



# Couchbase Capella Workshop

## > Vector & AI

2시 5분에 시작하겠습니다.

2024.09.25

손 광락, Solutions Engineer



# Capella Webinar

구분	일자	Webinar 주제
시리즈 1	2024-09-25	벡터 검색을 활용한 AI Powered 어플리케이션 구축
시리즈 2	2023-10-30	벡터 검색을 활용한 LLM/RAG 어플리케이션 구축
시리즈 3	2024-11-27	벡터 검색을 활용한 Mobile On-Device AI 어플리케이션 구축



# Agenda

- 14:00 – 14:10 등록 확인 & 실습 환경 확인
- 14:10 – 14:35 카우치베이스 소개
- 14:35 – 15:00 AI, Vector 와 Vector 검색
- 15:00 – 15:10 Break
- 15:10 – 15:25 Capella/Couchbase 사용법 실습
- 15:25 – 15:50 Vector 검색 실습/데모
- 15:50 – 16:00 Q & A

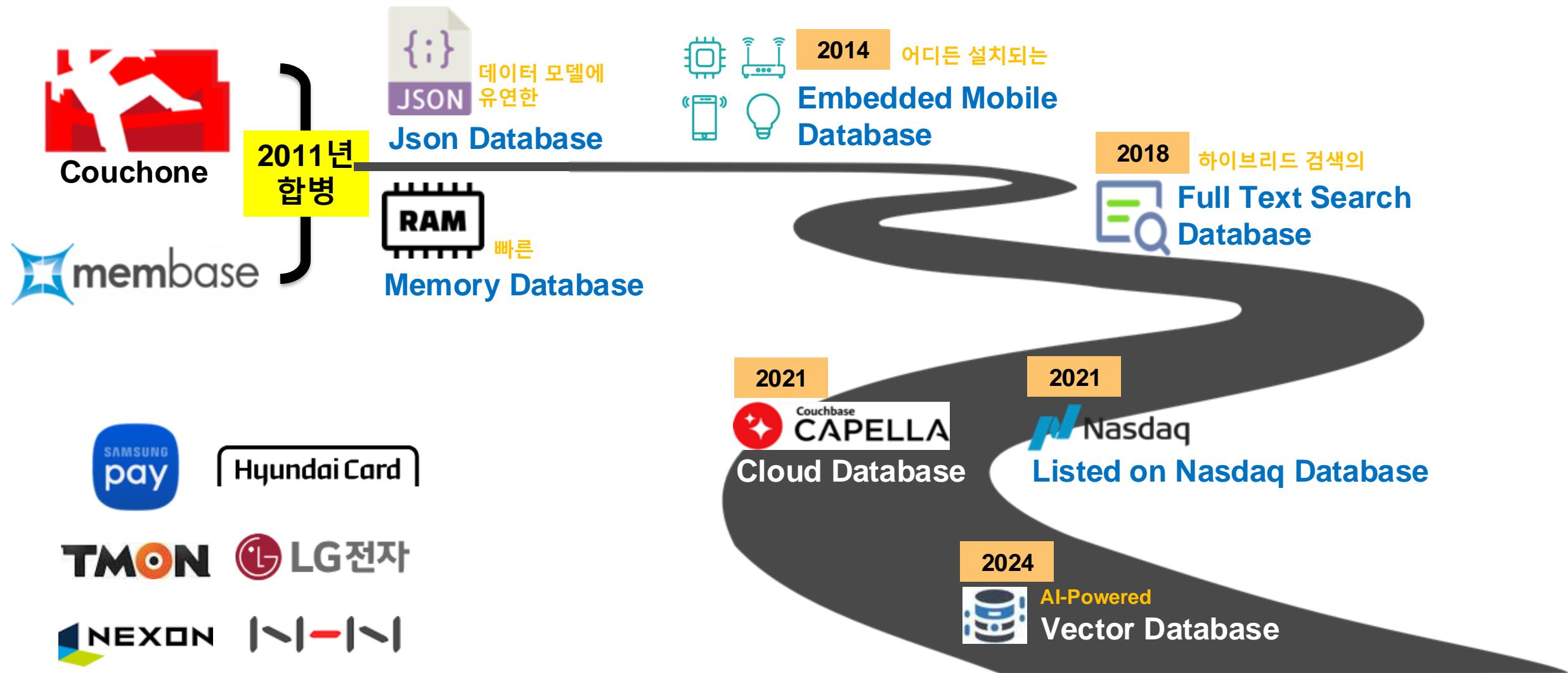
# Couchbase Introduction & Architecture

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# 1 개요 : Couchbase 회사 소개

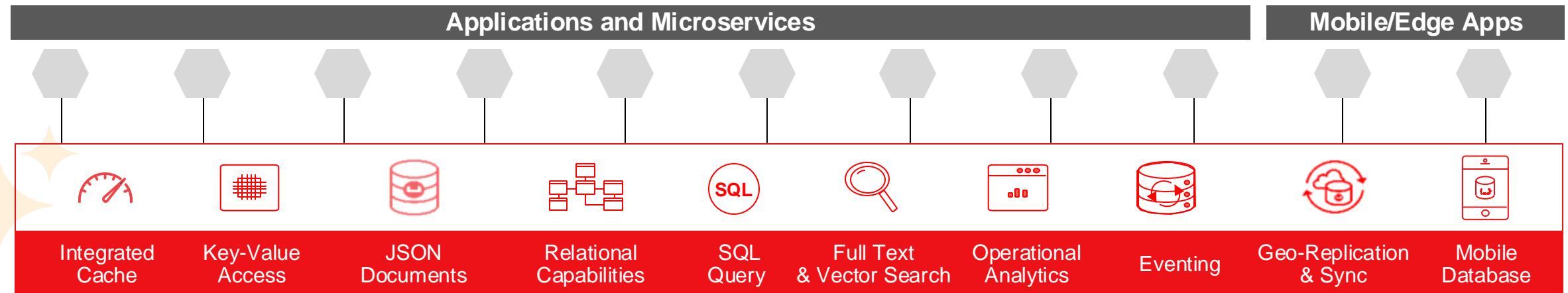
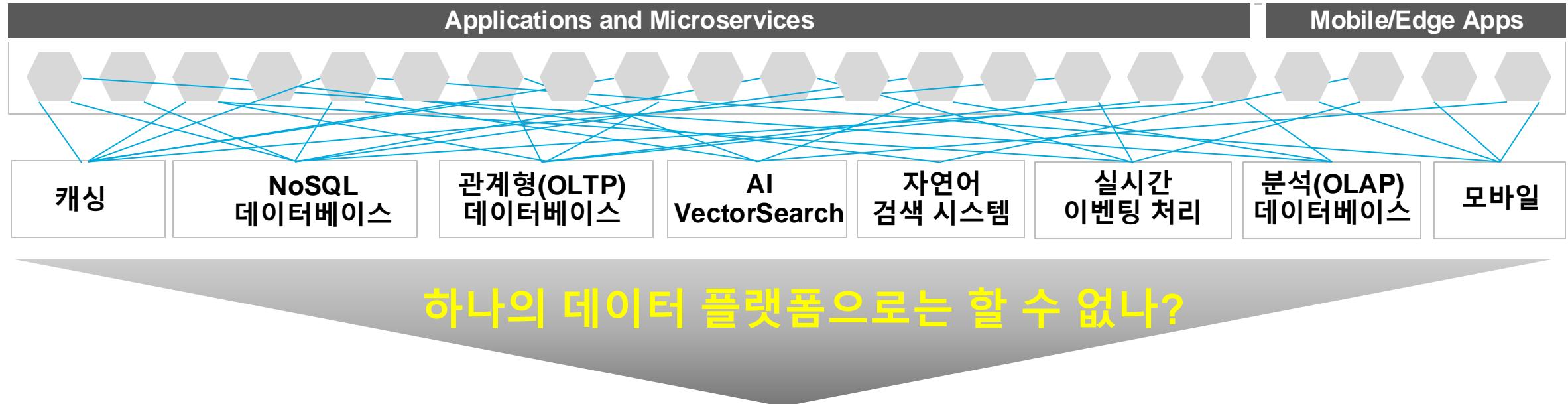


# 1 개요 : Couchbase 도입 사례

Customers	LinkedIn	TESCO	AMADEUS	COMCAST	UNITED
Application	캐싱 & 싱글뷰를 위한 세션 스토어	리얼 타임 프라이싱, 제품 캐탈로그, 재고관리	비행편 가용성, 예약, 가격분석등	Customer 360 싱글뷰, 'Unified notes'App지원	리얼타임 승무원 분석, 일정 및 리소스 관리
Performance	<b>2백만+</b> 읽기/초당  <b>1천만</b> 쿼리/초당	<b>1천만+</b> SKUs  <b>3만5천</b> 요청/초당.	<b>8백만</b> Ops / 초당  <b>&lt;2.5ms</b> 반응시간	<b>2.1억개</b> 다큐먼트  <b>10만</b> 사용자	<b>4.1만</b> 종업원  <b>1.5억+</b> 이용객

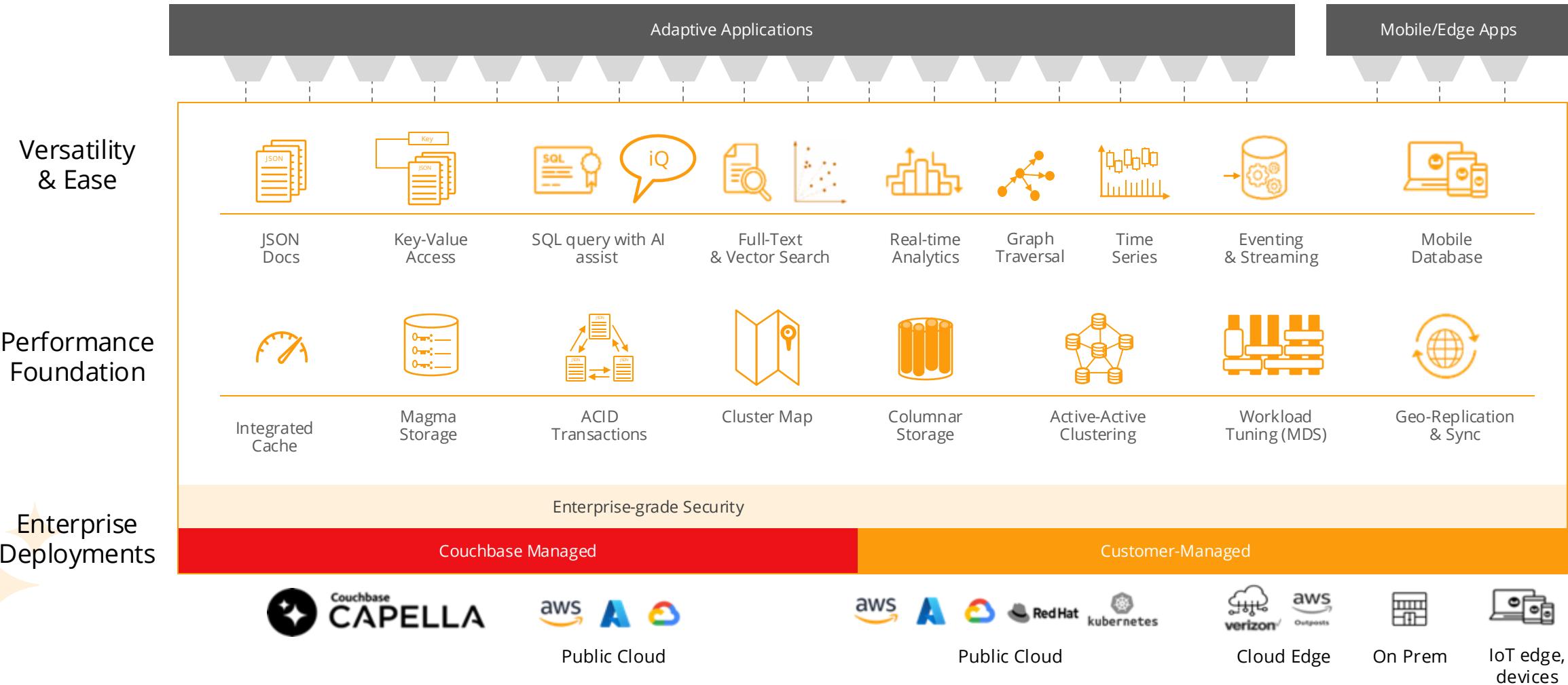


# 1 개요 : 하나의 App을 만들기 위해 다양한 데이터 관리 솔루션이 필요.

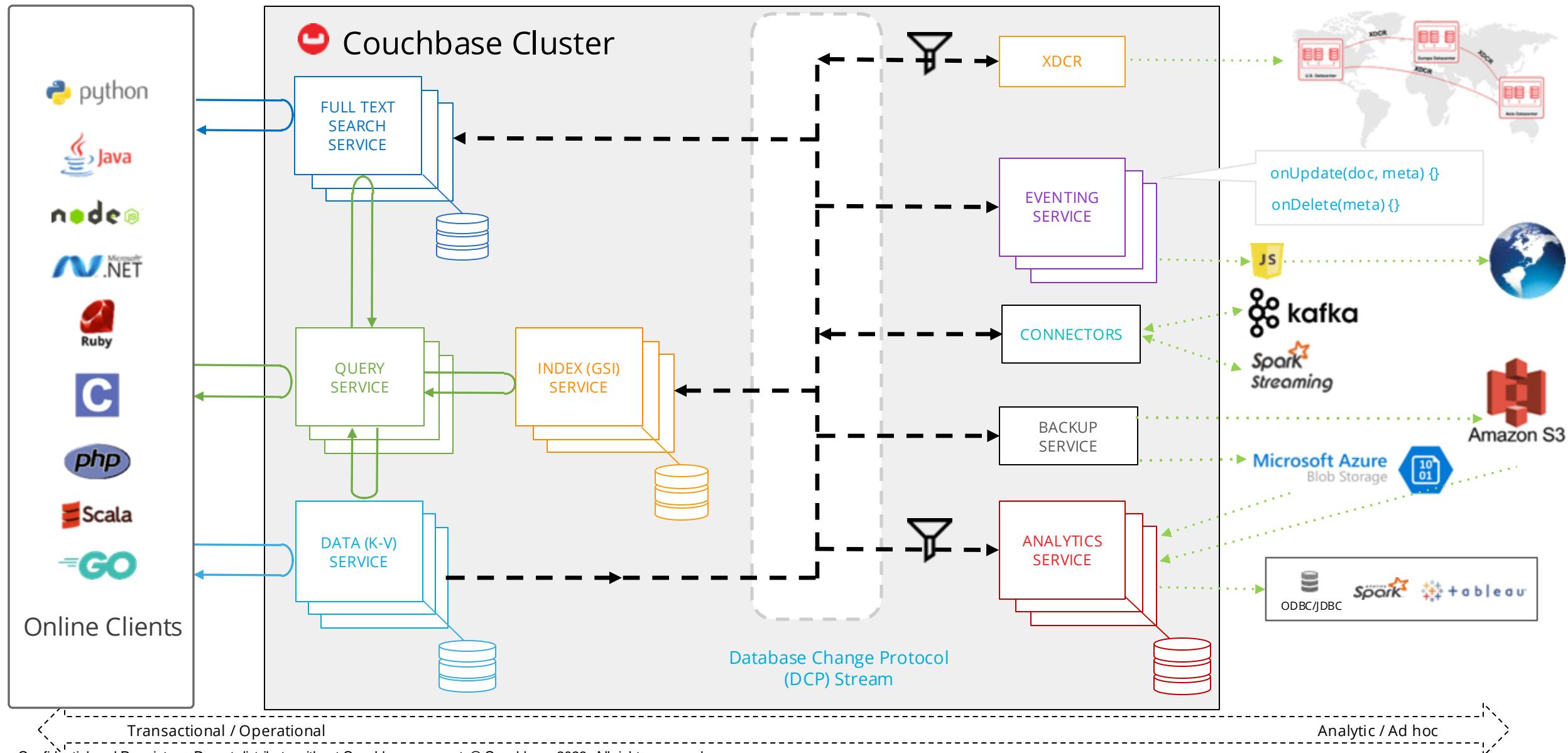


# 1 개요 : Enterprise 데이터 플랫폼

JSON 도큐먼트 DB, Key-Value 캐시, 표준 SQL, 텍스트 검색, 실시간 분석, 시계열 처리, 고가용성, 재해복구, 모바일 DB 지원하며 AI-Powered 어플리케이션을 위한 데이터 플랫폼입니다.



## 2 아키텍처 : 메모리 기반 Micro Service 아키텍처



## 2 아키텍처 : Memory First 아키텍처

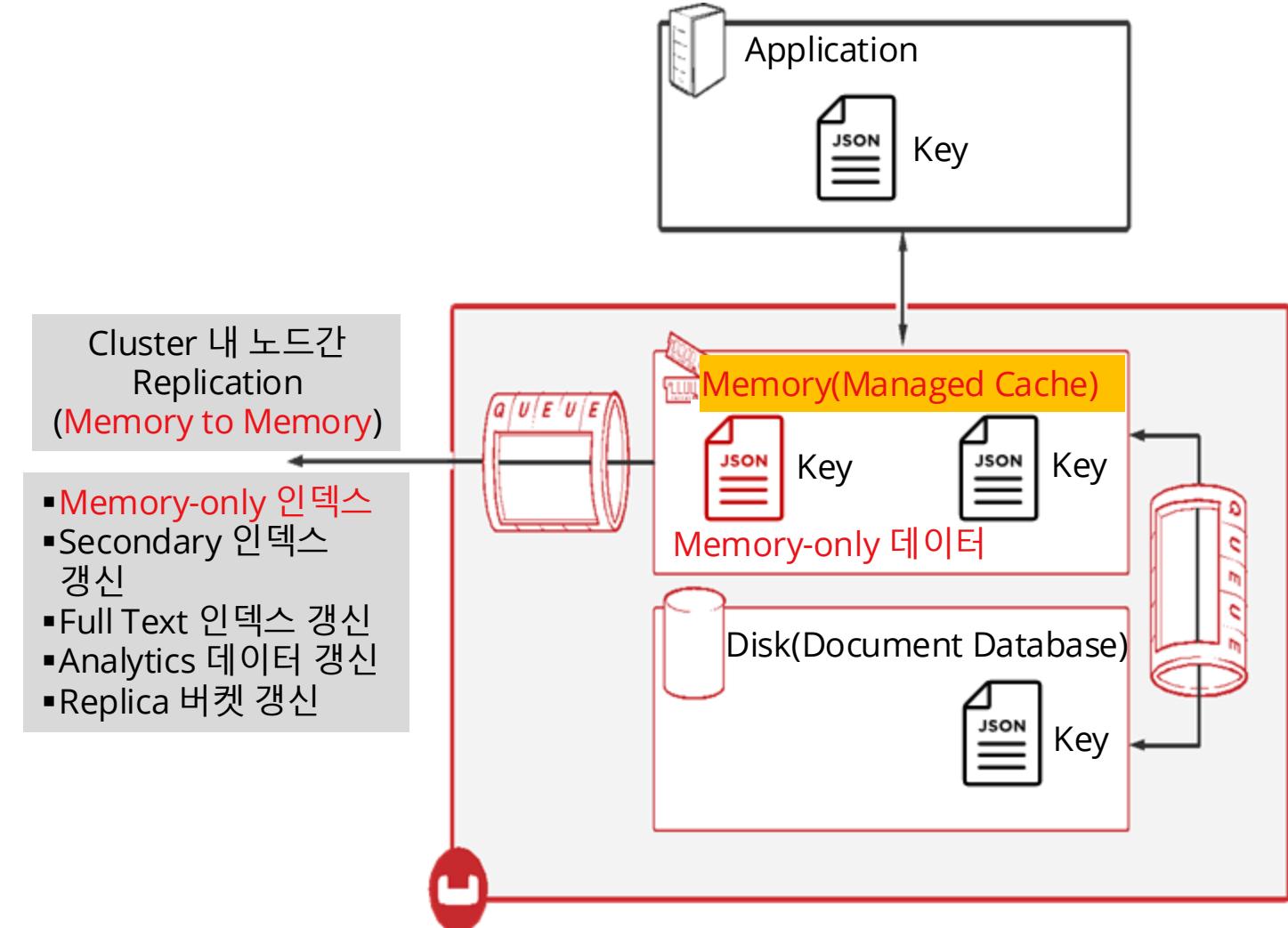
인 메모리 빌트인 캐시를 통해 빠른 Read/Write 업무를 수행하고 데이터 분산 관련 작업도 메모리 기반 프로토콜 사용

- **인메모리 Key-Value 오퍼레이션**

- 특정 Key를 기준으로 데이터를 인메모리에서 처리하는 메카니즘
- 대부분 도큐먼트 데이터베이스는 Read 성능 향상을 위해 별도 솔루션으로 적용

- **Couchbase**

- 인메모리 Key-Value 오퍼레이션의 장점을 구현한 빌트인 캐시 제공
- Value가 단순 수치나 배열이 아닌 JSON 도큐먼트 자체
- JSON 도큐먼트 처리가 메모리 우선 방식



## 2 아키텍처 : 분산 병렬, Master Node-less 아키텍처

데이터를 다수의 노드에 Key 기반 자동 분산 저장하며, 별도의 마스트 노드없이 모든 노드에서 병렬 처리를 수행함.

