search bar with a placeholder "Enter a search term" and a magnifying glass icon. To the left of the search bar is a "MongoDB Search" dropdown menu. To the right of the search bar is a "Scan Product" button. A large, semi-transparent watermark of a magnifying glass over a cloud is centered on the page. At the bottom, there is a navigation bar with icons for "Home", "Products", "Inventory", "Reports", and "Settings". The "Products" icon is highlighted. A "Recent Activity" section is also visible at the bottom.

The screenshot shows a web browser window titled "Product Inventory" at the URL "localhost:3000/product-inventory". The page has a header with the text "Leafy Associate" and a small leaf icon. Below the header is a main title "Product Inventory" with a subtitle "Search for a product to view detailed inventory information". On the left, there is a "Back" button. On the right, there is a "Talk track!" button. The search bar contains the placeholder "Enter a search term" and features a magnifying glass icon. To the left of the search bar is a dropdown menu labeled "MongoDB Search". To the right is a "Scan Product" button with a barcode icon. A large, stylized magnifying glass icon with a green leaf inside is centered on the page. At the bottom, there is a navigation bar with icons for back, forward, and other browser functions, along with a "Recent Activity" section.

```
backend > advanced-search-ms > .env
1 # MongoDB Atlas settings
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# Setup

```
Last login: Fri Sep  5 08:26:55 on ttys006
angie.guemes@M4377QJJ70 ~ % kubectl apply --context "${K8S_CTX}" -n "${MDB_NS}" -f -
apiVersion: mongodb.com/v1
kind: MongoDBSearch
metadata:
  name: ${MDB_RESOURCE_NAME}
spec:
  resourceRequirements:
    limits:
      cpu: "3"
      memory: 5Gi
    requests:
      cpu: "2"
      memory: 3Gi
EOF
```

•••

← →



[ ] ⌂ ⌂

! YAML X

```
1  apiVersion: mongodb.com/v1
2  kind: MongoDBSearch
3  metadata:
4    name: mdb-rs
5    namespace: mongodb
6  spec:
7    source:
8      # point to a MongoDB Enterprise server deployed on the same cluster
9      mongoDBResourceRef:
10        name: mdb-rs
11        # or a MongoDB Enterprise server running outside Kubernetes
12        # external:
13        #   hostAndPorts:
14        #     - replicaset-node-first.acme.com:27017
15        #     - replicaset-node-second.acme.com:27017
16        #     - replicaset-node-third.acme.com:27017
17    resourceRequirements:
18      limits:
19        cpu: "3"
20        memory: 5Gi
21      requests:
22        cpu: "2"
23        memory: 3Gi
```



•••

← →



[ ] ⌂ ⌂

! YAML X

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•••

← →



[ ] ⌂ ⌂

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```



angie.guemes@M-M4377QJJ70 ~ %  
angie.guemes@M-M4377QJJ70 ~ %  
angie.guemes@M-M4377QJJ70 ~ %

angie.guemes -->zsh -- 181x44

```
angie.guemes@M-M4377QJJ70 ~ %
angie.guemes@M-M4377QJJ70 ~ %
angie.guemes@M-M4377QJJ70 ~ % echo; echo "MongoDBCommunity resource"
kubectl --context "${K8S_CTX}" -n "${MDB_NS}" get mdb/mdb-rs
echo; echo "MongoDBSearch resource"
kubectl --context "${K8S_CTX}" -n "${MDB_NS}" get mdbs/mdb-rs
echo; echo "Pods running in cluster ${K8S_CTX}"
kubectl --context "${K8S_CTX}" -n "${MDB_NS}" get pods
```

**MongoDBCommunity resource**

NAME	PHASE	VERSION	TYPE	AGE
mdb-rs	Running	8.0.10	ReplicaSet	17d

**MongoDBSearch resource**

NAME	PHASE	AGE
mdb-rs	Running	17d

**Pods running in cluster**

NAME	READY	STATUS	RESTARTS	AGE
mdb-rs-0	1/1	Running	0	37h
mdb-rs-1	1/1	Running	0	27h
mdb-rs-2	1/1	Running	0	27h
mdb-rs-search-0	1/1	Running	0	37h
mongodb-kubernetes-operator-5ddfccf4d9-5kghp	1/1	Running	0	37h

angie.guemes@M-M4377QJJ70 ~ %

MongoDB Controllers for Kub... X Atlas Vector Search Overview X +

mongdb.com/docs/kubernetes/current/

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# MongoDB Controllers for Kubernetes Operator

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IMPORTANT

Kubernetes Operator deploys MongoDB Enterprise, Ops Manager, and MongoDB Community to Kubernetes. Due to the breadth of configuration options available for MongoDB Enterprise and Ops Manager, this guide focuses on these deployment options.