### • Key 기반 자동 분산 아키텍처

- 대량의 Key-Value 처리를 노드 별로 분산하여 성능 향상
- 최대한 균등하게 분산 저장 가능, 특정 노드에 편중되는 현상(Data Skew) 방지
- 별도의 분산 정책 불필요

### • Couchbase

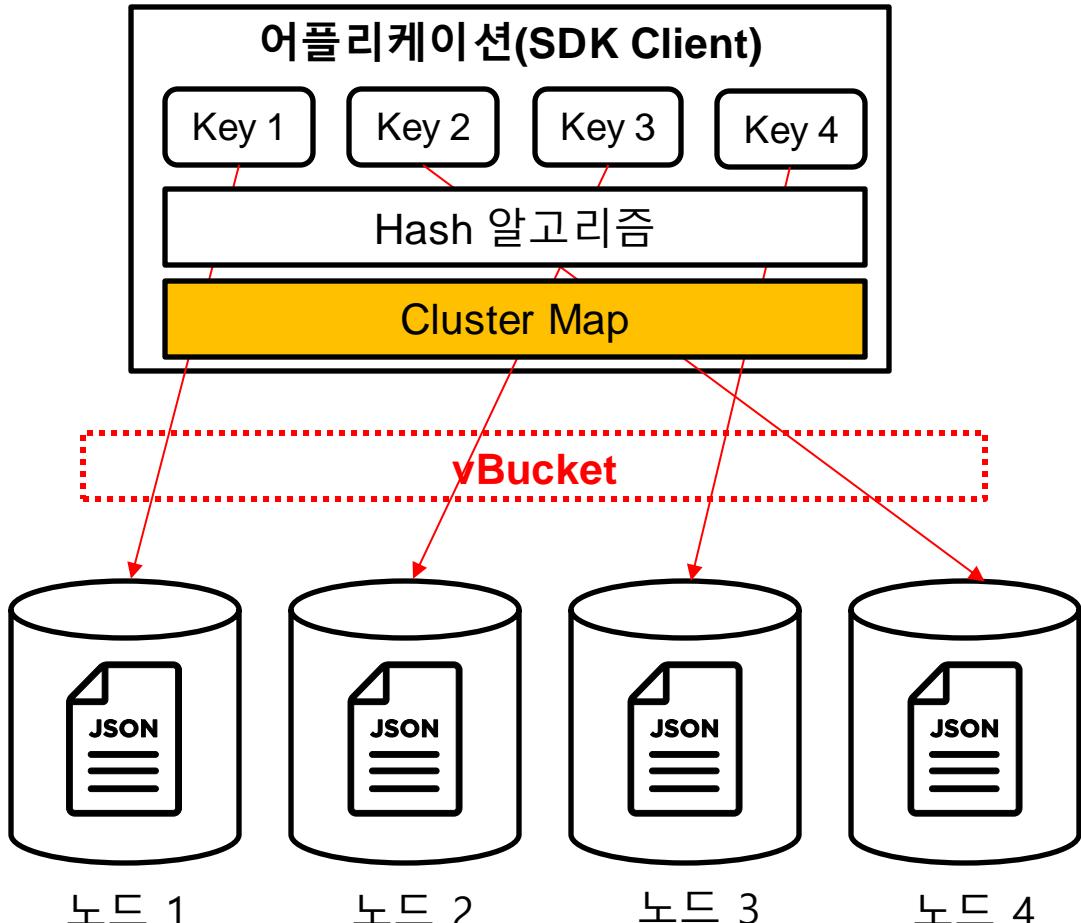
- Key에 대한 Hash 알고리즘 적용으로 자동 분산
- 노드 추가 시, Rebalancing을 통해 Key 재 분산 수행

### • Master Node-less 아키텍처

- 어플리케이션의 Key-Value Operation 시, 해당 Key에 맵핑된 특정 노드에 직접 접근
- 모든 노드가 어플리케이션 측면에서 Active 노드 역할

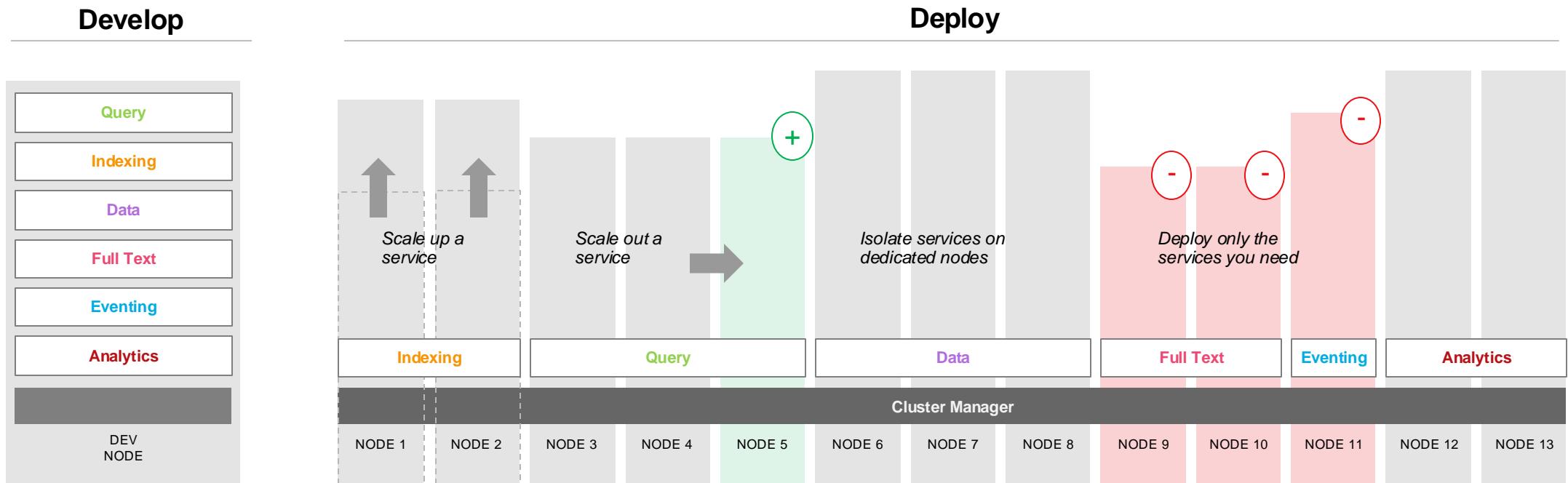
### • Couchbase

- 어플리케이션이 데이터 처리를 구현하기 위해 SDK 활용
- 데이터 분산 정보(Cluster Map)를 지속적으로 SDK Client에 Update



## 2 아키텍처 : 자원 절약형 다차원 독립 확장

Couchbase는 **Multi-Dimensional Scaling** 기능으로 서비스 별 Workload 분산 및 독립성을 보장합니다.



- **Service 단위 하드웨어 자원 최적화**
  - 각 Service 별 시스템 자원을 독립적으로 할당
  - **각 Service에서 수행되는 작업이 다른 Service에 영향을 최소화**, 예를 들어 Analytics Service에서 복잡한 작업을 수행하여 시스템 자원을 많이 사용해도 Data Service 혹은 Query Service에서 수행하는 Operational 작업에는 영향이 없는 구조

### 3 성능 : NoSQL Database 벤치마크에서 탁월한 우위

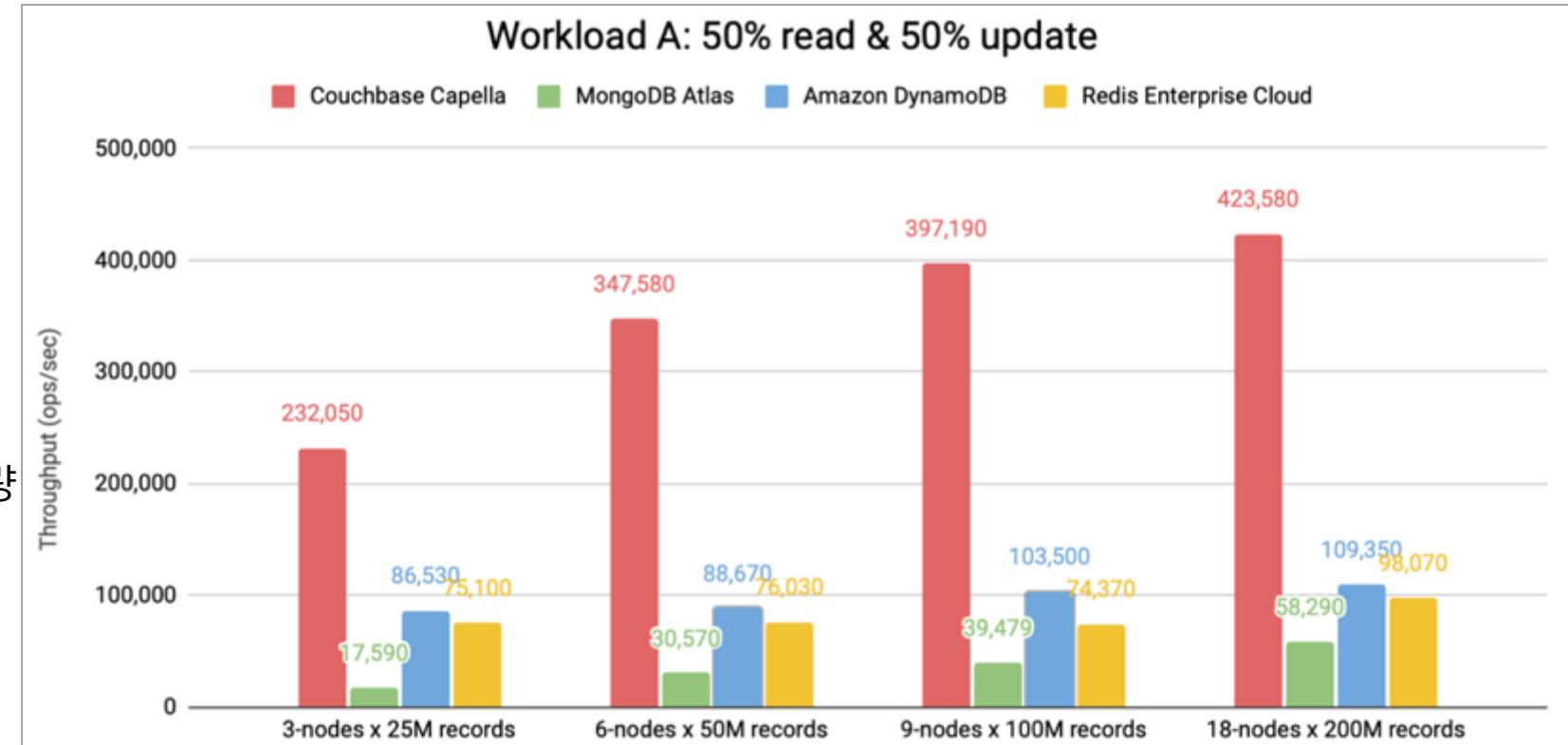
<Yahoo! Cloud Serving Benchmark(YCSB)>

- **테스트 방식**

- Key 기반 작업 성능
- 50% Read/50% Write
- 1 KB 도큐먼트

- **Couchbase**

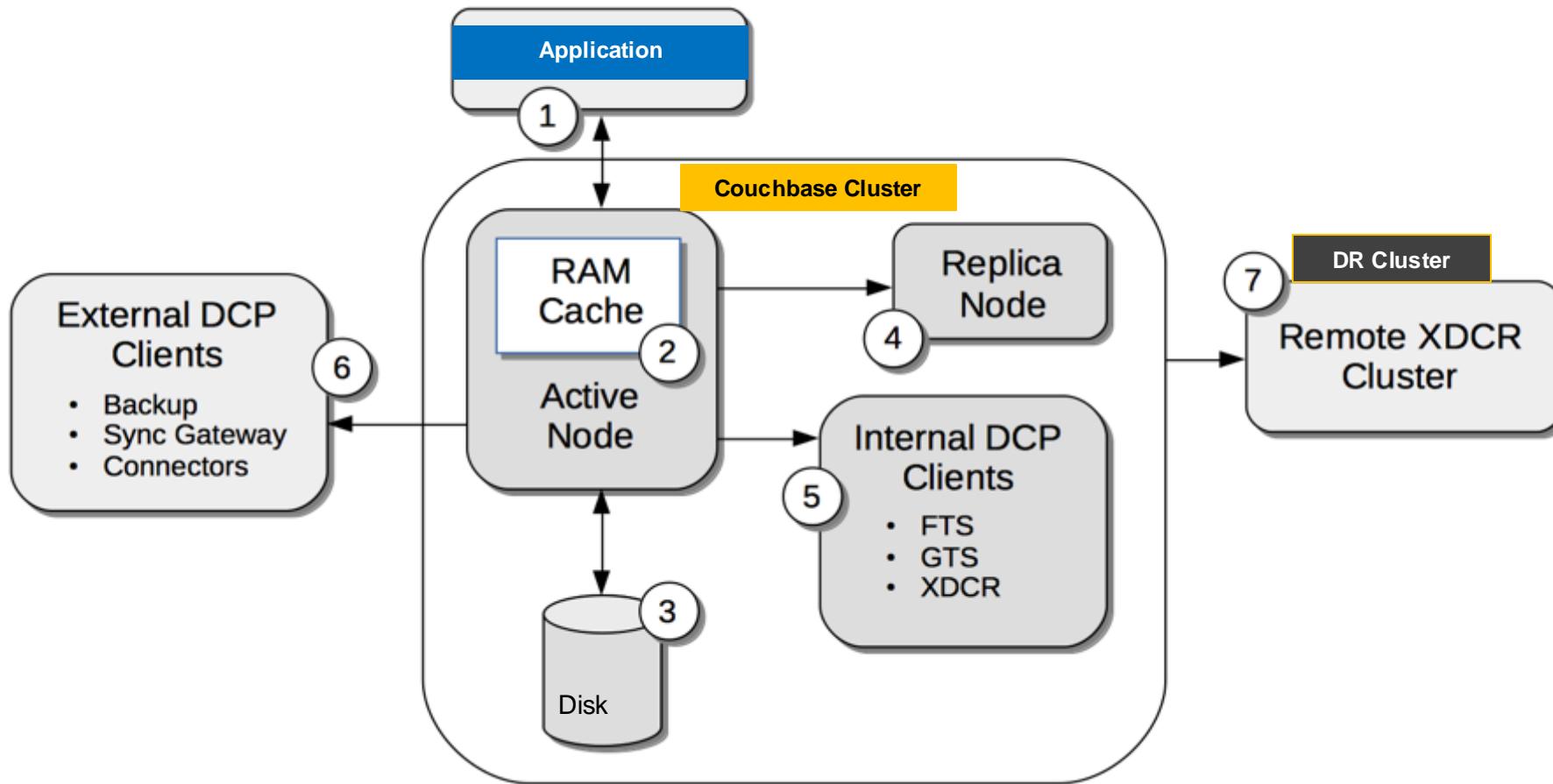
- 인메모리 Key-Value 처리
- 타 제품 대비 2 ~ 10 배 처리량 우수
- 노드 수 증가에 비례하여 처리량/처리 속도 증가



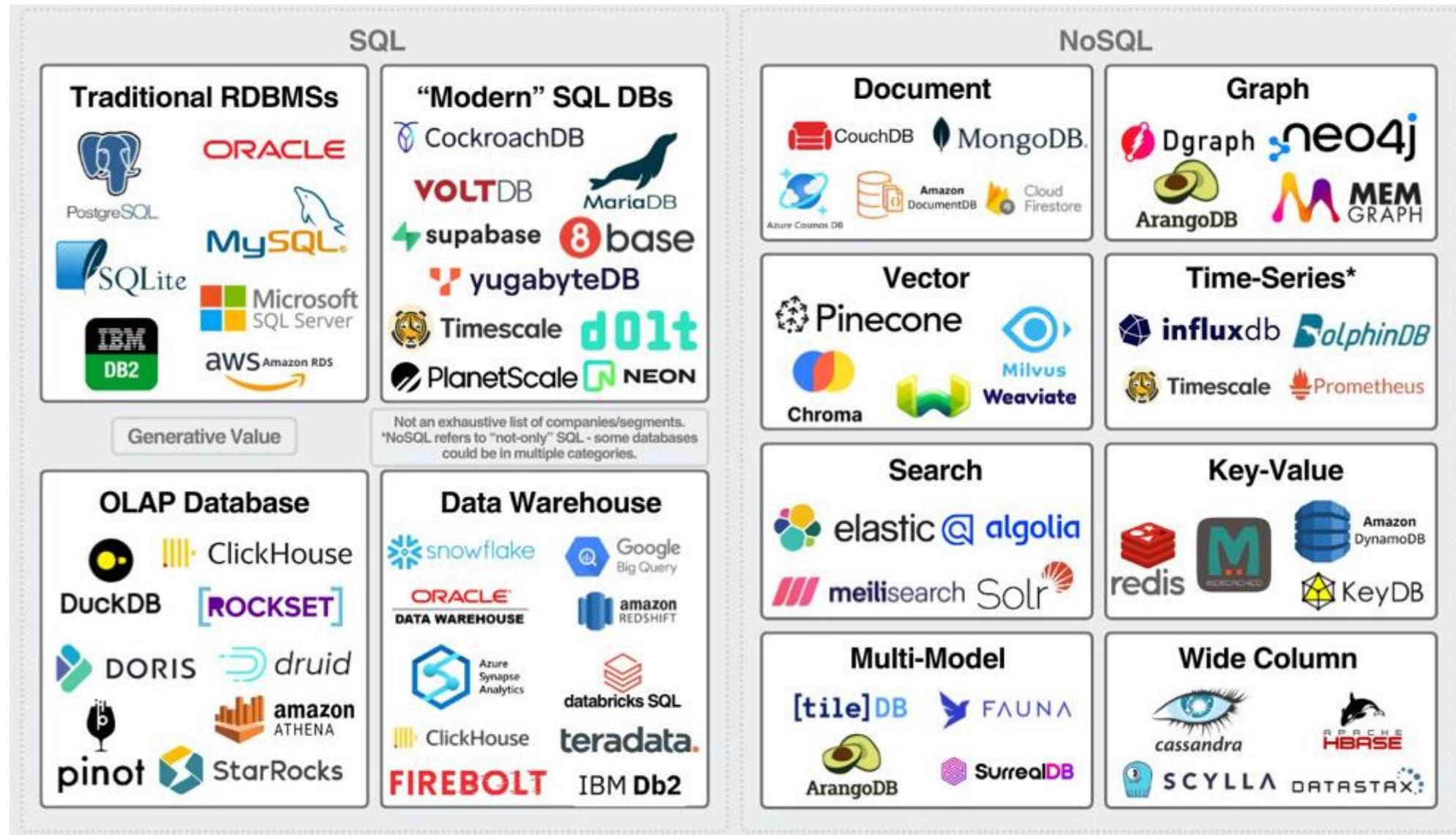
출처 : <https://www.altoros.com/blog/couchbase-capella-vs-mongodb-atlas-vs-amazon-dynamodb-vs-redis-enterprise-cloud/>

### 3 성능 : End-to-End 압축으로 네트워크/스토리지 비용 절감

Couchbase는 데이터를 압축하여 전송하며 압축된 형태로 메모리와 디스크에 보관됩니다. 즉, 네트워크 전송량, 메모리 및 디스크 사용량을 줄려 성능 및 운영비용을 절감할 수 있습니다.



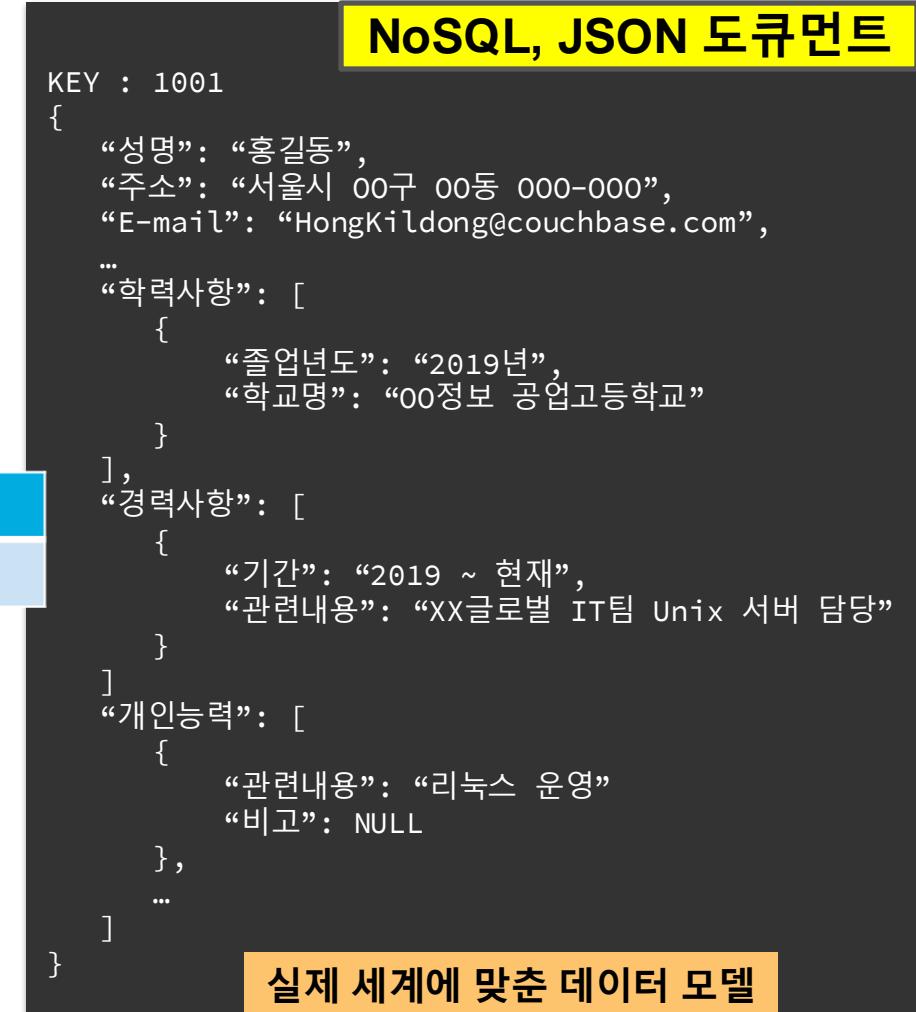
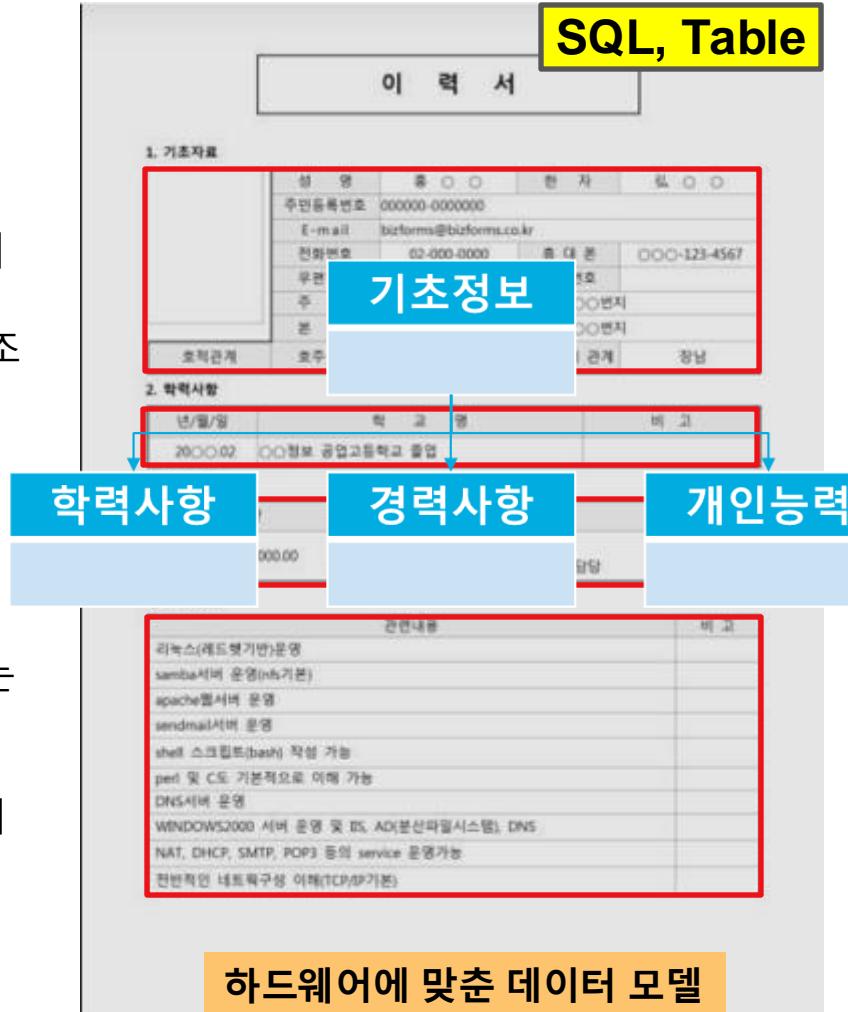
# 4 데이터 모델 : SQL(Table)과 NoSQL(Real World)



# 4 데이터 모델 : JSON 도큐먼트

JSON은 텍스트로 이루어져 있으므로, 사람과 기계 모두 읽고 쓰기 쉽다. 프로그래밍 언어와 플랫폼에 독립적이므로, 서로 다른 시스템 간에 객체를 교환하기에 좋다.