To deploy MongoDB Community in Kubernetes, see the documentation on GitHub.

The MongoDB Controllers for Kubernetes Operator translates the human knowledge of creating a MongoDB instance into a scalable, repeatable, and standardized method. Kubernetes needs help creating and managing stateful applications like databases. It needs to configure the network, persist storage, and dedicate computing capacity without additional human effort on each container.

The Kubernetes Operator manages the typical lifecycle events for a MongoDB cluster: provisioning storage and computing power, configuring network connections, setting up users, and changing these settings as needed. It accomplishes this using the Kubernetes API and tools.

You provide the MongoDB Controllers for Kubernetes Operator with the specifications for your MongoDB cluster. The MongoDB Controllers for Kubernetes Operator uses this information to specify to Kubernetes how to configure that cluster including provisioning storage, setting up the network connections, and configuring other resources.



MongoDB Controllers for Kub... Atlas Vector Search Overview +

mongodb.com/docs/atlas/atlas-vector-search/vector-search-overview/

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ATLAS ARCHITECTURE CENTER

Atlas Vector Search

- Quick Start
- Create Embeddings
- Create and Manage Indexes
- Create and Run Queries
- Hybrid Search
- Use Compatible Views
- Transform Documents & Filter Collections
- Vector Quantization
- Retrieval-Augmented Generation (RAG)
- Playground Chatbot Demo Builder
- Build AI Agents

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that contain vector embeddings at query-time. In your Atlas Vector Search index definition, you index the fields in your collection that contain your embeddings to enable vector search against those fields. Atlas Vector Search supports embeddings that are less than and equal to 8192 dimensions in length.

You can also pre-filter your data by indexing additional fields in your collection that you want to run your Atlas Vector Search queries against. You can filter on boolean, date, objectId, numeric, string, and UUID values, including arrays of these types. Filtering your data narrows the scope of your search and ensures that certain vector embeddings aren't considered for comparison.

To learn how to index fields for Atlas Vector Search, see [How to Index Fields for Vector Search](#).

## Atlas Vector Search Queries

Atlas Vector Search supports approximate nearest neighbor (ANN) search with the [Hierarchical Navigable Small Worlds](#) algorithm and exact nearest neighbor (ENN) search.

To find the most similar vectors, Atlas Vector Search performs ANN search without scanning every vector embedding and ENN search exhaustively on all the indexed vector embeddings. To learn more, see [vectorSearch Definition](#).

Atlas Vector Search queries consist of [aggregation pipeline stages](#) where the `$vectorSearch` stage is the first stage in the pipeline. The process for a basic Atlas Vector Search query is as follows:

1. You select either ANN or ENN search and specify the `query vector`, which is the vector embedding that represents your search query.
2. Atlas Vector Search finds vector embeddings in your data that are closest to the query vector.
3. Atlas Vector Search returns the documents that contain the most similar vectors.

To customize your vector search query, you can pre-filter your data on fields that you've indexed by using an [MQL](#) match expression with supported [query](#) or [aggregation operators](#), or you can add additional [aggregation stages](#) to further process and organize your results.

To learn how to create and run Atlas Vector Search queries, see [Run Vector Search Queries](#).

## Next Steps

For a hands-on experience creating Atlas Vector Search indexes and running Atlas Vector Search queries against sample data, try the [Atlas Vector Search Course on MongoDB University](#) and the tutorials in the

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On this page

What is Vector Search?