- JSON 도큐먼트의 장점
  - 단일 도큐먼트 내에 다양한 정보를 계층 구조를 활용하여 저장
  - 정보 추가/삭제가 유연한 구조 제공
  - 데이터 전달을 위한 표준 인터페이스 역할
- RDB와 차별점
  - 여러 테이블로 분리, 저장되는 데이터를 단일 도큐먼트에 저장
  - 테이블 간 조인을 최소화하여 데이터 처리 속도 향상

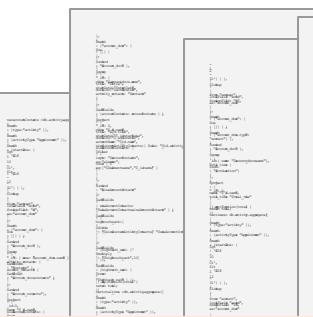


# 4 데이터 모델 : ANSI 표준 SQL vs. 자체 Query 언어

2018년 Q4 고객에 대해서 각 미팅에 소요된 시간, 해당 고객에 모든 미팅에 소요된 시간 대비 해당 미팅의 소요 시간 비율, 순위 등을 조회하는 Query에 대해 Couchbase와 타 NoSQL 솔루션 비교입니다.

```
SELECT
    c.name,
    a.title,
    a.actduration,
    a.startDate,
    SUM(a.actduration) OVER ( PARTITION BY
        c.name ORDER BY c.name, a.startDate )running_total,
    TRUNC(100*(a.actduration/SUM(a.actduration)
        OVER(PARTITION BY c.name)) ) pct_of_total_time,
    RANK()OVER(PARTITION BY c.name ORDER BY
        (ARRAY_COUNT(a.contacts)/
        ARRAY_COUNT(c.contacts))DESC)hightouch_rank
FROM activity a
    INNER JOIN account c
        ON (a.accid = c.id)
WHERE a.activityType = 'Appointment'
    AND a.startDate BETWEEN '2018-10' AND '2018-12'
GROUP BY c.name,a.title,a.startDate,
        a.actduration,a.contacts,c.contacts
ORDER BY c.name,a.startDate
```

21 lines vs 347 lines



```
db.activity.aggregate([
    { $match : { type: "activity" } },
    { $match : { activityType:"Appointment" } },
    { $match : { startDate:{$gt:'2018-10-01',
                     $lt:'2018-12-31' }}},
    { $lookup: {
        from: "account",
        localField: "accid",
        foreignField: "id",
        as: "account_docs"} },
    { $match : { "account_docs": {$ne: []} } },
    { $unwind: "$account_docs" },
    { $group : { "_id": {
        name: "$account_docs.name",
        title: "$title",
        startDate: "$startDate",
        duration: "$actduration",
        activity_contacts: "$contacts",
        account_contacts: "$account_docs.contacts",
        }}},
    { $addFields: { total_time: total_time } },
    { $addFields: { hightouch_rank: rank_temp } },
    { $addFields:{ running_total: running_total}},
    { $project: {
        "_id": 0,
        name: "$_id.name",
        title: "$_id.title",
        startDate: "$_id.startDate",
        duration: "$_id.duration",
        activity_contacts:
            "$_id.activity_contacts",
        account_contacts:.....}}
```

## • Couchbase

- ANSI 기반 SQL
- Join, Windows Function 등 지원

# 4 데이터 모델 : ANSI 표준 SQL++

- **개요**
  - ANSI 2003 SQL 기반
  - Multi-core 병렬 수행에 최적화된 Query Engine
  - Cost-based Optimizer 지원
- **확장 SQL**
  - NEST/UNNEST : Embedded Object, Arrays 지원
  - IS EMPTY/IS MISSING : Flexible Schema
- **SQL-Like**
  - 99 % 표준 SQL과 동일한 Syntax
  - DML 지원 : Insert/Select/Update/Delete/Upsert
  - **INNER/OUTER JOIN** 지원



# 4 데이터 모델 : 논리 / 물리 모델

- RDBMS와 유사한 구조의 논리 계층 구조로 구성하여 편리한 데이터 관리
- Data 서비스를 완전 메모리DB로 사용도 가능하며 용도에 따라 물리 저장 방식을 선택할 수 있음

RDBMS	Couchbase
Server	Cluster
Database	Bucket
Schema	Scope
Table	Collection
Row	Document (JSON)
Value	Sub-Document, Array

Feature	Ephemeral Bucket	Couchbase Bucket	Magma Bucket
Bucket memory quota (per node)	Min 256MB	Min 256MB	Min 1024MB
Max Object Size	20MB	20MB	20MB
Persistence	no	yes	yes
Replication and XDCR	yes	yes	yes
Encrypted data access	yes	yes	yes
Rebalance	yes	yes	yes
N1QL, Search, Analytics, Eventing	yes	yes	yes
Indexing	yes	yes	yes
Backup	yes	yes	yes

# 4 데이터 모델 : Time-Series

- **Time Series Format**

- JSON Array를 사용하여 대용량 데이터를 효율적으로 저장
- ts\_start, ts\_end, ts\_interval, ts\_data 규격에 맞게 데이터 구조화 필요

- **데이터 활용**

- \_timeseries function을 통해 테이블 형태의 데이터로 전환 가능
- 인덱스 하나로 모든 Query 대응
- 일반 JSON 도큐먼트 대비 사이즈 축소를 통해 이력 데이터 용도로 활용

```
{  
    "equip_id": "1",  
    "lot_id": "1",  
    "ts_start": 1375228800000,  
    "ts_end": 1372636800000,  
    "ts_interval": 100  
    "ts_data": [  
        [10, 27], [10, 27], [10, 27], [10, 27], [10, 30], [10, 30], [10, 30],  
        [10, 30], [10, 30], [10, 30], [10, 30], [10, 30], [10, 30], [10, 30],  
        [10, 30], [10, 30], [10, 30], [10, 30], [10, 30], [10, 30], [10, 30],  
        [10, 23], [10, 23], [10, 23], [10, 23], [10, 23], [10, 23], [10, 23], [10, 23],  
        [10, 23], [10, 23], [10, 23]  
    ]  
}
```

```
SELECT t.*  
FROM Raw_Collection AS d  
UNNEST _timeseries(d, {"ts_ranges":$ts_ranges}) AS t  
WHERE d.equip_id = '1'  
AND (d.ts_start <= $ts_ranges[1]  
AND d.ts_end >= $ts_ranges[0]);
```

# 5 서비스 : Analytics > Hybrid Transaction Analytical Processing

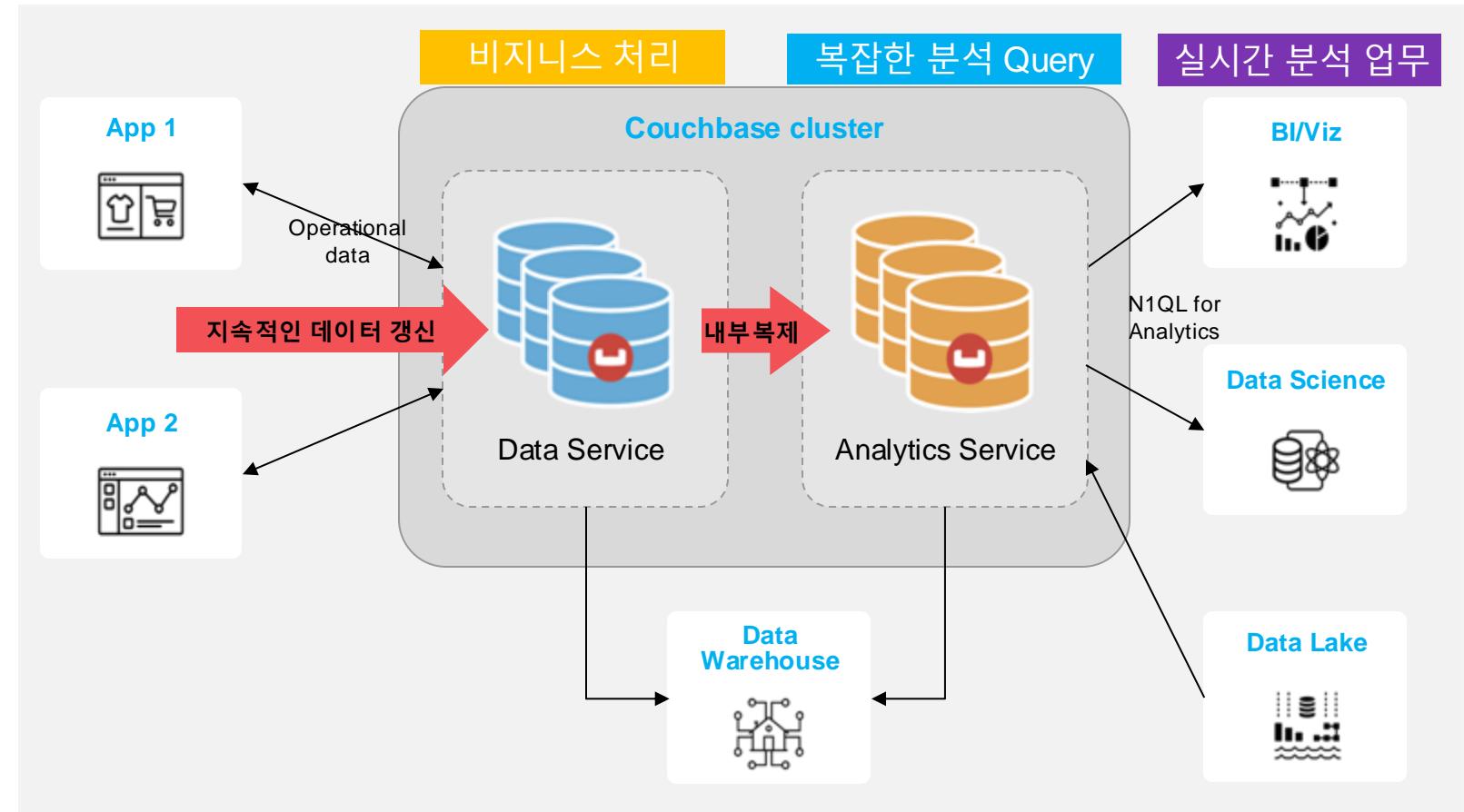
- 데이터를 별도의 시스템으로 추출-변환-로드할 필요 없이 거의 실시간으로 JSON 데이터를 분석
- 운영 데이터나 쿼리 속도를 늦추지 않고 Analytics용 SQL++을 사용하여 Analytics 데이터를 쿼리

## • Shadow Copy

- Data Service에 처리되는 데이터를 그대로 Analytics Service로 복제
- 메모리 기반 DCP 사용
- 별도의 CDC/ETL 솔루션 불필요

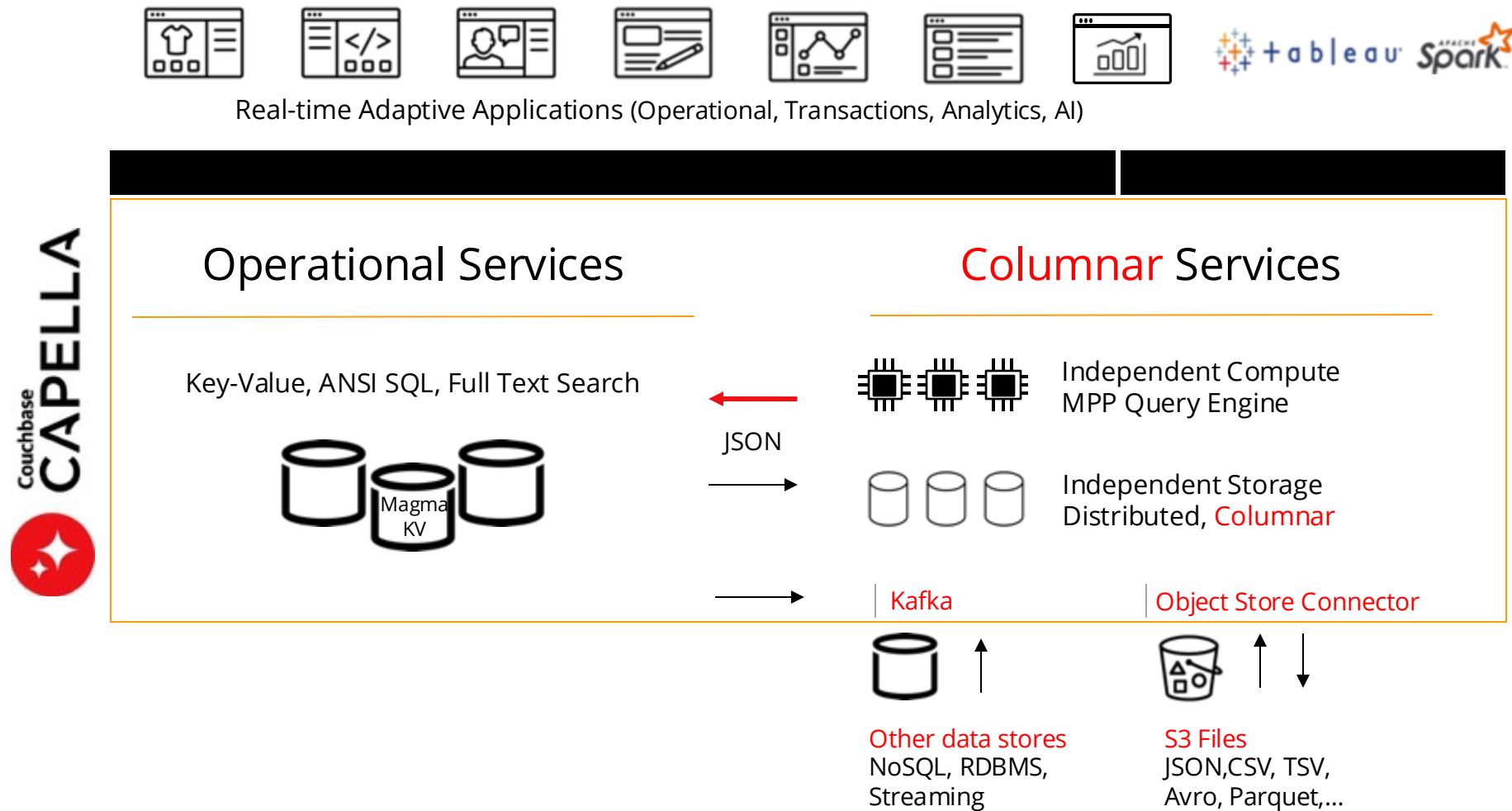
## • Parallel Processing

- SQL을 Analytics Service를 구성하는 노드에 분산하여 병렬 처리
- 복잡한 Query 및 ad hoc Query 수행에 적합
- 대용량 데이터 처리
- Tableau Native Connector 제공
- Power BI Native Connector 제공



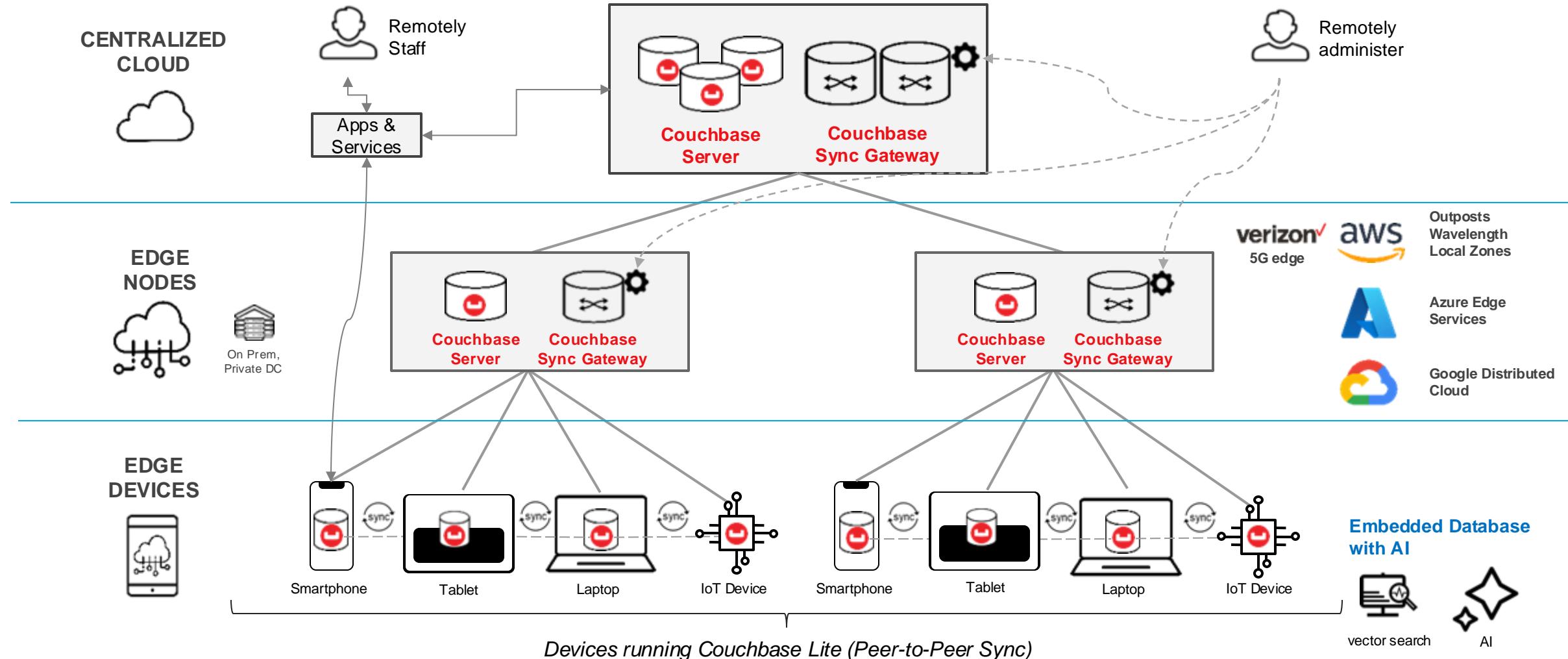
# 5 서비스 : Capella Columnar Service : Cloud Data Lake

내부 JSON 데이터를 비롯하여 다양한 외부 데이터 소스를 통합하여 분석을 수행하는 컬럼 기반 Data Lake 기능 출시



# 5 서비스 : Mobile (Couchbase Lite, Sync Gateway)

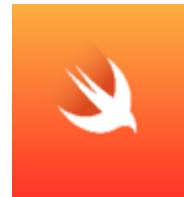
데이터 관리가 필요한 모든 디바이스에 데이터베이스를 적용할 수 있으며, 데이터 센터의 데이터베이스와 손쉬운 일관성을 유지



# 5 서비스 : Mobile (Couchbase Lite, Sync Gateway)

- **기능 개요**

- JSON Document 모델
- SQL++ Query 지원
- Full Text Search 지원
- Vector Search 지원
- Predictive Query 지원



iOS and macOS



Kotlin for  
Android



Java for  
Android

- **지원 개발 플랫폼**

- iOS, macOS
- Kotlin, Java for Android
- C-API



Desktop



Embedded, Desktop & Mobile



Desktop & Tablets



iOS & Android

- **Sync 방식**

- Remote Database with Sync Gateway
- Peer to Peer 동기화 지원
- Star, Mesh 구성 가능

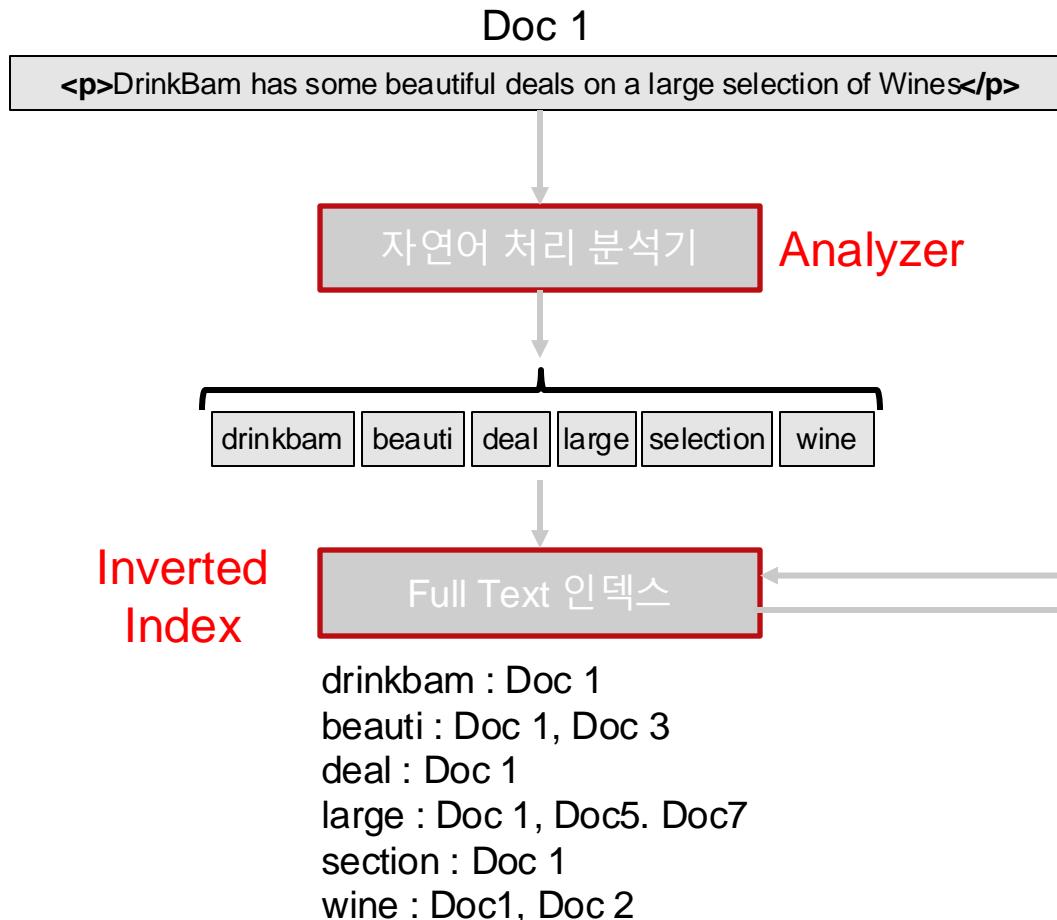


<https://www.couchbase.com/blog/mobile-cross-platform-development/>  
<https://www.couchbase.com/blog/fluttercouch-flutter-and-couchbase/>  
<https://cbl-dart.dev/>

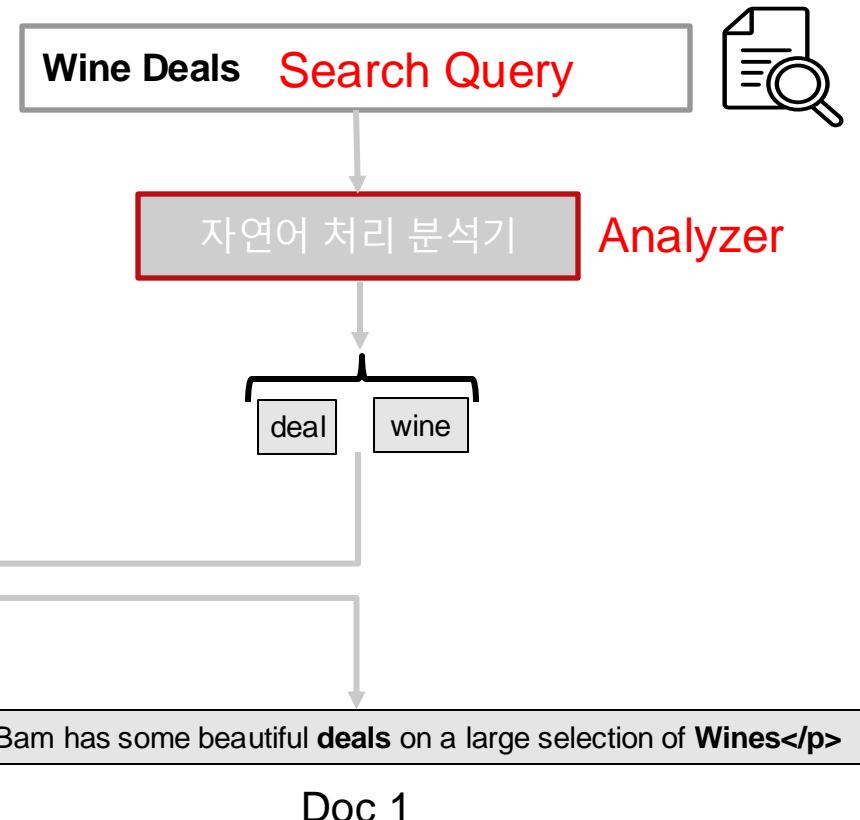
# 5 서비스 : Full Text Search(자연어 검색)

Data와 Query 서비스에 통합하여 검색 서비스 제공

## <1. 검색을 위한 인덱스 구성>



## <2. 검색어를 통한 도큐먼트 검색>



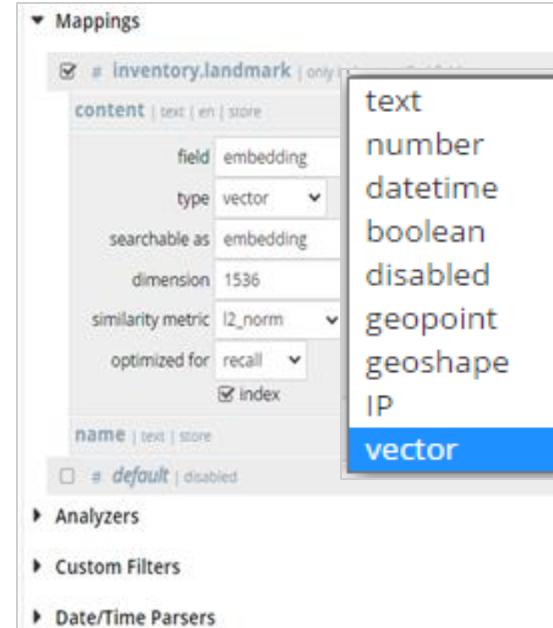
# 5 서비스 : Full Text Search with AI 벡터 검색

SQL 쿼리에 Full Text 검색 쿼리와 벡터 검색 쿼리를 통합 가능

## JSON Storage

```
{ "type": "shoes",
  "productId": "CP123456",
  "category": "Gym Shoes",
  "name": "Beach Sneakers",
  "brand": "Ultimate Surf",
},
"description": "The ultimate companion for beach adventurers, designed to seamlessly transition from sandy shores to urban landscapes. This innovative sneaker features a water-resistant, quick-drying mesh upper, allowing your feet to breathe while keeping them dry.",
"descriptionVector": [0.131, 0.339, -0.611, 0.981,...]
```

## Indexes



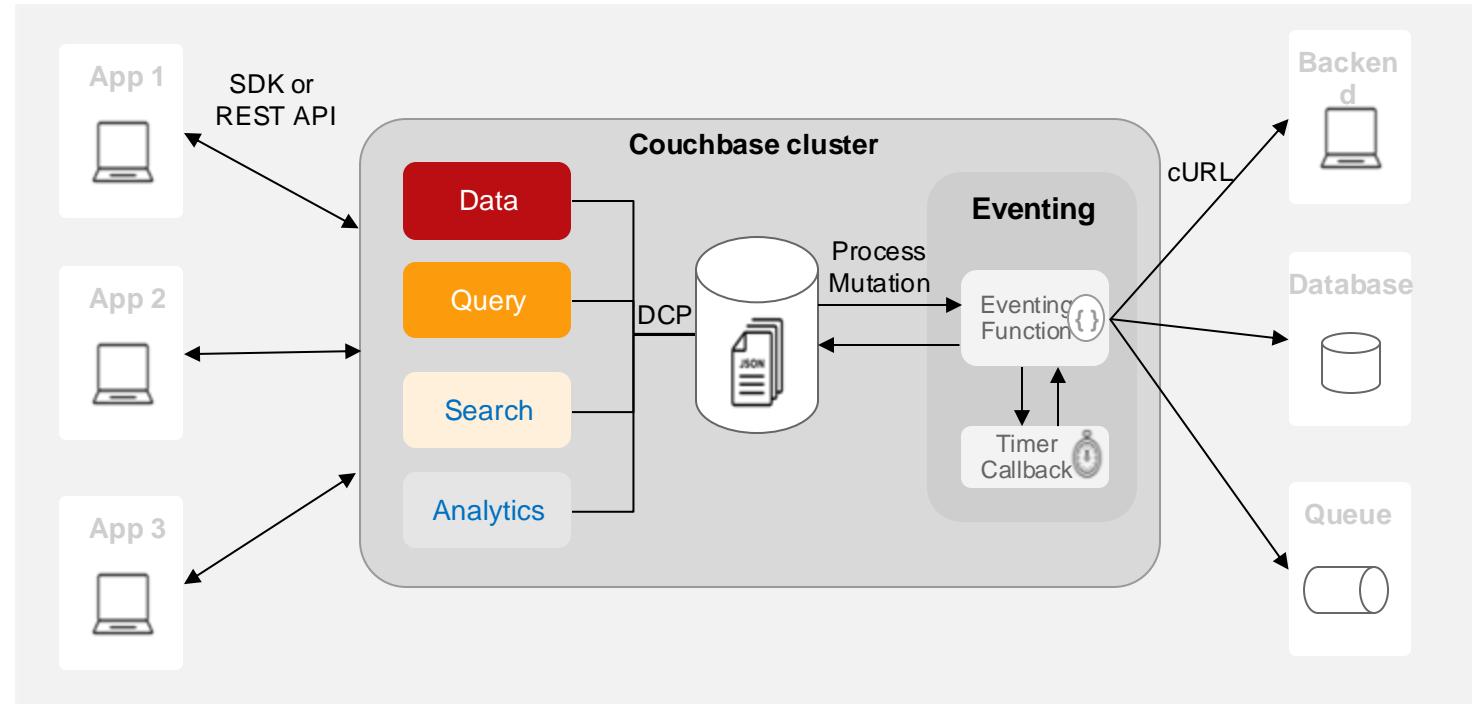
SQL + 자연어 검색 + AI Vector Search

```
SELECT meta().id, t.name
FROM `product` AS t
WHERE
SEARCH(t,
{"query": {"match_phrase": "sneaker", "field": "description"}})
ORDER BY search_score() DESC
LIMIT 10;
```

```
SELECT *
FROM product
WHERE LOWER(product.type) = 'shoes'
AND product.size = 11
AND product.price between 50 and 80
/* desc SIMILAR TO 'blue running shoes' */
ORDER BY GSI_VECTOR_ORDER(desc_embedding, {
  "knn": [
    "field": "desc_embedding",
    "vector": [0.1, 0.334, -0.604, 0.985] ]})
LIMIT 4
```

# 5 서비스 : Eventing

- **개요**
  - Event-Condition-Action Model
  - JavaScript 기반 : JSON Document의 변경을 분석, 처리에 유리
- **Handler Type : DB Trigger와 유사**
  - onUpdate
  - onDelete
- **주요 Use case**
  - 실시간 Document Enrichment
  - Threshold 기반 Altering
  - Streaming 처리
  - 데이터 변경에 대한 확산 작업
  - 데이터 Cleansing



- **비즈니스 로직을 중앙 집중적 관리**
  - Document 데이터 변경에 실시간으로 Trigger되는 Business Logic 구현
  - Java Script 기반으로 Cluster 내 Key-Value operation, SQL++ Query 지원
  - cURL function을 통해 외부 REST API 호출 가능

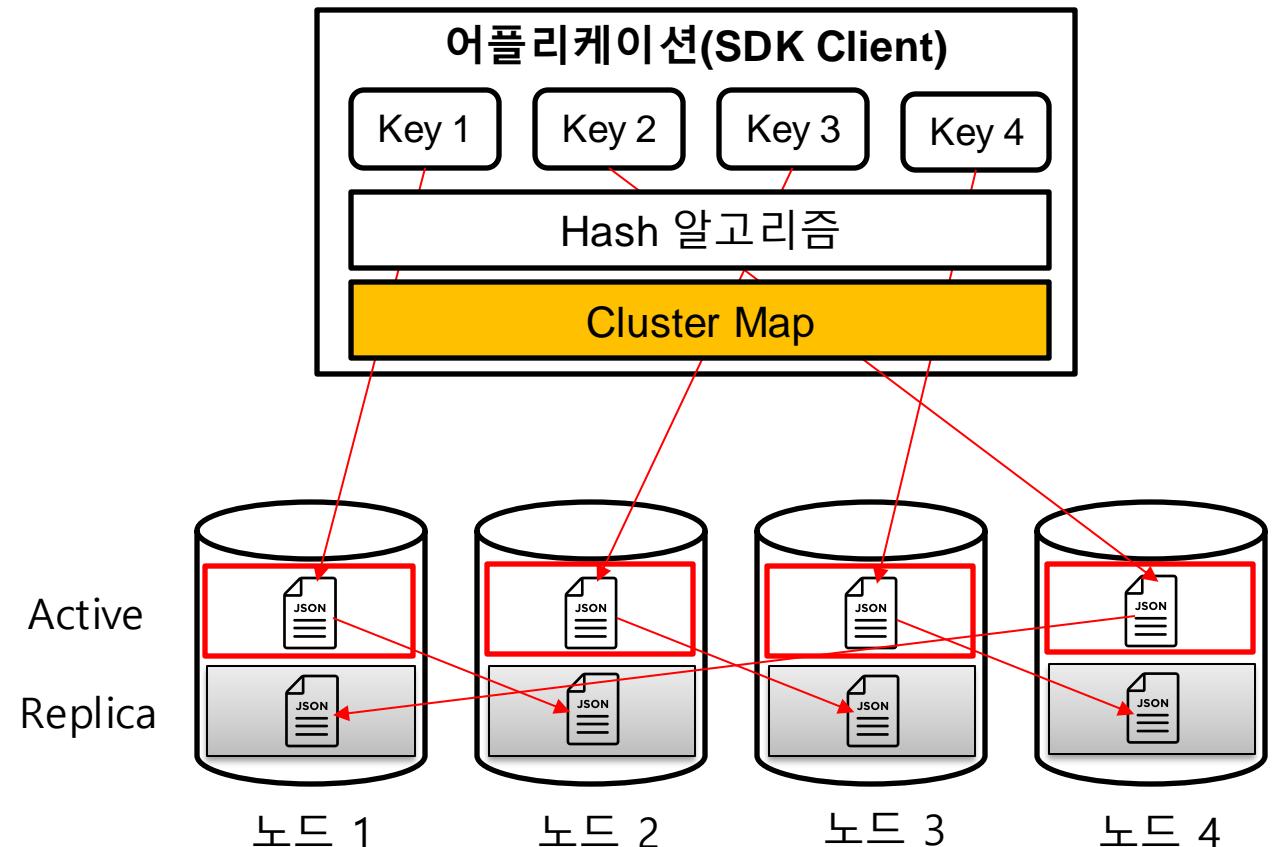
# 6 가용성 : 빠른 Fail-over를 통한 고 가용성

- **Replica 버켓**

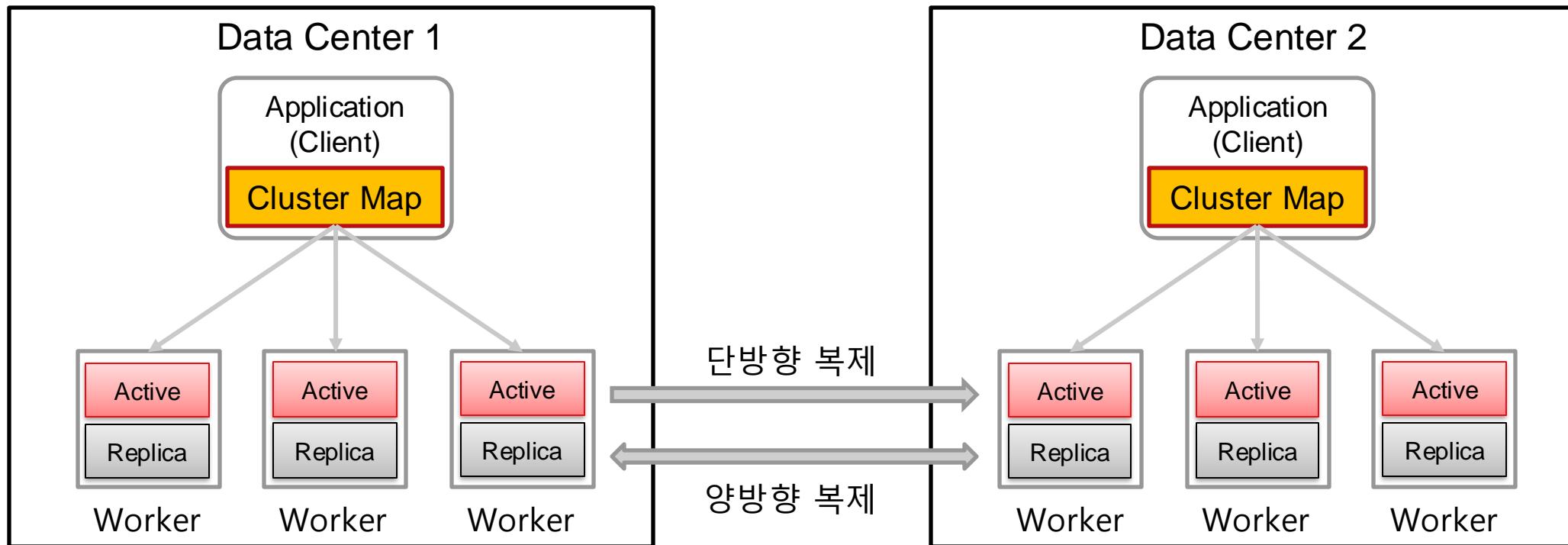
- Auto-sharding을 통한 균등한 데이터 분산
- Active 버켓에 대한 Replica 버켓을 내부 노드 단위에서 관리
- Replica 버켓을 최대 3 까지 가능

- **Couchbase**

- 특정 노드의 장애가 발생하면 장애가 발생한 Active 버켓의 Replica 버켓을 Active 상태로 전환
- 빠른 Fail-over
- 별도의 Replica 노드나 Standby 노드가 필요 없음



# 6 가용성 : 클러스터 간 Native 복제를 통한 재해 복구

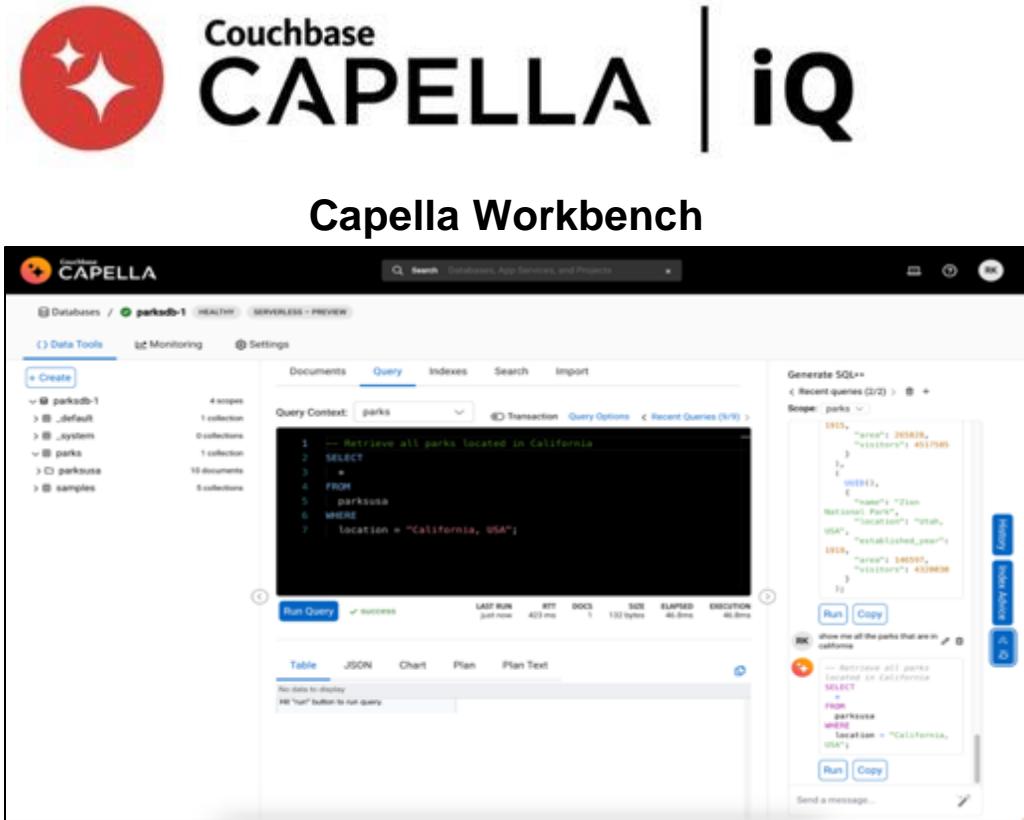


- **XDCR(Cross Data Center Replication)**

- XDCR을 통해 멀티 데이터 센터에 위치한 클러스터 간 데이터 복제
- 단방향 복제 및 양방향 복제 지원
- 복제는 필요한 데이터만 필터링 가능
- 단순 재해 복구 솔루션 이상의 글로벌 워크로드 분산 솔루션

# 7 개발 편의성 : 생성형 AI 기반 코딩 지원

- Generative AI의 LLM을 활용한 Couchbase Capella 전용 Code Assistant
- 자연어로 SQL 및 소스 코드 코딩 지원
- Couchbase 내부 스키마 정보를 활용하여 실제적인 코딩 지원



# 8 운영/관리 : 내장 백업복구 솔루션

## • Backup Service

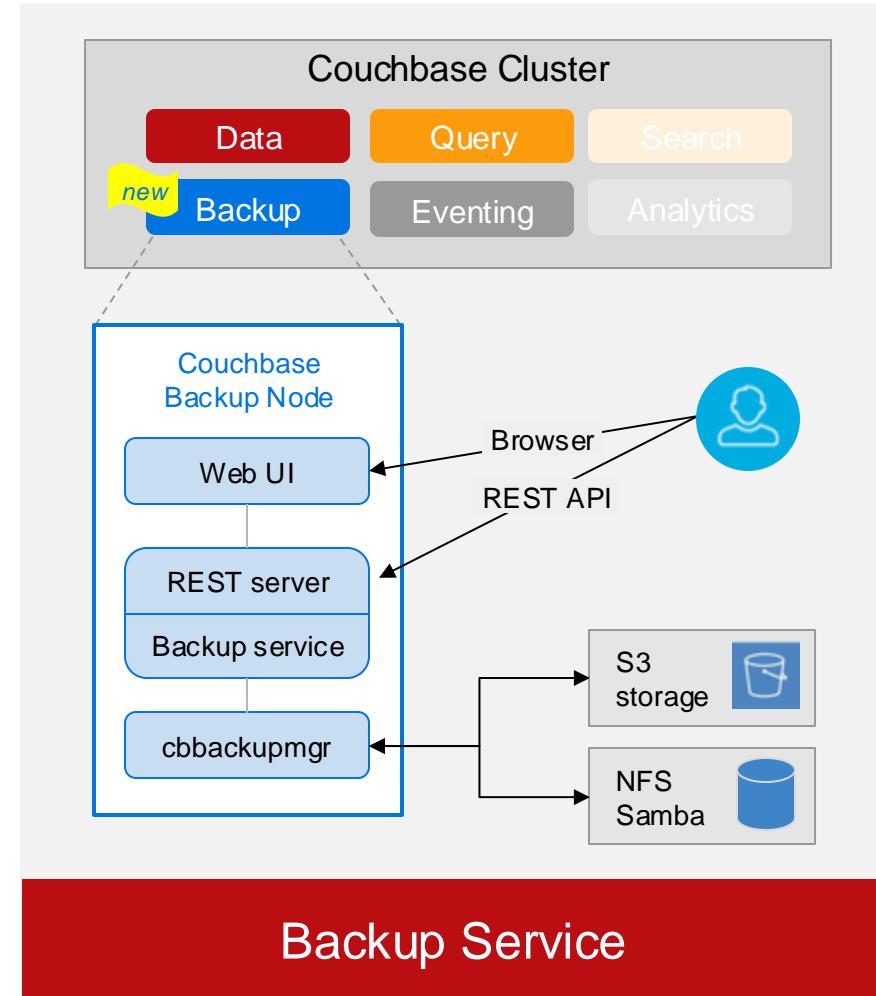
- UI 기반 Backup & Recovery
- 공유 파일 시스템 구성 필수
- Backup Scheduler 제공
- 백업 중 장애를 위한 Resume 기능 제공
- 병렬 백업
- 암호화 저장

## • Backup 방식

- Full Backup
- Incremental Backup
- Merge Backup File

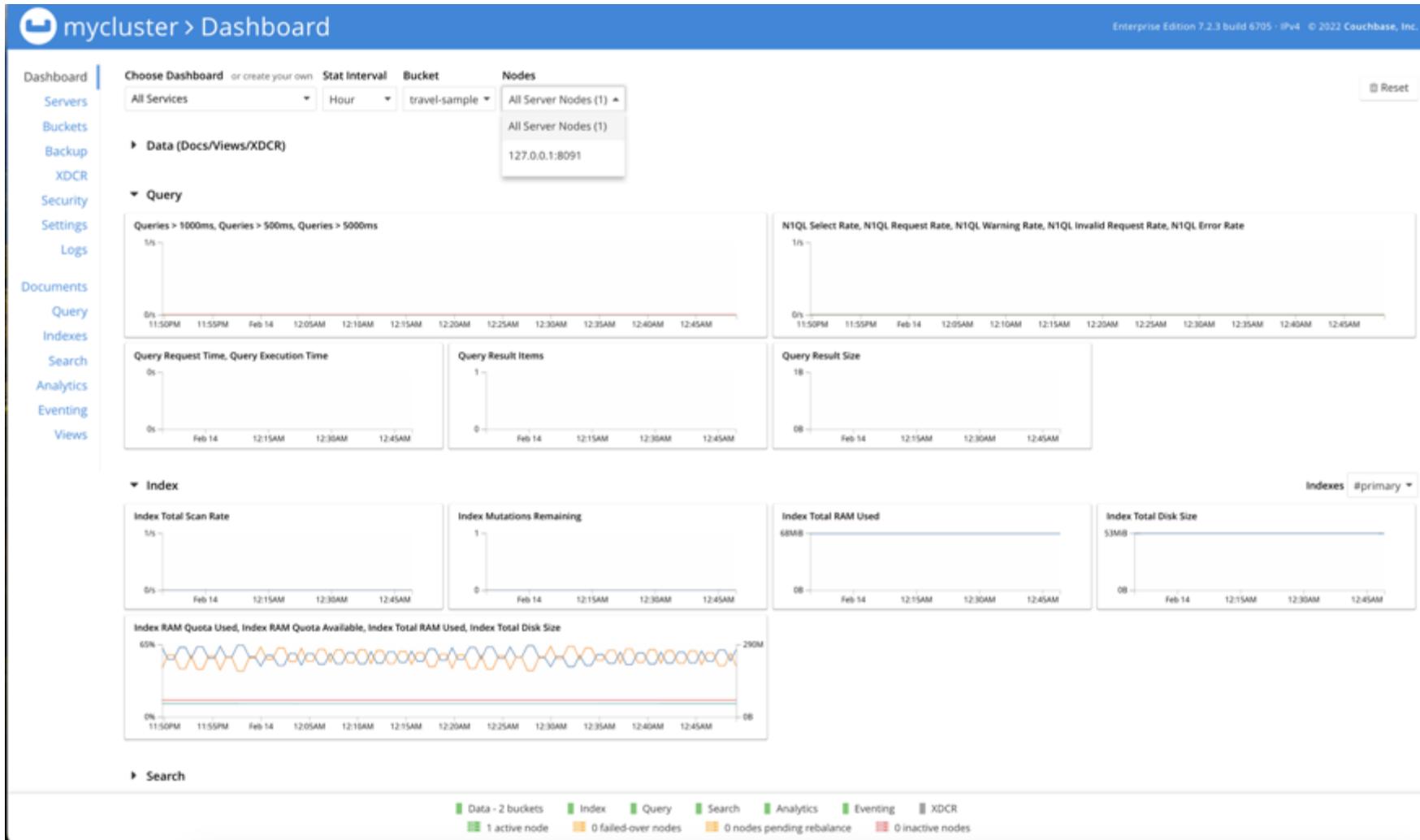
## • Restore 방식

- Bucket, Scope, Collection 단위 가능



# 8 운영/관리 : 성능 모니터링

Couchbase는 다양한 성능 매트릭을 제공합니다. 그리고, Prometheus/Grafana 로도 관리할 수도 있습니다.