Use Cases

AI Integrations

Key Concepts

Atlas Vector Search Indexes

Atlas Vector Search Queries

Next Steps

# Use Cases

## Order details

[Talk track!](#)

### Summary

Date: Aug 25, 2025 at 2:37:17 AM  
ID: 68ac20bd9e02021484ad1f62  
Status: **DELIVERED**

Type: [BUY ONLINE, GET DELIVERY AT HOME](#)  
Address: 226 W 108th St, New York City NY 10025, USA  
Receipt: [See details](#)

Total: \$183  
Shipping: \$0  
Receipt: [See details](#)

### Status



In process: Aug 25, 2025 at 2:37:17 AM

Ready for delivery: Aug 25, 2025 at 2:37:27 AM

Picked up from warehouse: Aug 25, 2025 at 2:37:37 AM

In Transit: Aug 25, 2025 at 2:37:47 AM

Delivered: Aug 25, 2025 at 2:37:57 AM

### Products



Girls' Petite Sterling Silver Birthstone Open Heart Stud Earrings and 16" Pendant Necklace Jewelry Set

\$116

Amount: 1



Flavia Women's Clutch (Wine)

\$67

Amount: 1

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## Digital receipt

x

Receipt Document Digital receipts Behind the scenes Why MongoDB

Loyalty

Points earned +50

Tier Gold

Download receipt as PDF ↴

Based on this order you might also like

★ 0.90979	★ 0.86607	★ 0.86789
Amazon Collection Sterling Silver Birthstone Halo Heart Stud Earrings, Garnet \$77	Sterling Silver Rose Gold Plated Polished Bead Post 12mm Stud Earrings Amazon Collection \$53	Platinum-Plated Sterling Silver and Swarovski Zirconia Solitaire Pendant Necklace, 16 Inch Amazon Collection \$49
★ 0.86498	★ 0.86488	★ 0.86469
Silver Plated Swarovski Emerald Crystal Birthstone Pendant Necklace (May) Amazon Collection \$47	Yellow Gold Plated Sterling Silver Stud Earrings set with Round Cut Swarovski Zirconia (4 ctw) Amazon Collection \$107	10k Gold Made with Swarovski Birthstone November Stud Earrings Amazon Collection \$82

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MongoDB



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## Transaction Simulator

Powered by MongoDB

### Select Customer

Customer

Stephen Burns

### Profile Summary

Account	Risk Score	Avg. Transaction
PHTF5894949Bd16337	16.73	\$58.33

{ MongoDB Document }

### Scenario Selection

- Normal Transaction
- Unusual Amount
- Unusual Location
- New Device
- Multiple Red Flags

### Scenario Description

A typical transaction within customer's normal patterns and behaviors.

### Transaction Details

Transaction Type

Purchase

Payment Method

Credit Card

Amount (USD)

\$ 58

Merchant Category

Healthcare

Common: healthcare, restaurant, gas

### Location

Using Customer's Common Location

Williamsburgh, Louisiana, NL



### Device

Select Device

desktop - macOS (Firefox)



### Device Details

ID: 167291-24a9-4711-eb22-1ece3be1afc4  
Type: desktop  
OS: macOS  
Browser: Firefox

Evaluate Transaction



Transactions

Select

Customer ID

Stephanie

Profile

Account ID

PHT754

...

[More]

Transactions

Transactions

Purchases

Amount

\$ 58.00

Avg: \$ 58.00

...

[View]

Locations

City

Unknown

...

[View]

Devices

Device ID

new-device

...