# 8 운영/관리 : 시스템 상태 경고 및 권고

Couchbase는 매트릭이 임계 수준을 넘어서면 경고(Alerts) 보내게 되고, 권고 사항(Recommended actions)도 제시됩니다. 경고 수준(Severity Level)은 **Info**, **Warning**, **Critical** 이 있습니다.

The screenshot shows the Couchbase Settings page for a cluster named "mycluster". The left sidebar lists various management options like Dashboard, Servers, Buckets, etc. The "Settings" tab is selected. On the right, under the "General" tab, there's a section for "Available Alerts" which lists 20 different alert types. Each alert entry includes checkboxes for "Email" and "UI popup" and a brief description. The alerts range from critical system issues like auto-failed-over nodes to more minor performance warnings like high metadata overhead or approaching RAM thresholds.

Available Alerts				
<input checked="" type="checkbox"/>	Email	<input checked="" type="checkbox"/>	UI popup	Node was auto-failed-over
<input checked="" type="checkbox"/>	Email	<input checked="" type="checkbox"/>	UI popup	Maximum number of auto-failed-over nodes was reached
<input checked="" type="checkbox"/>	Email	<input checked="" type="checkbox"/>	UI popup	Node was not auto-failed-over as other nodes are down at the same time
<input checked="" type="checkbox"/>	Email	<input checked="" type="checkbox"/>	UI popup	Node was not auto-failed-over as there are not enough nodes in the cluster running the same service
<input checked="" type="checkbox"/>	Email	<input checked="" type="checkbox"/>	UI popup	Node was not auto-failed-over as auto-failover for one or more services running on the node is disabled
<input checked="" type="checkbox"/>	Email	<input checked="" type="checkbox"/>	UI popup	Node's IP address has changed unexpectedly
<input checked="" type="checkbox"/>	Email	<input checked="" type="checkbox"/>	UI popup	Disk space used for persistent storage has reached at least 90% of capacity
<input checked="" type="checkbox"/>	Email	<input checked="" type="checkbox"/>	UI popup	Metadata overhead is more than 50%
<input checked="" type="checkbox"/>	Email	<input checked="" type="checkbox"/>	UI popup	Bucket memory on a node is entirely used for metadata
<input checked="" type="checkbox"/>	Email	<input checked="" type="checkbox"/>	UI popup	Writing data to disk for a specific bucket has failed
<input checked="" type="checkbox"/>	Email	<input checked="" type="checkbox"/>	UI popup	Writing event to audit log has failed
<input checked="" type="checkbox"/>	Email	<input checked="" type="checkbox"/>	UI popup	Approaching full Indexer RAM warning
<input checked="" type="checkbox"/>	Email	<input checked="" type="checkbox"/>	UI popup	Remote mutation timestamp exceeded drift threshold
<input checked="" type="checkbox"/>	Email	<input checked="" type="checkbox"/>	UI popup	Communication issues among some nodes in the cluster
<input checked="" type="checkbox"/>	Email	<input checked="" type="checkbox"/>	UI popup	Node's time is out of sync with some nodes in the cluster
<input checked="" type="checkbox"/>	Email	<input checked="" type="checkbox"/>	UI popup	Disk usage analyzer is stuck; cannot fetch disk usage data
<input checked="" type="checkbox"/>	Email	<input checked="" type="checkbox"/>	UI popup	Memory usage threshold exceeded
<input checked="" type="checkbox"/>	Email	<input checked="" type="checkbox"/>	UI popup	History size threshold exceeded
<input checked="" type="checkbox"/>	Email	<input checked="" type="checkbox"/>	UI popup	Approaching Indexer low resident percentage

# 9 보안 > End-to-End 보안

Couchbase는 엔드 투 엔드 보안 기능을 제공합니다. 클라이언트 접속 인증에서 네트워크 보안, 서버 스토리지 저장시 암호화할 수 있으며, 다양한 감사 기능 제공합니다.

Authentication 인증	Authorization 권한	Crypto 암호화	Auditing 감사	Operations 운영보안
<ul style="list-style-type: none"><li>App/Data: SASL Authentication</li><li>Users Database:<ul style="list-style-type: none"><li>Local</li><li>LDAP / AD</li><li>PAM</li></ul></li></ul>	<ul style="list-style-type: none"><li>RBAC<ul style="list-style-type: none"><li>For Admin</li><li>For Data</li></ul></li><li>Limits at various levels<ul style="list-style-type: none"><li>Cluster</li><li>Bucket</li><li>Scope (v7.0)</li><li>Collection (v7.0)</li></ul></li></ul>	<ul style="list-style-type: none"><li>TLS Admin Access</li><li>TLS client-server access</li><li>TLS XDCR</li><li>X.509 certificates</li><li>Secret Management</li><li>TLS Protocol and Cipher Mgmt</li><li>Data-at-rest Encryption*</li></ul>	<ul style="list-style-type: none"><li>Audit Events:<ul style="list-style-type: none"><li>Login</li><li>Add node</li><li>Settings</li><li>N1QL</li><li>Etc.</li></ul></li></ul>	<ul style="list-style-type: none"><li>Security management via UI/CLI/REST</li><li>Log Redaction</li><li>Non-Root Install</li></ul>

# 9 보안 > 사용자/그룹 권한 관리

Couchbase는 그룹과 사용자에 대한 권한 관리를 통해 Admin 관리 기능과 데이터별 쓰기/읽기를 허용할 수 있습니다.

The screenshot shows the Couchbase Security interface with the following details:

- Dashboard:** Shows a summary of the cluster: Sync Gateway Replicator [\*:\*:\*], Sync Gateway Architect [\*:\*:\*], Sync Gateway Application Read Only [\*:\*:\*], Sync Gateway Application [\*:\*:\*], Sync Gateway [\*], Sync Gateway Dev Ops.
- Filter:** Allows filtering by username, groups, and roles.
- LDAP:** Shows a message: "LDAP/SAML is not enabled".
- Users & Groups:** Selected tab. Buttons: ADD GROUP, ADD USER.
- Other Settings:** Other tabs include Certificates, Audit, SAML, and Other Settings.
- Security:** Selected tab.
- Add New Group:** Modal dialog with fields for Group Name and Description, and a list of Roles:
  - Administrative
    - Full Admin ⓘ
    - Read-Only Admin ⓘ
    - Local User Security Admin ⓘ
    - External User Security Admin ⓘ
    - Cluster Admin ⓘ
    - Eventing Full Admin ⓘ
    - Backup Full Admin ⓘ
  - Views Admin ⓘ
  - External Stats Reader ⓘ
  - Bucket
    - Data Reader ⓘ
  - Data
    - Data Reader ⓘ
- Add New User:** Modal dialog with fields for Username, Full Name (optional), Password, Verify Password, and Roles:
  - Administrative
    - travel-sample:inventory:\*
    - +,\*,\*
  - Bucket
  - Data
    - Data Reader ⓘ
    - Data Writer ⓘ
    - Data DCP Reader ⓘ
    - Data Monitor ⓘ
    - Views
    - Owner & Index

# 10 설치/구성 : 지원 플랫폼

Bare-Metal, VM, Container 와 완전관리형 클라우드 데이터베이스 서비스(DBaaS) 사용 가능



## Fully Managed

- 완전관리형 데이터베이스 서비스
- AWS, GCP, Azure
- 설치, 구성, 모니터링, 업그레이드 등 모든 운영은 Couchbase가 담당



## Enterprise

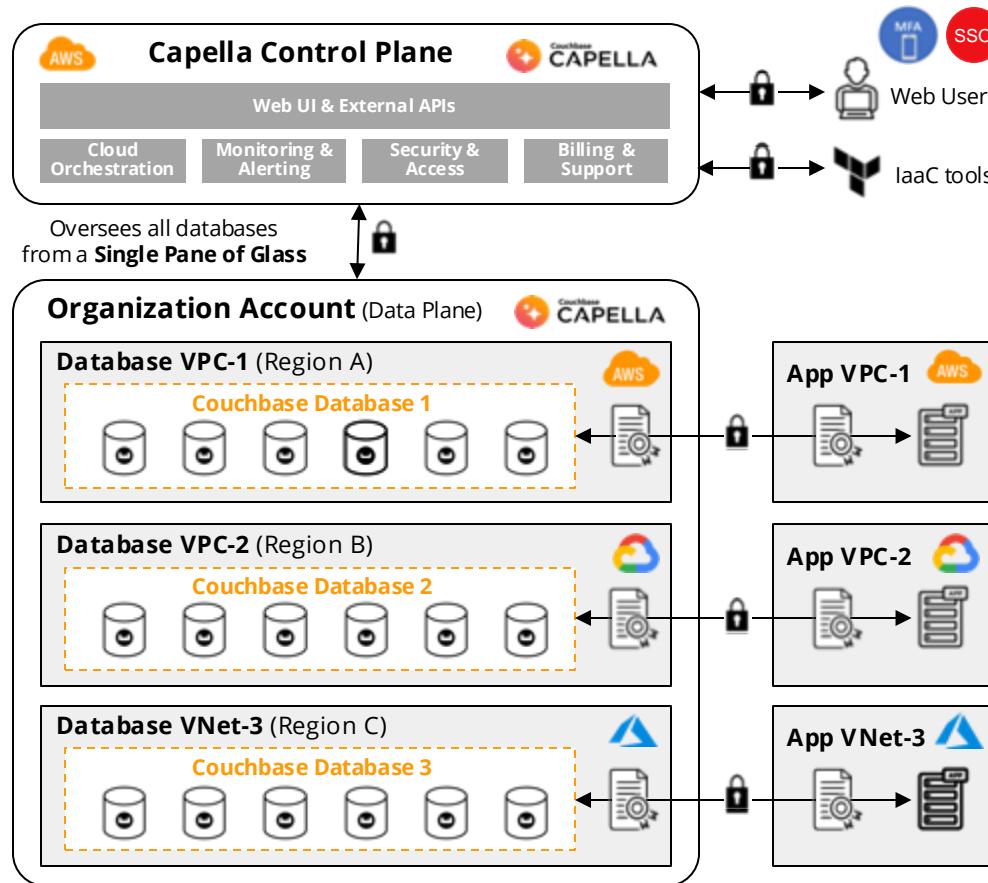
- Bare-metal 서버, 클라우드 IaaS 서버
- Private Cloud 서버, K8S 컨테이너
- 설치, 구성, 모니터링, 업그레이드 등 모든 운영은 고객이 수행



Linux, Windows, MacOS, Intel/AMD, ARM

# 10 설치/구성 : 카펠라 아키텍처

완전관리형 클라우드 데이터베이스 서비스(DBaaS)인 Capella 아키텍처



## Capella Control Plane

- Manages the Cloud Orchestration, Monitoring & Alerting, Security & Access, Billing & Support
- Is the Access Point for Organization Web UI Users
- Allows Infrastructure as Code Tools (e.g. Terraform)

## Organization Account (Data Plane)

- Account Isolation:** 1 Account per Organization
- Database Isolation:** 1 VPC per Couchbase Database
- Multiple Clouds:** AWS, Google and Azure

## Applications

- Connect directly to Databases
- Multiple connectivity options: over Public Connection, through VPC Peering or Private Link
- All communications are encrypted

# 11 교육 : Couchbase Academy

<https://learn.couchbase.com/store>

The screenshot shows the Couchbase Academy store page. At the top, there's a large banner with two women working at a computer, with the text "Couchbase Academy" overlaid. Below the banner, a message says "Welcome to the Couchbase Academy instructor-led and eLearning training options! Couchbase Certification Exams for 2023, now without a proctor requirement." A "Questions?" button is also present. Below the banner is a search bar with a placeholder "Search by keyword" and a "Search" button. To the right of the search bar is a "All Types and topics" link. The main content area is titled "Upcoming Sessions". It lists an event for February 20, 2024, titled "CD410: Advanced N1QL Course: Tuning and Optimization - APAC Virtual (GMT+8)". The event details include starting on 02/20/2024 at 09:00 AM (GMT+08:00) in Singapore and ending on 02/23/2024 at 05:00 PM (GMT+08:00) in Singapore, categorized as a "Multi-day Session".

The screenshot shows a list of four Couchbase Academy courses, each with a circular icon and a brief description. A red dashed circle highlights the first course.

- CB130n: Couchbase Associate Node.js Developer Certification With Capella Course**  
This newly revamped course shows how to leverage the full power of Couchbase 7 as a service with Couchbase Capella. The following 8 courses provide a fundamental understanding of the Couchbase NoSQL database and essential functionality. Throughout these courses, we share the basics of SQL vs. NoSQL, how to sign up for Couchbase Capella, modeling data to the benefit of Couchbase, and an example application you will build. Learners will also walk through the basics of Couchbase Capella. [Read More](#)
- CB130j: Couchbase Associate Java Developer Certification With Capella Course**  
This newly revamped course leverages the full power of Couchbase 7 and supports Couchbase Capella. The following 8 courses provide a fundamental understanding of the Couchbase NoSQL database and essential functionality. Throughout these courses, we share the basics of SQL vs. NoSQL, obtaining and downloading Couchbase, modeling data to the benefit of Couchbase, and an example application you will build. Learners will also walk through the basics of Couchbase's N1. [Read More](#)
- CB131: Couchbase Associate Architect Certification With Capella Course**  
This newly revamped course demonstrates the full power of Couchbase 7 and the fully-managed Database as a Service (DBaaS), Couchbase Capella. The Couchbase Associate Architect Course shares a fundamental understanding of the Couchbase NoSQL database and essential functionality as accessed through the Couchbase Capella user interface. It discusses modeling data to the benefit of the database and application, as well as how to write and implement SQL. [Read More](#)
- CB140a: Couchbase Associate Android Developer With Capella Course**  
This course showcases and demonstrates how to create a new Android application using Couchbase Mobile and Couchbase Capella, our fully managed DBaaS service. The following 7 modules provide fundamental instruction on building an Android application with or without a pre-existing database. To that end, we walk through the essential functionality of Couchbase Capella, the benefits of a fully managed NoSQL database, and how that database interacts with Couchbase Mobile products. [Read More](#)

# 12 요약하면,

Couchbase는

JSON Document  
직관적이고

SQL, Generative AI  
익숙하고, 쉽게

Data Platform  
일관적 적용

- 사람이 인지 하는 세상을 그대로 데이터 모델로 사용
- 복잡한 정규화 과정 없이 직관적인 방식으로 어플리케이션 개발/운영

- NoSQL 이지만 표준 SQL을 지원
- 생성적 AI인 Capella IQ 지원으로 더 손쉬운 개발이 가능

- Key/Value 데이터서비스에서 분석서비스, 모바일 앱서비스까지 일관성있게 업무에 적용 가능
- 센서, 모바일, 퍼스널컴퓨터, 데이터센터 서버, 쿠버네티스, 클라우드에 동일한 데이터플랫폼 적용으로 개발의 일관성 뿐만 아니라 데이터의 일관성도 보장

Enterprise에서 요구하는 성능, 안정성, 보안성

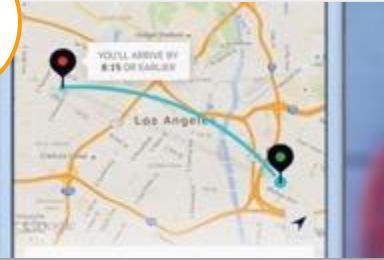
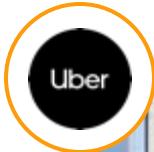
# A Brief History of AI

>

T



# You are already using AI today



ETA for transportation



FICO



Protect credit card transactions



c



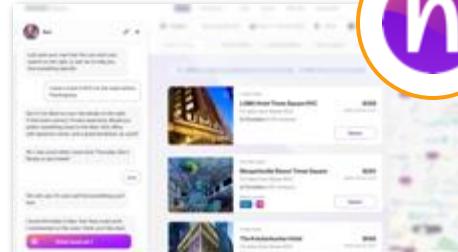
Find promising business leads



Recommend TV show & movies



Translate text between languages



AI-assistant for travel booking

...

AI is **everywhere**, both in your personal and professional life

# Top AI Business Use Cases in 2024

## Customer Experience

Provide personalized product recommendations

## Supply chain

Identify the most efficient delivery routes to deliver products faster

## Human Resources

Streamline the hiring process in recruiting top talent

## Fraud Detection

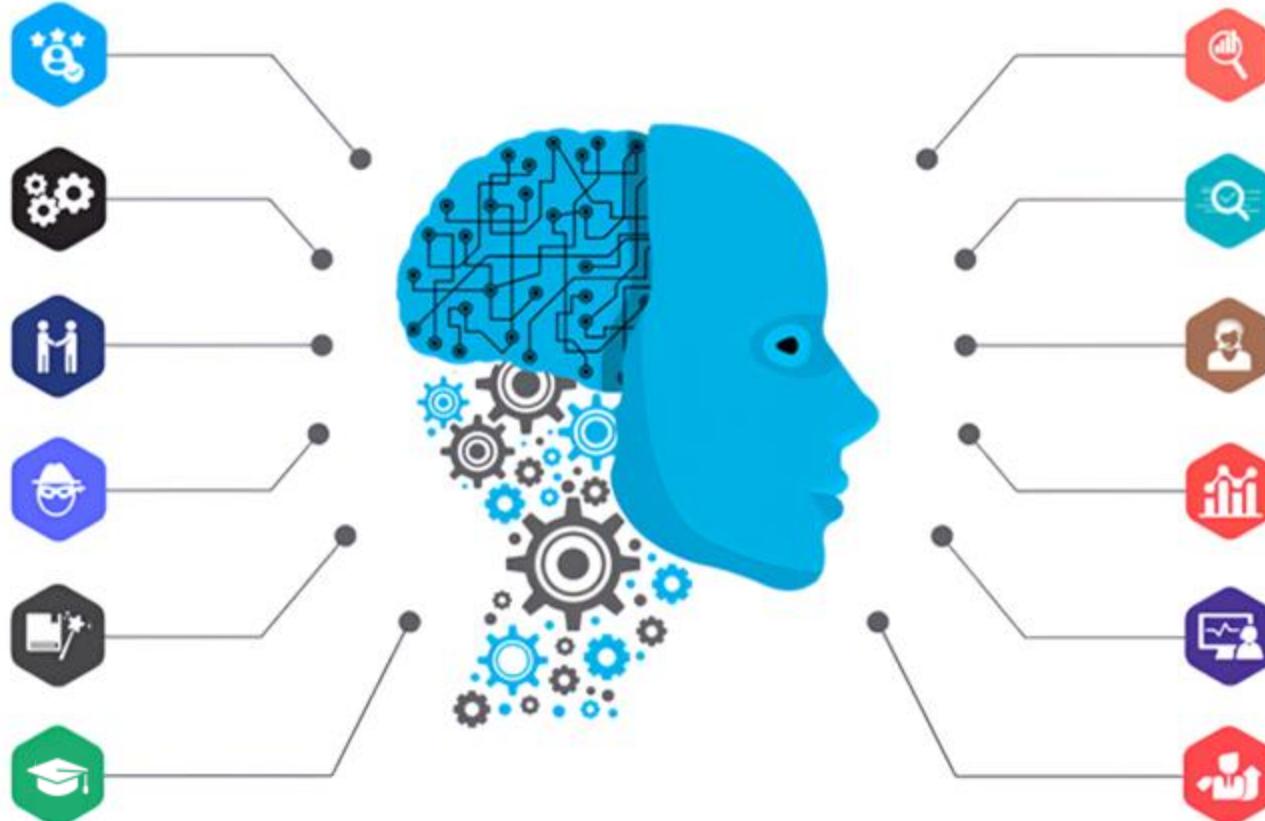
Analyze vast amounts of data and detect fraudulent activities

## Digital Marketing

Produce blog posts, email campaigns, videos and websites.