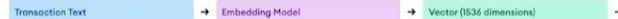
[View]

Vector Search Fraud Assessment

Vector Search Fraud Analysis

Using MongoDB Vector Search to analyze semantically similar transactions for fraud detection

Vector Embedding Process



MongoDB Vector Search

Vector Search Risk Score Calculation (SCORE: 50)

Click to see the detailed mathematical breakdown of how the vector search risk score was calculated

Vector-Matched Transactions: (Showing top 5 of 15 vector matches)

**\$681.43 purchase at healthcare**

Date: 5/13/2025, 11:21:09 AM Risk Level: medium Risk Score: 57.52514859120216 Payment Method: Credit Card

Risk Flags:

Rare Transaction Time Velocity Alert

Vector Similarity: 88.2%

**\$808.51 purchase at healthcare**

Date: 5/8/2025, 1:16:02 AM Risk Level: medium Risk Score: 64.42560220727748 Payment Method: Credit Card

Risk Flags:

Unusual Amount Unexpected Location Velocity Alert

Vector Similarity: 87.7%

**\$781.03 purchase at healthcare**

Date: 5/6/2025, 1:40:43 PM Risk Level: medium Risk Score: 49.29952792518717 Payment Method: Credit Card

Risk Flags:

Unexpected Location Unusual Amount

Vector Similarity: 87.7%

**\$247.79 purchase at healthcare**

Date: 2/16/2025, 1:50:15 PM Risk Level: medium Risk Score: 37.307993062491185 Payment Method: Credit Card

Risk Flags:

Rare Transaction Time

Vector Similarity: 87.4%

**\$82.55 purchase at healthcare**

Date: 1/22/2025, 12:56:02 PM Risk Level: low Risk Score: 18.06907907596037 Payment Method: Debit Card

Vector Similarity: 88.8%

 Type a prompt or choose one from the examples below Select Search Type

## Suggested advanced searches

[Show me cases where additional tests are recommended](#)[Show me patients that need urgent action](#)[Show patients with asymmetric densities and microcalcifications](#)[Retrieve records indicating a need for biopsy](#)[Find patients with benign findings and fatty breasts](#)[Show records with ill-defined masses and architectural distortion](#)[Retrieve patients with masses and BI-RADS 3 or 4](#)



Show me patients that need urgent action

Select Search Type



Suggested advanced searches

[Show me cases where additional tests are recommended](#)[Show me patients that need urgent action](#)[Show patients with asymmetric densities and microcalcifications](#)[Retrieve records indicating a need for biopsy](#)[Find patients with benign findings and fatty breasts](#)[Show records with ill-defined masses and architectural distortion](#)[Retrieve patients with masses and BI-RADS 3 or 4](#)

53 years old

Report Date: 12/29/2023, 5:14:00 AM

Ask a Question

**Clinical notes**

Patient's age: 53 years old Clinical history: The patient has a family history of breast cancer, with the patient's mother diagnosed at the age of 48. Findings: Left Crano-Caudal (L-CC) view: BI-RADS score 6 - Highly suggestive of malignancy. Left Medio-Lateral Oblique (L-MLO) view: BI-RADS score 4 - Suspicious abnormality, additional imaging and/or biopsy recommended. Right Crano-Caudal (R-CC) view: BI-RADS score 5 - Highly suggestive of malignancy. Right Medio-Lateral Oblique (R-MLO) view: BI-RADS score 5 - Highly suggestive of malignancy. Impression: The

**Conclusions**

recommended for optimal management. Urgent follow-up is encouraged due to the high suspicion of malignancy and the patient's family history of breast cancer.

Search score: 0.493234



52 years old

Report Date: 9/20/2023, 9:59:28 AM

Ask a Question

**Clinical notes**

Patient's age: 52 years old Clinical History: The patient has a family history of breast cancer. BI-RADS scores: - Left Craniocaudal (L-CC): BI-RADS 2 - Left Mediolateral Oblique (L-MLO): BI-RADS 5 - Right Craniocaudal (R-CC): BI-RADS 5 - Right Mediolateral Oblique (R-MLO): BI-RADS 5 Impressions: 1. Left CC: No significant abnormalities identified, BI-RADS 2. 2. Left MLO: Suspicious findings for malignancy, BI-RADS 5. 3. Right CC: Suspicious findings for

**Conclusions**

steps. Urgent evaluation and expedited follow-up are strongly recommended, given the patient's family history of breast cancer and the high BI-RADS scores on the affected views. Early detection and intervention are crucial for optimal patient outcomes. Further evaluation with additional imaging modalities and potential biopsy will help determine the nature of the suspicious findings and guide appropriate treatment decisions. The patient should be informed of the



# In conclusion

MongoDB Search and Vector Search in Enterprise Server enable developers to build full-text and semantic search features directly in self-hosted MongoDB, without external engines, simplifying development, reducing complexity, meeting strict regulatory requirements, and accelerating innovation in self-managed environments.



Are you ready to disrupt  
industries and unleash the **power**  
of software and **data**?

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Solutions





# Thank You

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**Genevieve Broadhead**

Global Lead, Retail  
Solutions, MongoDB