## Education

Facilitates creation of dynamic and interactive educational content



## Predictive Maintenance

Foresee and address equipment failures before they occur

## Real-time Operations Mngt

Detect inefficiencies, identify threats and prevent potential disruptions

## Customer Services

Chatbots and voice assistants can handle routine inquiries

## Inventory Optimization

Predict consumer demand to maintain optimal stock levels

## Customer Relationship Mngt

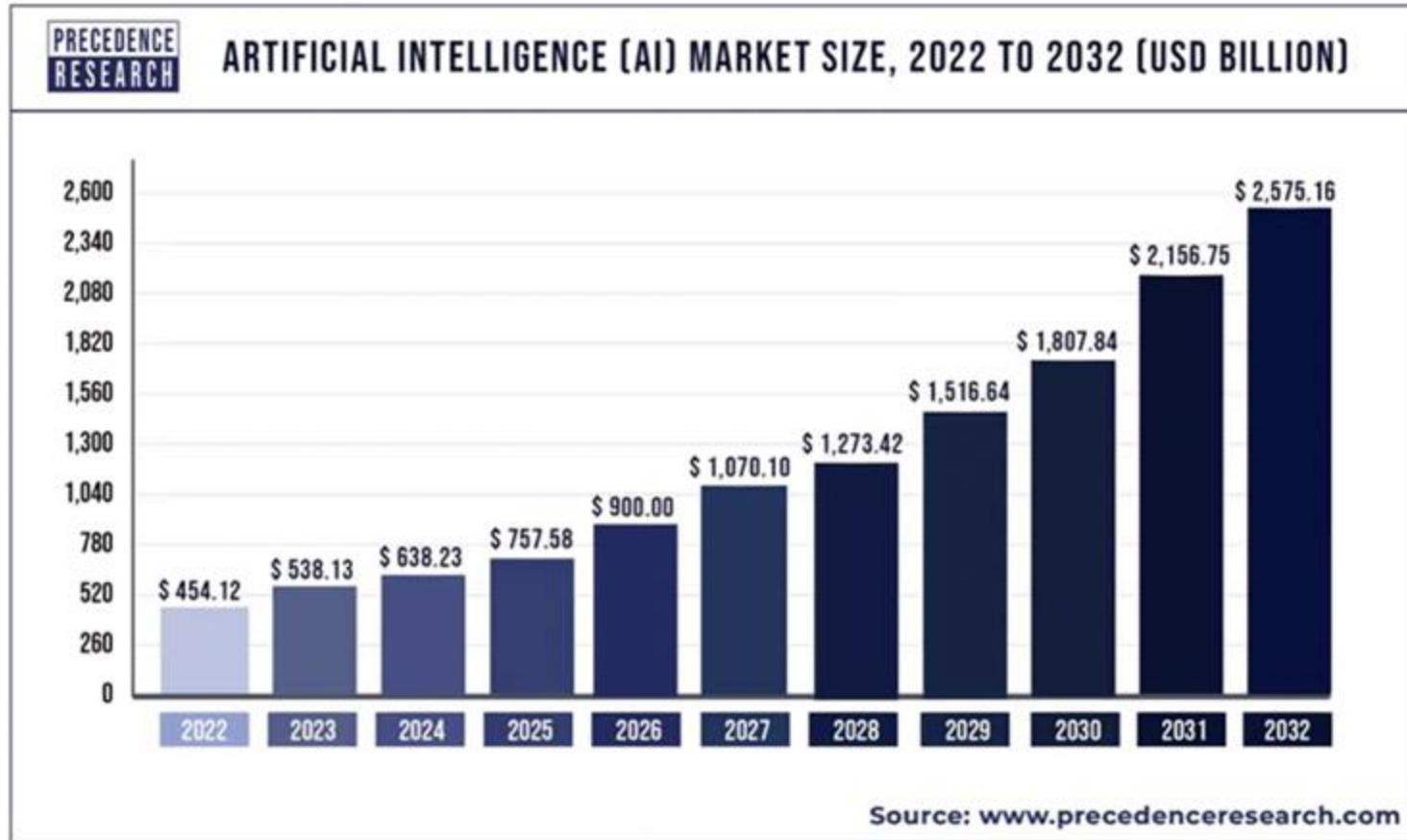
Score and qualify leads accurately based on numerous data sources

## Pricing and Promotion

Analyse patterns to craft pricing and promotion dynamically

AI has significantly evolved over the past few years and has found applications **in nearly every business sector**

# AI Market Size



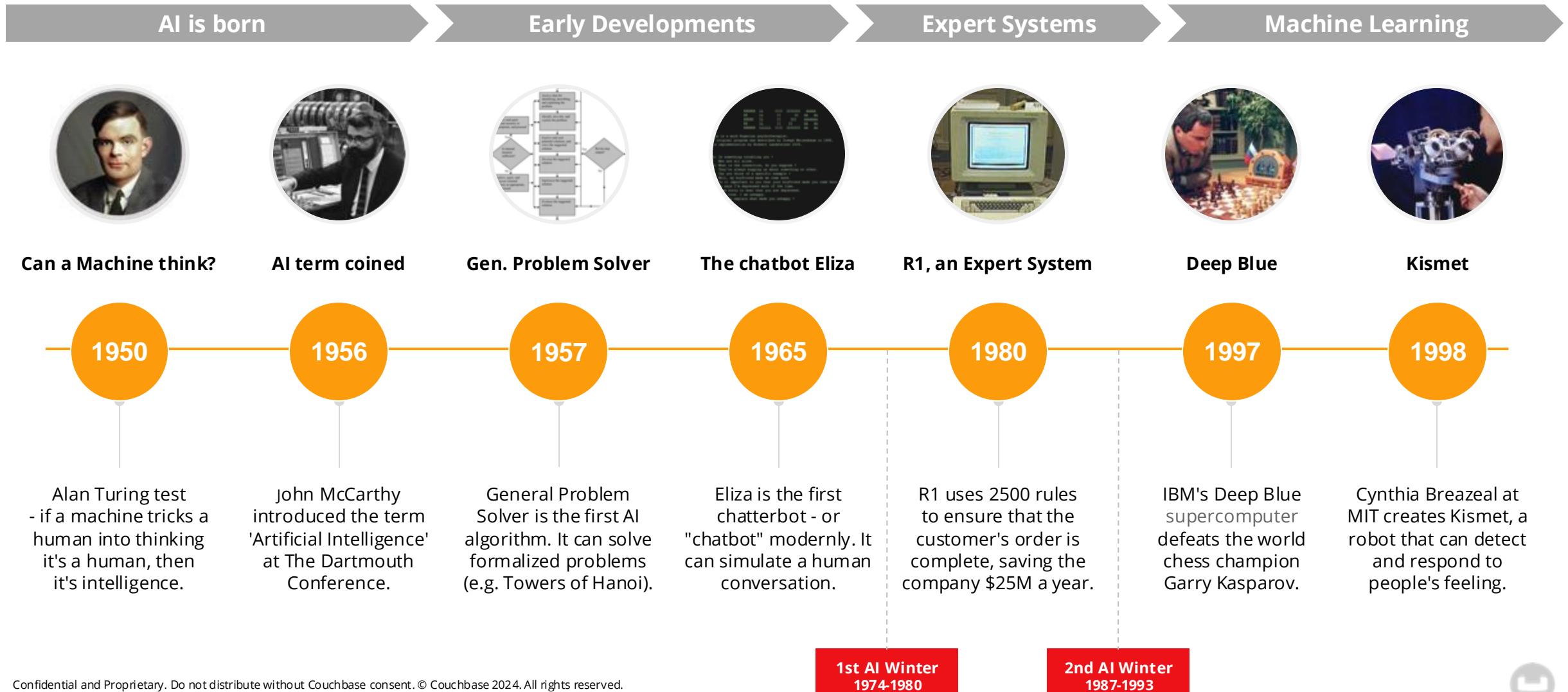
The Artificial Intelligence Market size is **huge ... and growing fast**

# What is Artificial Intelligence (AI)

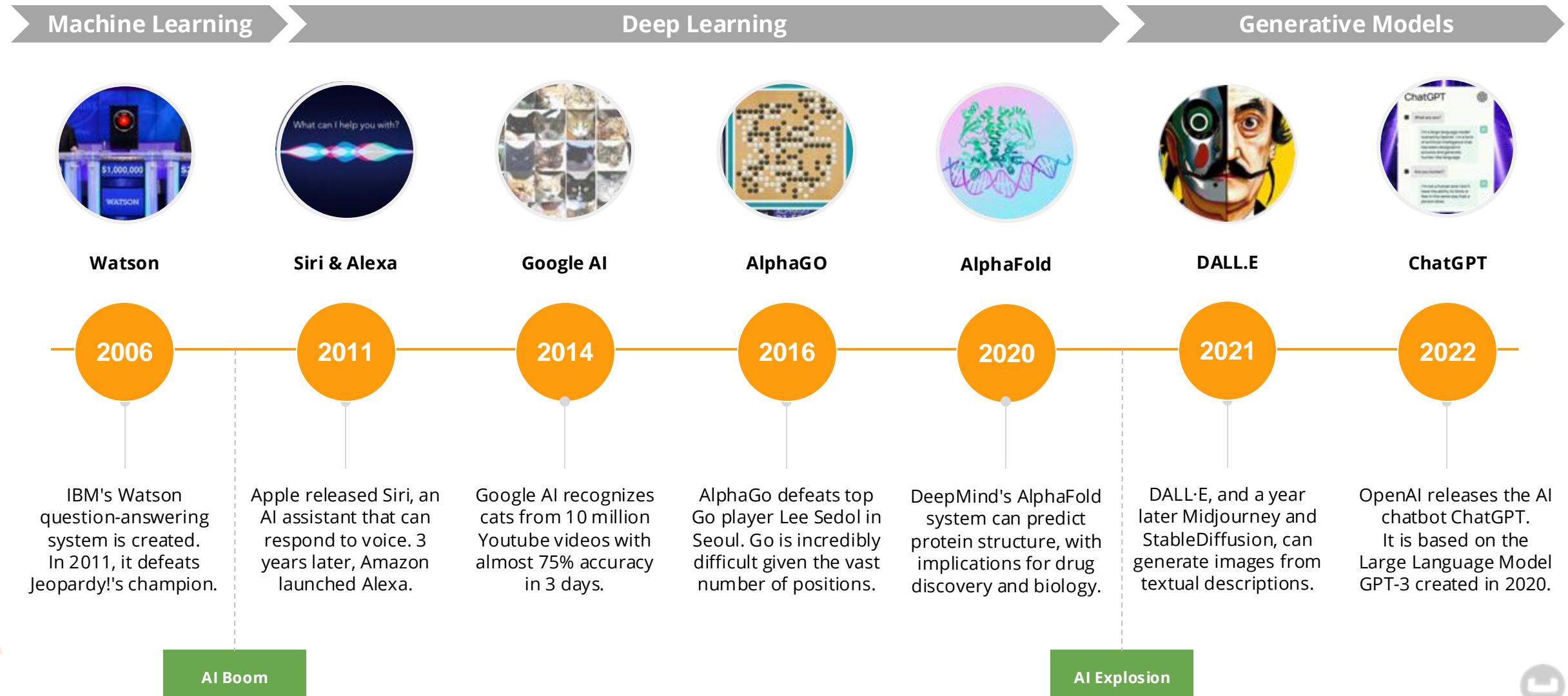


Artificial Intelligence refers to machines capable of performing **complex tasks that historically only a human could do**, such as learning, reasoning, problem-solving, perception, or understanding language and creativity.

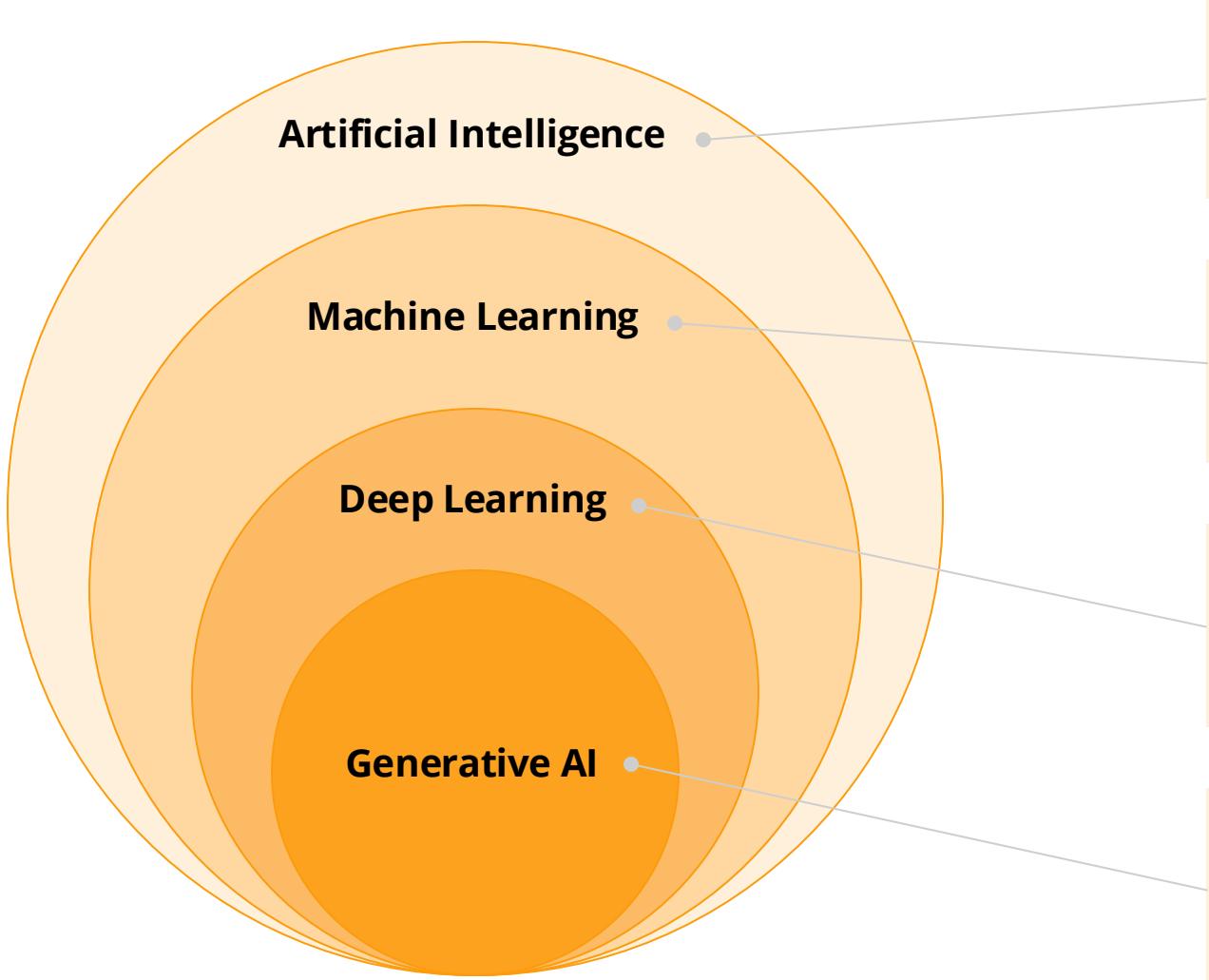
# Key Milestones in the History of AI | 20th Century



# Key Milestones in the History of AI | 21st Century



# The Technology behind AI



## **Artificial Intelligence (AI)**

Techniques that allows computers to emulate human behavior (e.g. learn, recognize patterns, solve complex problems).

## **Machine Learning (ML)**

A subset of AI, using advanced algorithms to detect patterns in large data sets, allowing machines to learn and adapt for prediction or content generation use cases.

## **Deep Learning (DL)**

A subset of ML, using multiple layers of artificial neural networks that simulate human brains for in-depth data processing.

## **Generative AI (GenAI)**

A subset of DL, using models that generate content like text, images, or code based on provided input.

# Powering Apps: A Combination of Predictive & Generative AI

## Predictive AI

### Outcomes and Insights driven by ML



- Predict Outcomes based on historical data
- Utilize ML algorithms for pattern recognition
- Learns patterns and correlations from data
- Drives decision making and Future planning
- High ROI, trained on proprietary data

- Predictive Insights
- Dynamic Pricing
- Fraud Detection
- Inventory Optimization

## Generative AI

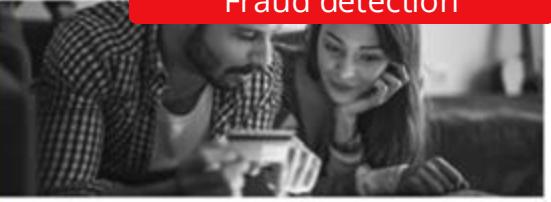
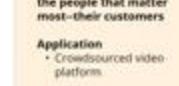
### Generate Content and Experiences



- Generate or Synthesize content
- Needs large amounts of unlabeled data for training
- Generates new data probabilistically
- Fosters creativity, innovation
- Accelerates human productivity

- Hyper-personalized experiences
- Contextualized content
- Chatbots and CoPilots
- Synthetic data and Summarization

# Existing Predictive AI Customers

<p><b>FICO</b></p> <p>World's #1 fraud detection platform; scores 65% of world's credit/debit cards.</p> <p>Application • FICO Falcon credit monitoring and reporting (using AI)</p> <p>Products • Couchbase Server</p> 	<p><b>Fraud detection</b></p>  <p>Provide credit checks, fraud screening, and targeted offers for customers with low response times.</p> <p>Chose Couchbase over MongoDB™ to provide superior speed, scalability, and availability for the world's #1 fraud detection platform.</p> <p>Memory-first architecture allows &lt;1 ms response times.</p>	<p><b>Revolut</b></p> <p>UK challenger bank Revolut developed Sherlock, a machine learning-based card fraud prevention system, to counter the growing threat of financial fraud</p> <p>Application • Fraud monitoring</p> <p>Products • Couchbase Server</p> 	<p><b>Fraud detection</b></p>  <p>Strengthen fraud detection with machine learning to protect customers' accounts.</p> <p>Fraud detection, user profile store, digital communication, caching.</p> <p>Selected Couchbase because of architectural advantages – including speed, agility, and scalability – that address the ever-changing data needs of users and merchants.</p> <p>75% improvement over industry standards, \$3M+ saved, 96% of fraudulent transactions caught.</p>	<p><b>Wells Fargo</b></p> <p>World's second-largest bank by market capitalization and the fourth largest bank in the U.S. by total assets</p> <p>Application • Fraud monitoring</p> <p>Products • Couchbase Server</p> 	<p><b>Fraud detection</b></p>  <p>Monitor each and every transaction for fraud in real-time.</p> <p>Caching, user profile store.</p> <p>Previous system couldn't handle total transactions in real-time, needed to scale the system horizontally and vertically.</p> <p>Couchbase supports its fraud monitoring infrastructure with high performance, high availability, and easy scalability.</p> <ul style="list-style-type: none"><li>• 50M+ transactions per day</li><li>• &lt;10ms for read or write operations</li><li>• 100% of transactions processed in real time</li></ul>
<p><b>seenit</b></p> <p>seenit enables businesses to create compelling collaborative video with the people that matter most—their customers.</p> <p>Application • Crowdsourced video platform</p> <p>Products • Couchbase Capella</p> <p>• Couchbase Mobile</p>  	<p><b>Video Recommendation</b></p>  <p>Telling ongoing stories with video for recruitment and employee engagement.</p> <p>Couchbase handles all support/upgrades so DevOps could focus on other areas.</p> <p>Recommendation engine, user profile, media catalog.</p> <p>Hundreds of thousands of videos in the platform. Upgrade took less than a month vs 6 months previously.</p> <p>Needed a scalable and resilient solution to evaluate, store, and search complex properties of video content.</p>	<p><b>SWARM</b></p> <p>Provides a SaaS platform that lets organizations in the agri-food industry optimize their supply chains using next-gen cognitive computing</p> <p>Application • AI and ML based supply chain optimization platform</p> <p>Product • Couchbase Capella</p>  	<p><b>Supply Chain optimization</b></p>  <p>Help customers save millions of dollars, minimize waste, and reduce their environmental impact.</p> <p>AI-powered digital assistant, key-value store.</p> <p>Couchbase enables quick SQL implementation, unlimited scalability, fast prototype development, and allows data scientists to access all data from one place.</p> <p>400% faster planning time, 3-10x average ROI, \$1M+ savings per optimization.</p> <p>Consolidate data and minimize system configuration and maintenance.</p>	<p><b>tondob</b></p> <p>Global leader in Smart Lighting and Smart Network infrastructure that enables the vision for connected Smart City applications</p> <p>Application • Tondob's Smart Lighting and Smart City enablement platform</p> <p>Products • Couchbase Server</p>  	<p><b>Smart Cities monitoring</b></p>  <p>Provide customers with operational insights into how the infrastructure is performing and ensuring everything is running smoothly.</p> <p>Real-time database for AI, managing upwards of hundreds of thousands of devices total. Enabled fast implementation, indefinite scalability.</p> <p>Smart Lighting system deployed in ~40 cities - hundreds of thousands of units total.</p> <ul style="list-style-type: none"><li>• 60%+ decrease in street &amp; area lighting costs</li><li>• 80%+ decrease in sensor &amp; device operating costs</li></ul>

Some of the use cases are **Fraud Detection, Supply Chain optimization, Smart Cities monitoring or Video Recommendation**

# Use Cases for Generative AI and Vector Search

## Content Generation

BLACK+DECKER 12-Cup Digital Coffee Maker, CM1160B, Programmable, Washable Basket Filter, Sneak-A-Cup, Auto Brew, Water Window, Keep Hot Plate, Black



### Customers say

Customers like the ease of use of the coffee maker. They say it's very simple to set and use. Customers are also satisfied with ease of cleaning, value, and speed. However, some customers have reported issues with drips. They mention that the inside will flood over with coffee grounds. Customers disagree on performance, quality, and temperature.

AI-generated from the text of customer reviews

## Data Analysis: Classification / Anomalies



## Advanced Semantic / Hybrid Search

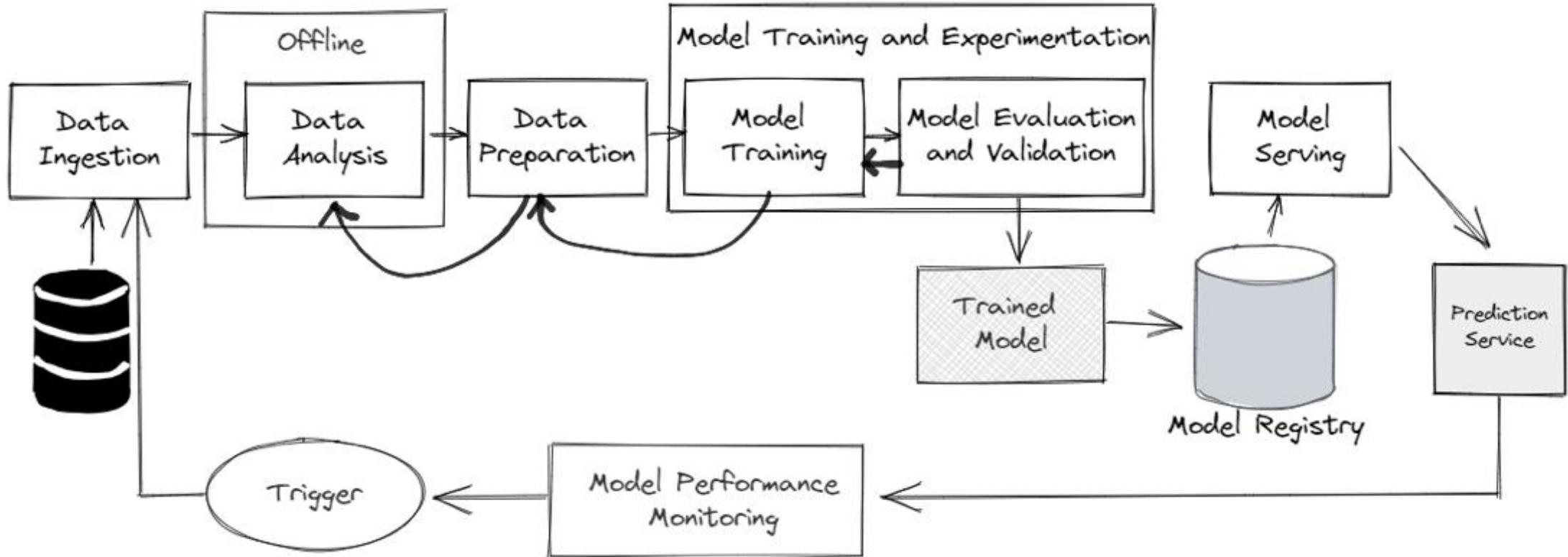


## AI-powered Chatbots and Applications



Vector Search on Mobile coming soon

# Model? Machine Learning Workflow



출처 : <https://www.iguazio.com/blog/ml-workflows-what-can-you-automate/>

<https://cloud.google.com/architecture/mlops-continuous-delivery-and-automation-pipelines-in-machine-learning>

# Examples of Embedding Models

CLOVA X

## Open-Source Text Embedding Models

Word2Vec

Google project in 2013

Glove

Stanford University project - 2014

BERT

Adopted

Word2Vec has been a game  
changer in the history of AI

 txtai

[github link](#)

 chroma

[github link](#)

 OpenAI

text-embedding-ada-002 (2022)  
text-embedding-3-small (2024)

 cohere

 Google

 aws

embed-en  
embed-3.0

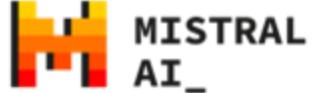
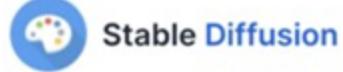
OpenAI shipped very popular  
Text Embeddings Models,  
and there are evolving fast

Vertex AI text-embeddings API

Titan Text Embeddings models

More than 300 Text Embedding Models can be found in the [MTEB leaderboard](#)

# Examples of Vendors and their LLM Models

Vendor	Models
Microsoft / OpenAI	 ChatGPT 
Google	 PaLM, Bard & Gemini 
Mistral	 Open Source Mistral 
Anthropic	 Claude 
Meta	 LLAMA 2 
Stability AI	 Stable Diffusion 
HuggingFace	  starcoder

# Vector DB, Search

1. Demystifying Vector Search
2. The power of Hybrid Search



*Next Capella Workshop Topics*

3. Vector Search Use Case:  
Semantic Search
4. A quick tour of LLMs and Generative AI
5. Vector Search Use Case:  
Retrieval-Augmented Generation (RAG)



# Demystifying Vector Search



# What is a Vector

This is a vector

2.6	11.3	-4.2
-----	------	------



First value



Second value



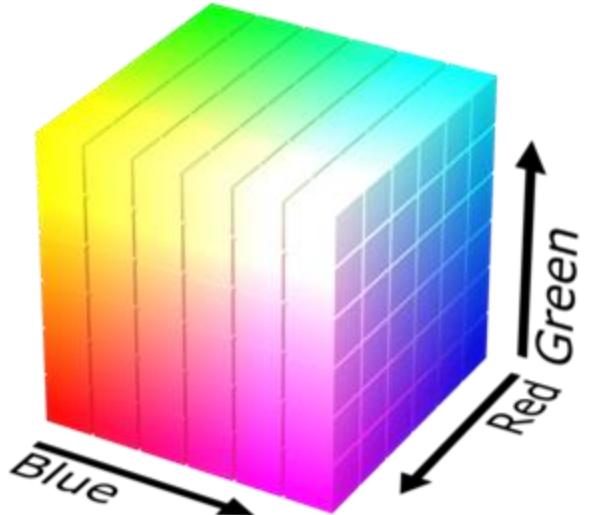
Third value

Here, it contains 3 values  
=> its dimension is 3

A Vector is a just an **array of numerical values**

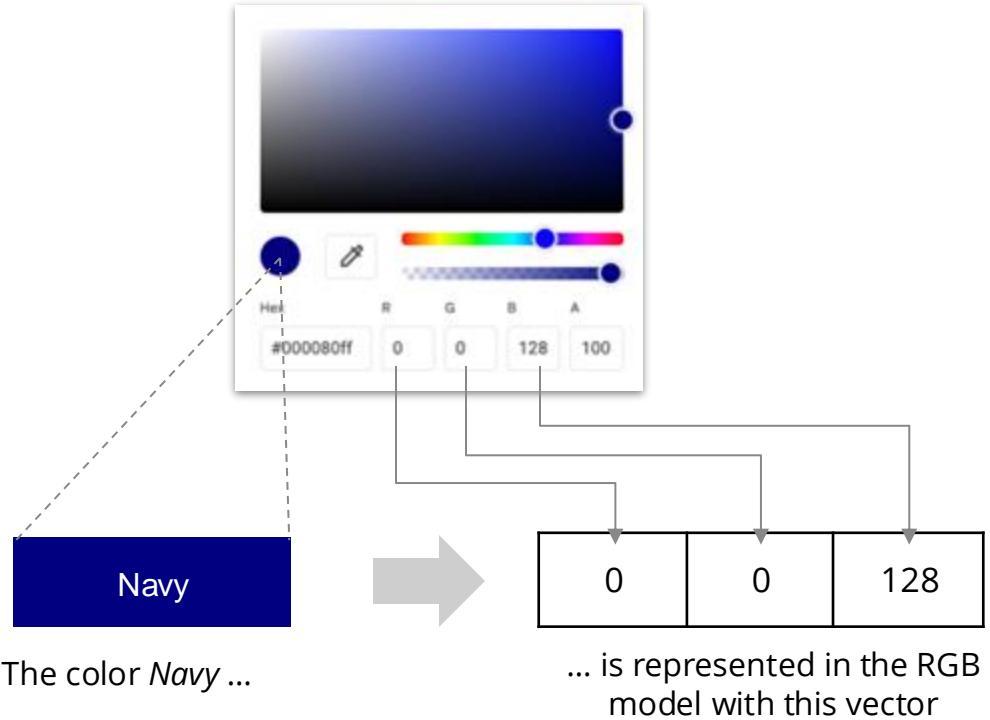
# What is a Vector used for | Basic RGB Example

The RGB model example



The model used to create the colors you see on TV and computer screens.  
Each color is the addition of a **Red**, **Green** and **Blue** primary colors.

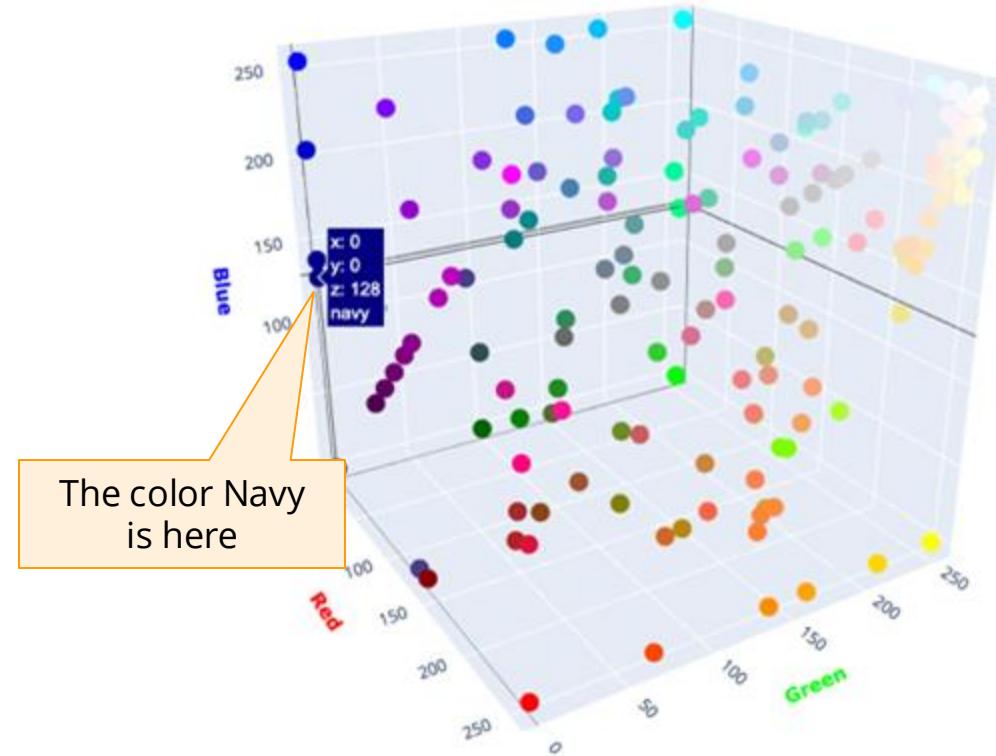
A Vector representation of a Color



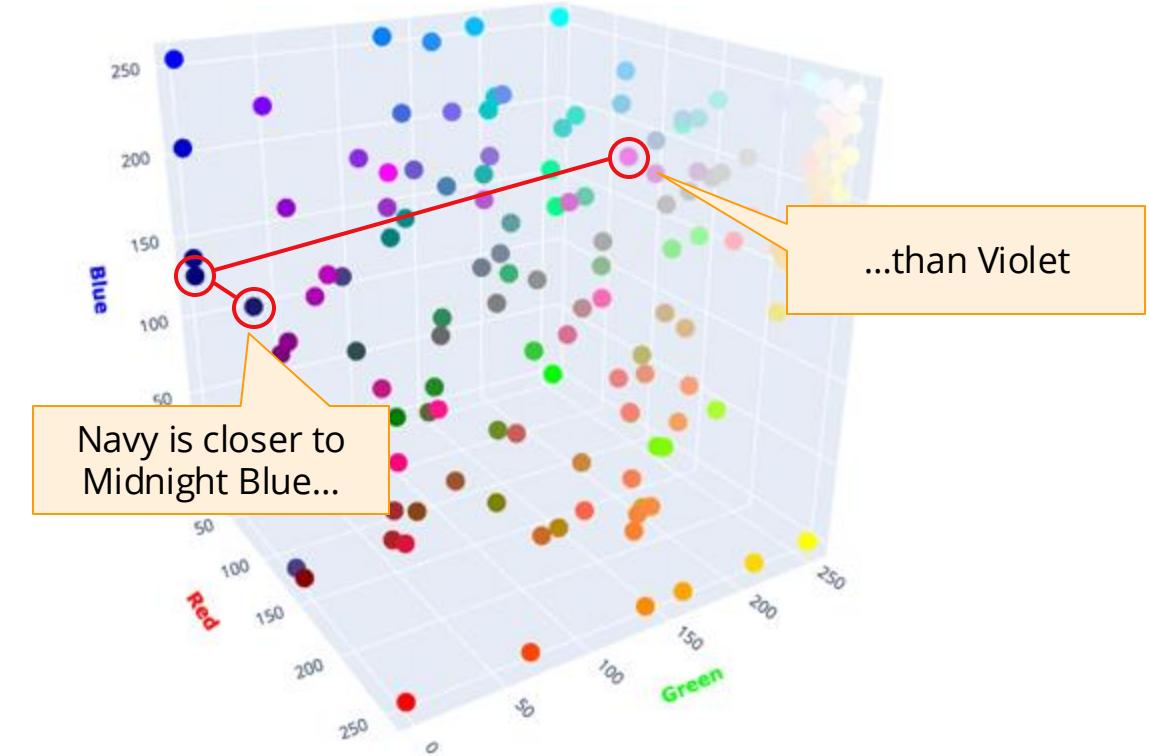
A **Vector** is used to **represent** a more complex object. The **Model** defines the **meaning** of each dimension.

# Vectors Similarity

Example of 123 vectors of RGB colors



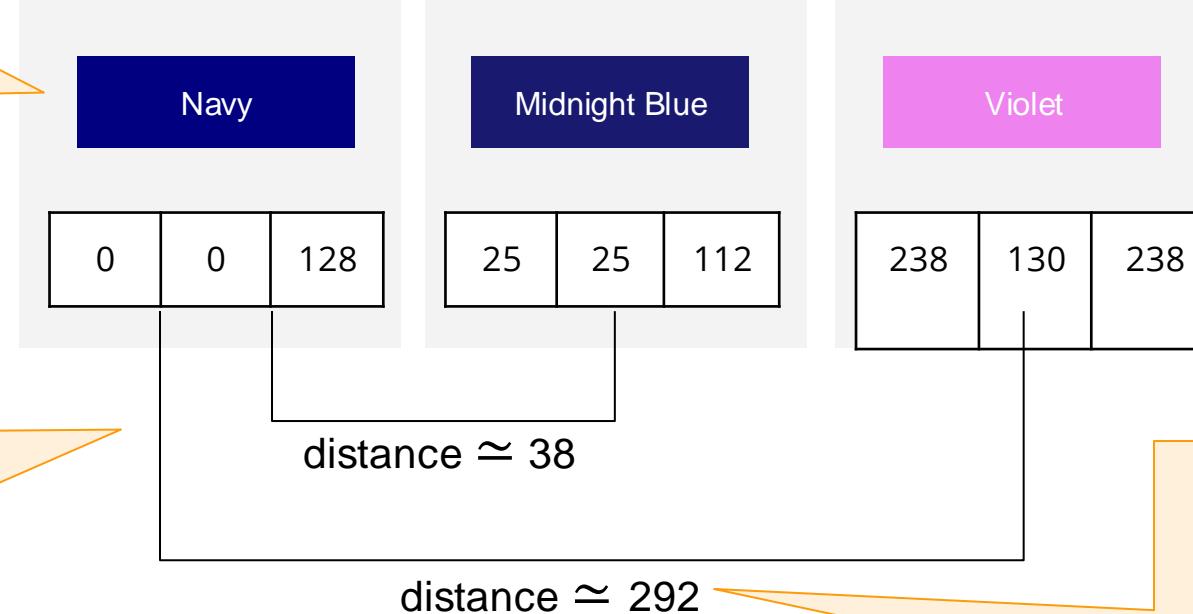
Similar colors are closer to each other



Vectors make it possible to translate **similarity** as perceived by humans to **proximity in a vector space**.

# How does Similarity works

To the human eyes,  
Navy is closer to Midnight  
Blue than Violet



Mathematically,  
we got the same result by  
comparing the vectors

Vectors are compared using  
**a similarity distance.**

Here the *euclidean distance*  
 $292 \approx \sqrt{(238-0)^2 + (130-0)^2 + (238-128)^2}$

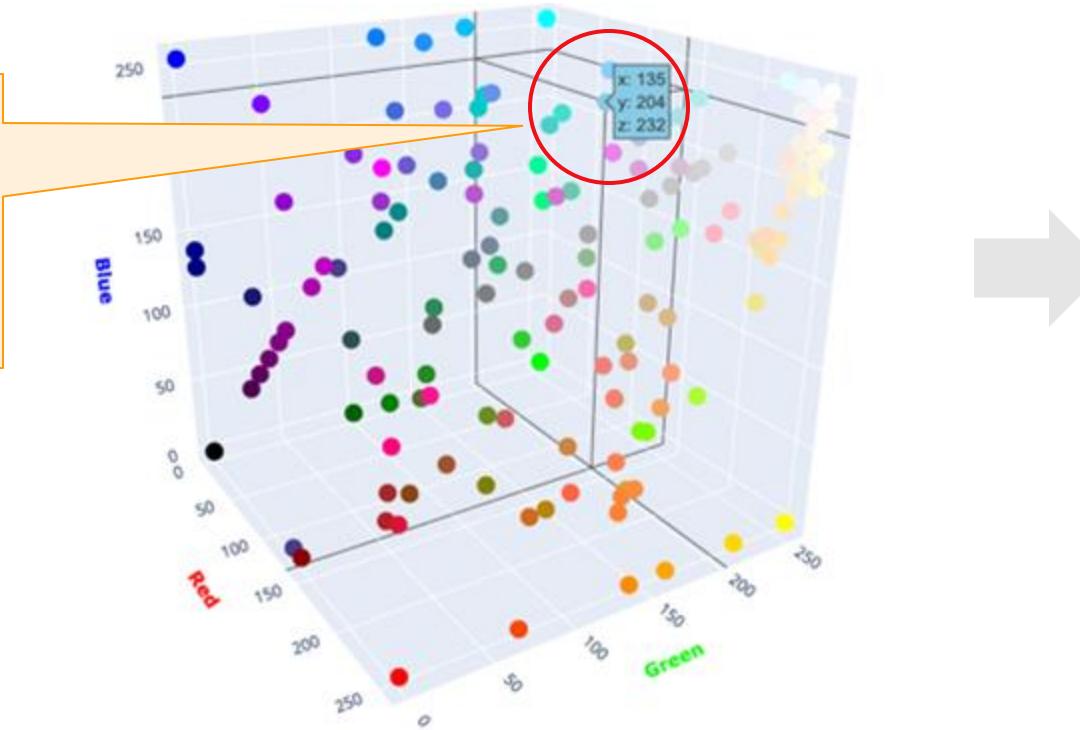
Vectors can easily be compared mathematically using a **similarity distance**

# Similarity Search with K-NN (K-Nearest Neighbors)

Which are the top k nearest neighbors to this color?

[135,204,232]

Example of 123 vectors of RGB colors

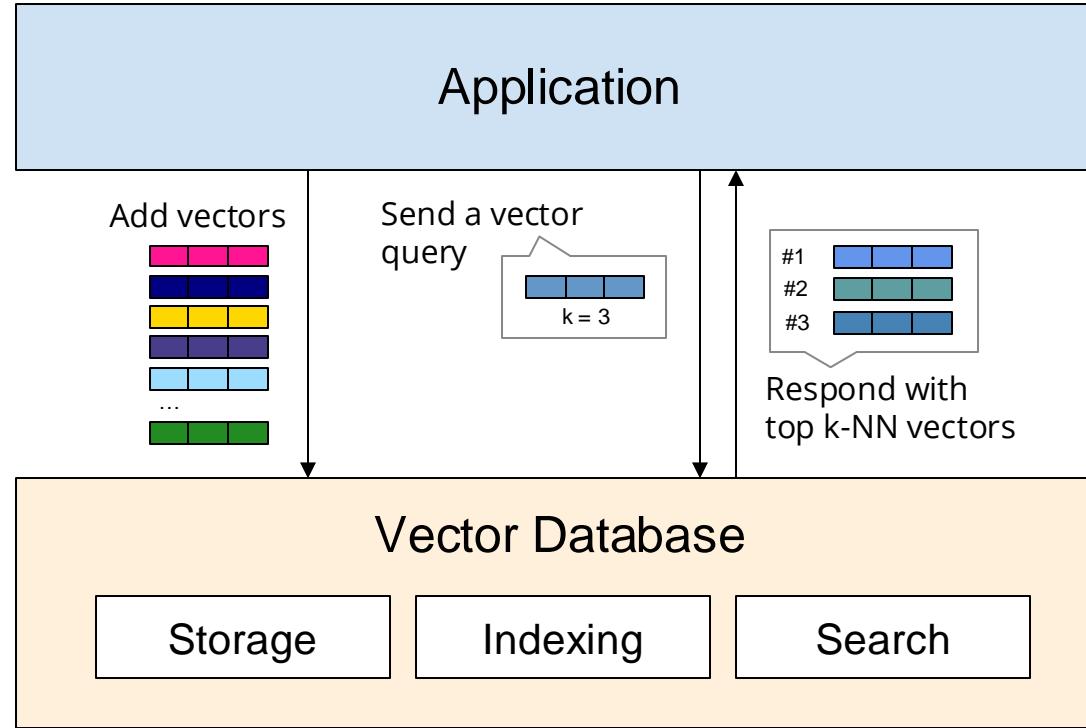


Top k-NN results of the query

- #1 sky blue [135,206,235]
- #2 light sky blue [135,206,250]
- #3 light blue [173,216,230]

A similarity search is a query that **finds the k nearest neighbors to a vector**, as measured by a similarity metric

# What is Vector Database



Vector databases provide the ability to **store, index and search vectors** using similarity search

# Couchbase Vector Search

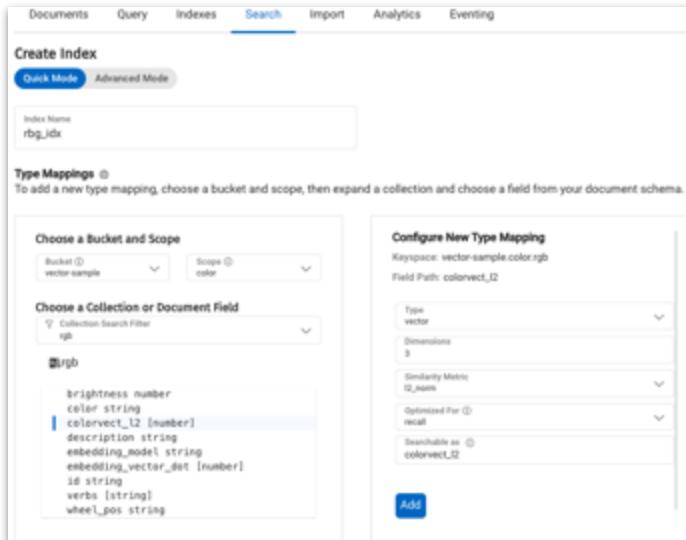
The vectors are stored as a **field in JSON** documents

```
{  
  "id": "#000080",  
  "color": "navy",  
  "brightness": 14.592,  
  "colorvect_l2": [0, 0, 128],  
  "description": "Navy is a deep, rich color that  
    exudes sophistication. It is a dark shade of  
    blue that is often associated with authority,  
    stability, and elegance. Navy is a versatile  
    color that can be both bold and understated,  
    making it a popular choice in fashion and  
    interior design. It is a timeless color that  
    never goes out of style and adds a touch of  
    sophistication to any look or space.",  
}
```

JSON Storage

 **Data Service**

A **Vector Index** must be created to allow the vectors to be searched



Vector Index

 **Search Service**

A **Vector Query** can now search for the top k-NN of a color

```
{  
  "query": { "match_none": {} },  
  "knn": [  
    {  
      "field": "colorvect_l2",  
      "vector": [135, 204, 232],  
      "k": 3  
    }  
  ],  
  "fields": ["color"]  
}
```

Vector Query

Couchbase uses the **Data Service to store vectors**, and the **Search Service to index and query vectors**

# The power of Hybrid Search



# Hybrid SQL++ and Vector Search with Couchbase

This is a **SQL++ query**

Combining Vector Search query

And standard SQL++ criteria

```
SELECT color, brightness
FROM `vector-sample`.color.rgb AS t1
WHERE
  SEARCH(t1,
  {
    "query": { "match_none": {} },
    "knn": [
      "field": "colorvect_l2",
      "vector": [135,204,232],
      "k": 3
    ]
  }
)
AND
  brightness >= 180 AND brightness <= 190
```



SQL++ is easy and familiar to developers



You can filter vector search results with other criteria



You don't have to run 2 separate databases, one for Documents and one for Vector Search!

Couchbase can run hybrid SQL++ and Vector Search queries to **facilitate application development**

# Comparison between Keyword Search and Vector Search



Keyword Search on the  
**description of the colors**



Vector Search on the  
**RGB vectors of the colors**

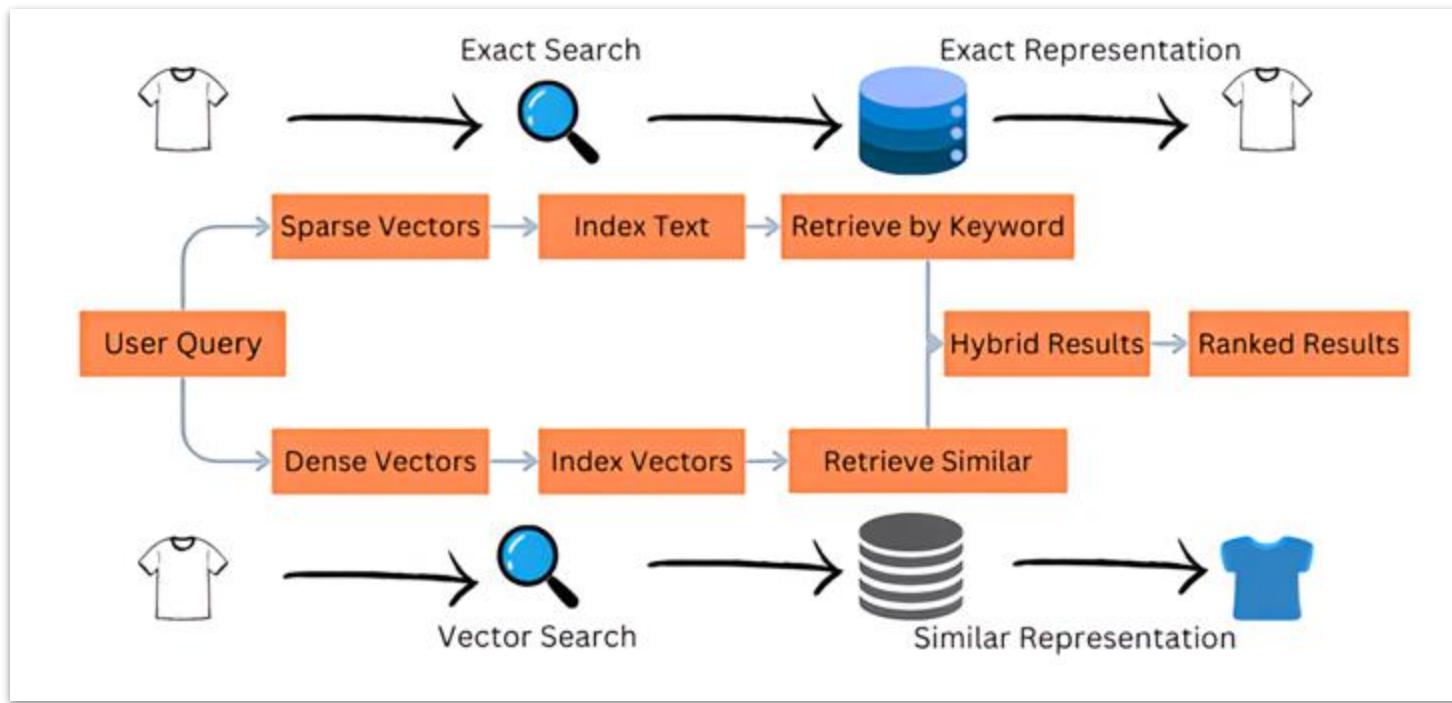


A Keyword search looks for **terms** that match

A Vector search looks for **similarity**

# Hybrid Search to get the best of both worlds

Hybrid Search Architecture



Hybrid Search with Couchbase

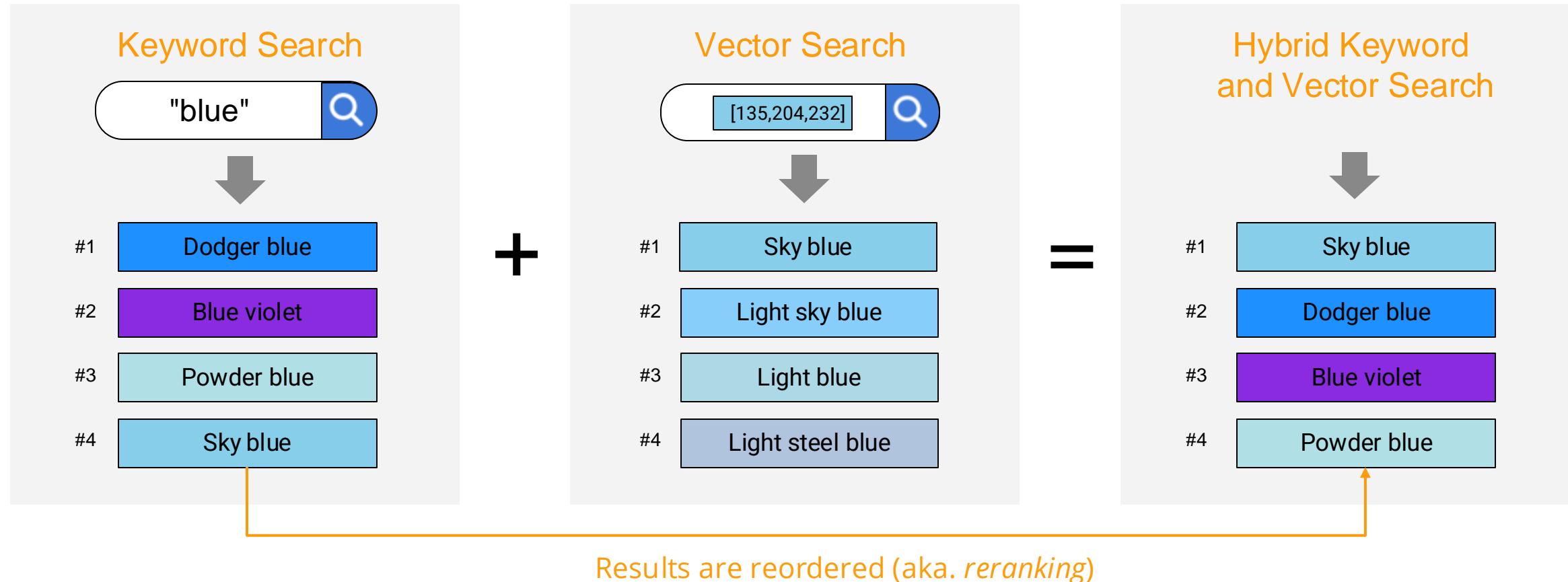
```
{  
  "query": {  
    "match": "blue",  
    "field": "description"  
  },  
  "knn": [  
    {  
      "field": "colorvect_l2",  
      "vector": [135,204,232],  
      "k": 4  
    }  
  ],  
  "fields": ["color","description"],  
  "size": 4  
}
```

Arrows on the right side of the JSON object point to specific fields, indicating their purpose:

- Keyword search:** Points to the `query` field.
- Vector search:** Points to the `knn` field.
- Results to return:** Points to the `size` field.

**Vector search in conjunction with traditional Keyword** search delivers the most complete and relevant results

# Hybrid Keyword and Vector Search Example



Results from the Keyword search are **boosted** if they appear in the Vector Search results

# Vector DB, Search

1. Demystifying Vector Search
2. The power of Hybrid Search



## *Next Capella Workshop Topics*

- 3. Vector Search Use Case:  
Semantic Search
- 4. A quick tour of LLMs and Generative AI
- 5. Vector Search Use Case:  
Retrieval-Augmented Generation (RAG)

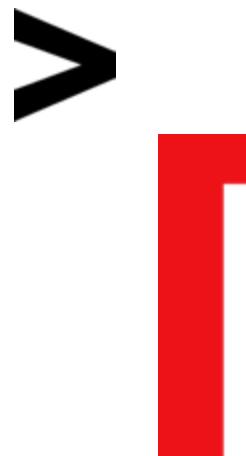
>

T

# Hands-on Lab

> Capella 기본 구성

3시 10분에 다시 시작하겠습니다.  
질문 : 챗팅 방에 남겨 주시면 감사하겠습니다.



# Couchbase 개발/테스트 환경

Download URL : <https://www.couchbase.com/downloads/>

The screenshot shows the Couchbase website's deployment options page. It features four main deployment icons: Capella (Couchbase as a Service), Server (Couchbase locally), Kubernetes Operator (Cloud-native database), and Mobile & Edge (Embedded NoSQL). Below these, the 'Couchbase Server' section is highlighted with an orange border. It displays the 'Version' dropdown set to '7.2.3 (Current)', the 'OS' dropdown showing 'Linux x86\_64 .deb (all distributions)' selected, and a 'Release notes' link.

[https://hub.docker.com/\\_/couchbase/](https://hub.docker.com/_/couchbase/)

The screenshot shows the Docker Hub page for the 'couchbase' image. It includes the Docker logo, the image name 'couchbase', and a brief description: 'Couchbase Server is a NoSQL, document database with a distributed architecture.' Below this are sections for 'Quick reference', 'Supported tags and respective Dockerfile links', and 'About Official Images'. The 'Recent Tags' sidebar lists tags like 'latest', 'enterprise-7.2.3', 'enterprise-7.1.6', etc.



# Couchbase Capella Sign-up

Sign-up URL : <https://cloud.couchbase.com/sign-up>

The screenshot shows the 'Create Account' page for Couchbase Capella. At the top left is the Capella logo with the text 'Couchbase CAPELLA'. Below it is a section titled 'Accelerate your development process with Couchbase Capella.' followed by a paragraph about Capella's automated setup on AWS, GCP, and Azure. To the right is a large 'Create Account' button. Below the button are two social login options: 'GitHub' and 'Google'. A horizontal line separates these from the 'or sign up with email and password' section. This section contains three input fields: 'Full name' (grayed out), 'Email Address' (highlighted with a red border and an error message 'Email Address must be in a valid format.'), and 'Password' (with a character strength meter below it). Below the password field are four checkboxes: 'I agree to the Terms of Use' and 'Privacy Policy', 'I agree to be updated on offers, products, and services from Couchbase', and a small note 'You can unsubscribe at any time.' At the bottom are 'Get Started' and 'Sign in' buttons.

## <입력 항목>

- Full Name
- Email : 계정 및 확인 메일 전달
- Password



# Couchbase Capella

기본 메뉴 설명 : Project > Databases, App Services(Sync Gateway)

The screenshot displays the Couchbase Capella web application interface across three main sections: Projects, Databases, and App Services.

**Projects Section:** This section shows a list of projects. Two specific rows are highlighted with red dashed boxes: "PoC" and "TestProject". The columns include NAME, CREATED BY, DATE CREATED, DATABASES, APP SERVICES, and COLLABORATORS. The "PoC" project was created by Paul Son 11 days ago, has 1 database, 1 app service, and 7 collaborators. The "TestProject" project was created by Paul Son 19 days ago, has 1 database, 0 app services, and 7 collaborators.

NAME	CREATED BY	DATE CREATED	DATABASES	APP SERVICES	COLLABORATORS
PoC	Paul Son	11 days ago Jan 12, 2024 15:59:48 GMT+9	1	1	7
TestProject	Paul Son	19 days ago Jan 04, 2024 13:42:06 GMT+9	1	0	7

**Databases Section:** This section lists databases associated with the selected projects. It includes columns for NAME, PROJECT, STATUS, SCHEDULE ON/OFF, PROVIDER, LINKED APP SERVICE, CREATED BY, and VERSION. Two databases are listed: "poc\_db" and "test\_db". Both are linked to the "pos-appservice" provider in the AWS Asia Pacific (Seoul) region, created by Paul Son, and are version 7.2.3.

NAME	PROJECT	STATUS	SCHEDULE ON/OFF	PROVIDER	LINKED APP SERVICE	CREATED BY	VERSION
poc_db	PoC	Off 8 days/30 Days	-	AWS Asia Pacific (Seoul)	pos-appservice	Paul Son	7.2.3
test_db	TestProject	Healthy	-	AWS Asia Pacific (Seoul)	-	Paul Son	7.2.3

# Couchbase Capella

## 기본 메뉴 설명 : Project > Databases > Create Database

The screenshot shows the 'Create Database' interface in the Couchbase Capella web UI. The process is divided into several steps:

- SCHEDULED** and **LINKED APP** tabs are visible at the top.
- Create Database** step: A note says "Before creating a database, select a project. You can manage your projects [here](#)". A dropdown menu for "Project" is highlighted with a red dashed border. A "Continue" button is below it.
- Cloud** step: "Use Couchbase managed cloud service provider".
  - AWS** is selected (indicated by a checked checkbox) and highlighted with a red dashed border. Its "Available Regions" dropdown is set to "Asia Pacific (Seoul)".
  - Azure** and **Google Cloud** are also listed with their respective icons.
- Summary**:
  - Cloud**: AWS Asia Pacific (Seoul)
  - Database Name**: generousshakuntalaatre
  - Configuration**: 7.2 Couchbase Server Version, Data, Index, Query, Search Services, Total 3 Nodes
  - Plan**: Developer Pro
  - Availability Zone**: Multiple
  - Cost**: Credits Pay-As-You-Go
- Name and Description**: "Database Name \* generousshakuntalaatre" is highlighted with a red dashed border.



# Couchbase Capella

## 기본 메뉴 설명 : Project > Databases > Create Database

The screenshot shows the 'Create Database' page in the Couchbase Capella web interface. At the top, it displays 'Couchbase Server Version' (7.6), 'Service Groups' (with an option to 'Add Service Group'), and a note about auto-expansion. The main area is divided into several sections:

- Summary:** Shows 'Cloud' (Asia Pacific (Seoul)), 'Database Name' (generousshakuntalaatre), and a 'Configuration' section for 7.6 Couchbase Server Version, Data, Index, Query, Search Services, and Total 3 Nodes.
- Plan:** Set to 'Developer Pro'. It includes a table comparing 'Basic', 'Developer Pro', and 'Enterprise' plans, listing features like backup retention, support, and audit logs.
- Availability:** Options for 'Same Availability Zone' (selected) or 'Multiple Availability Zones'.
- Cost:** Shows 'Credits' (1.18 Developer Pro credits / hour) and a 'Pay-As-You-Go' button.
- Create Database:** A large blue button at the bottom right.



# Couchbase Capella UI

## 기본 메뉴 > Databases

The screenshot displays the 'Databases' section of the Couchbase Capella UI. The top navigation bar includes the Capella logo, a search bar, and links for 'Playground', 'Get Help', and a user profile. Below the navigation is a secondary header with 'FIELD ENGINEERING' and several menu items: 'Databases' (selected), 'App Services', 'Projects', 'People', 'Teams', 'Support', and 'Settings'. The main content area is titled 'Databases' and features a 'Create Database' button. A table lists two databases:

NAME	PROJECT	STATUS	SCHEDULE ON/OFF	PROVIDER	LINKED APP SERVICE	CREATED BY	VERSION	⋮
poc_db	PoC	Off 8 days/30 Days	-	aws AWS Asia Pacific (Seoul)	pos-appservice	Paul Son	7.2.3	⋮
test_db	TestProject	Healthy	-	aws AWS Asia Pacific (Seoul)	-	Paul Son	7.2.3	⋮

Showing 2 of 2 results

Database 명 클릭!



# Couchbase Capella UI

기본 메뉴 > Databases > Bucket : Data Tools

Databases / **test\_db** HEALTHY PROVISIONED **Databases(instance)**

[Data Tools](#) [App Service](#) [Connect](#) [Monitoring](#) [Backup](#) [Settings](#)

[+ Create](#) [Filter...](#)

Get documents from

+ Create Document

Bucket: fdc Scope: time Collection: trace

Paginate and Filter documents

Filter by: ID ID Range SQL++ WHERE

Limit: 50 Offset: 0 DDC ID: Get Documents

**Buckets(database)**

**Scope(schema)**

**Scope(table)**

**Document(row)**

travel-sample 7 scopes

- > fdc 2 scopes
- > FDC\_TTL 2 scopes
- > pos 2 scopes
- > travel-sample 7 scopes
  - > inventory 5 collections
    - > airline 187 documents
    - > airport 1,968 documents
    - > hotel 917 documents
    - > landmark 4,495 documents
    - > route 24,024 documents
    - > tenant\_agent\_00 2 collections
    - > tenant\_agent\_01 2 collections
    - > tenant\_agent\_02 2 collections
    - > tenant\_agent\_03 2 collections
    - > tenant\_agent\_04 2 collections
    - > \_default 1 collection



# Couchbase Capella UI

기본 메뉴 > Databases > Bucket : Data Tools

The screenshot shows the Couchbase Capella UI interface. The top navigation bar includes the logo, search bar, playground, help, and user profile. The main title is "Databases(instance)". The left sidebar shows a tree view of databases and collections, with specific items like "travel-sample", "inventory", and "airline" highlighted with red boxes. The right panel contains tabs for Documents, Query, Indexes, Search, Import, Analytics, and Eventing. A yellow box highlights the "Documents" tab. Below it, there's a "Get documents from" section with a "Create Document" button and a "Paginate and Filter documents" section with a "Get Documents" button. A large red arrow points from the "Documents" tab to a diagram on the right. The diagram illustrates the Couchbase data model: a central "Database" cylinder containing two "Bucket" containers, "Bucket 1" and "Bucket 2". Each bucket contains a "Scope" container (Scope 1 and Scope 2) which in turn contains a "Collection" container (Collection 1 and Collection 2). Each collection contains a "Document" (Document 1 and Document 2).

Databases / test\_db HEALTHY PROVISIONED

Databases(instance)

Data Tools App Service Connect Monitoring Backup Settings

+ Create Filter...

Get documents from

+ Create Document

Paginate and Filter documents

Get Documents

Buckets(database)

Scope(schema)

Scope(table)

Document(row)

<Data Model>

Database

Bucket 1

Scope 1

Collection 1

Document 1

Bucket 2

Scope 2

Collection 2

Document 2

# Couchbase Capella UI

기본 메뉴 > Databases > Bucket : Data Tools > Documents

The screenshot shows the Couchbase Capella UI interface for managing documents. The top navigation bar includes the Capella logo, a search bar, and links for Playground, Get Help, and a user icon. The main area is titled 'Databases / test\_db (HEALTHY, PROVISIONED)'. A red dashed box highlights the 'Data Tools' tab in the top navigation, which is connected by an arrow to a yellow box labeled 'Admin. 메뉴' (Admin Menu). Another red dashed box highlights the 'Documents' tab in the sub-navigation, connected by an arrow to a yellow box labeled 'Services 메뉴' (Services Menu). A third red dashed box highlights the 'airline' collection in the left sidebar, connected by an arrow to a yellow box labeled 'Collection 지정 메뉴' (Collection Selection Menu). The central content area displays a table of documents with columns for 'DOC ID' and 'DOCUMENT'. A specific document row for 'airline\_10' is highlighted with a red box and an arrow pointing to it, with the text 'Document ID 클릭!' (Click Document ID) overlaid. The table lists several airline documents with their IDs and some sample JSON data.

DOC ID	DOCUMENT
airline_10	{ "id": 1000, "type": "airline", "name": "40-Mile Air", "iata": "Q5", "icao": "MLA", "callsign": "MILE-AIR", ... }
airline_10123	{ "id": 10123, "type": "airline", "name": "Texas Wings", "iata": "TQ", "icao": "TXW", "callsign": "TX... " }
airline_10226	{ "id": 10226, "type": "airline", "name": "Atifly", "iata": "A1", "icao": "A1F", "callsign": "atifly", "countr... " }
airline_10642	{ "id": 10642, "type": "airline", "name": "Jc royal.britannica", "iata": null, "icao": "JRB", "callsign": "... " }

# Couchbase Capella UI

기본 메뉴 > Databases > Bucket : Data Tools > Documents

The screenshot shows the Capella interface for managing Couchbase databases. The top navigation bar includes the Capella logo, a search bar, and links for 'Playground' and 'Get Help'. The main area displays the 'test\_db' database status as 'HEALTHY' and 'PROVISIONED'. On the left, a sidebar lists various collections and their details. The central part of the screen is an 'Edit Document' dialog for a document in the 'travel-sample . inventory . airline' collection. The dialog shows the document ID 'airline\_10' and its JSON content:

```
1 {  
2   "id": 10,  
3   "type": "airline",  
4   "name": "40-Mile Air",  
5   "iata": "Q5",  
6   "icao": "MLA",  
7   "callsign": "MILE-AIR",  
8   "country": "United States"  
9 }
```

The right side of the dialog shows a list of other airline documents with their IDs and some truncated JSON snippets.

# Couchbase Capella 연결 준비

## Databases > MyDatabase

The screenshot shows the Couchbase Capella web interface. At the top, there's a navigation bar with the Capella logo, a search bar, and tabs for Databases, App Service, Connect, Monitoring, Backup, and Settings. The 'Connect' tab is highlighted with a blue dashed box and a red arrow points to it from the text '접속 방법 확인' (Connection Method Confirmation). Below the navigation, there's a sidebar with 'SDKs' selected, showing options for 'Couchbase Shell (preview)' and 'Import & Export Tools'. The main content area is titled 'SDKs' and contains instructions to connect using a Software Development Kit (SDK). It features a 'Public Connection String' section with a text input containing 'couchbases://cb.lapq1t8mpvdlycj3.cloud.couchbase.com'. A red arrow points to this string from the text '공인 Connection String' (Official Connection String). Another red arrow points to the 'Allowed IP Addresses' link in a section about allowed network settings, from the text '허용 접속 네트워크 설정' (Allowable Network Configuration). The bottom of the page has a note about existing allowed IP addresses and a link to 'Allowed IP Addresses'.

접속 방법 확인

SDKs

Public Connection String

Use the Public Connection String to specify the Capella database endpoint for your client connection.

couchbases://cb.lapq1t8mpvdlycj3.cloud.couchbase.com

공인 Connection String

허용 접속 네트워크 설정

1. You already have an allowed IP address for your database. You can use this IP address to connect.  
To add a new allowed IP address, go to [Allowed IP Addresses](#).



# Couchbase Playground

The screenshot shows the Couchbase Capella Playground interface. At the top, there's a navigation bar with the Capella logo, a search bar, and links for 'Playground' and 'Get Help'. Below the navigation, there are dropdown menus for 'Tutorial' (set to 'SDKs for Beginners') and 'Chapter' (set to 'About This Tutorial'), along with 'Prev' and 'Next' buttons, and an 'Exit Playground' button.

**About This Tutorial**

Learn how to access a Capella database using Couchbase SDKs and the Capella Playground. The tutorial walks you through several examples of how you can leverage Couchbase SDKs to access your data. You'll learn how to:

- Retrieve full documents
- Insert or replace data
- Query Result Rows
- Query with named parameters
- Query with positional parameters
- Retrieve a portion of a document
- Change a sub-document

**Understanding Couchbase Capella**

While Capella offers flexibility in how you organize your data, you can leverage Scopes and Collections to mimic the basic structure of a relational database:

Relational Model	Couchbase
Server	Cluster
Database	Bucket

In the main workspace, there are dropdowns for 'Database' (set to 'capella-workshop'), 'Bucket' (set to 'travel-sample'), and 'Scope' (set to 'inventory'). Below these, there are tabs for 'Node.js' (selected), 'Python', and 'Java'. A code editor displays the following Node.js code:

```
1 // A temporary credential will be used to run this sample in the UI
2 const couchbase = require('couchbase')
3
4 const main = async () => {
5   const cluster = await couchbase.connect(`couchbases://${process.env.DATABASE_CONNECTION_STRING}`, {
6     username: '<DATABASE_USERNAME>', password: '<DATABASE_PASSWORD>', configProfile: 'wanDevelopment'
7   })
8
9   const bucket = cluster.bucket('<SELECTED_BUCKET>')
10  const collection = bucket.scope('<SELECTED_SCOPE>').collection('travel-sample')
```

A 'Run' button is available to execute the code. The 'Response' section shows the output: '1 {}'.

# Hands-on Lab

## > Vector Search with RGB samples



# Couchbase Developer Tutorials

<https://developer.couchbase.com/tutorials>

The image shows two side-by-side screenshots of the Couchbase Developer Tutorials website at <https://developer.couchbase.com/tutorials>.

**Left Screenshot:** This view shows a search bar at the top followed by a grid of tutorial cards. Each card includes a title, a brief description, and a list of technologies used. The technologies listed are: Gin Gonic, REST API, Spring Boot, Spring Data, Ktor, and REST API.

Tutorial Type	Language/SDK	Tags	Technology
Quickstart in Couchbase with Golang and Gin Gonic	golang	REST API, Spring Boot	Gin Gonic, REST API
Quickstart in Couchbase with Kotlin and Ktor	kotlin	Ktor, REST API	Ktor, REST API

**Right Screenshot:** This view shows a search bar at the top followed by a grid of tutorial cards. Each card includes a title, a brief description, and a list of technologies used. The technologies listed are: Artificial Intelligence, LangChain, and OpenAI.

Tutorial Type	Language/SDK	Tags	Technology
Retrieval-Augmented Generation (RAG) with Couchbase, OpenAI, and Claude	Artificial Intelligence	LangChain, OpenAI	Artificial Intelligence, LangChain, OpenAI
Retrieval-Augmented Generation (RAG) with Couchbase and Azure OpenAI	Artificial Intelligence	LangChain, OpenAI	Artificial Intelligence, LangChain, OpenAI
Retrieval-Augmented Generation (RAG) with Couchbase and Cohere	Artificial Intelligence	LangChain, Cohere	Artificial Intelligence, LangChain, OpenAI

# Couchbase SDK Page

The screenshot shows a web browser displaying the Couchbase Documentation website at [docs.couchbase.com/java-sdk/current/hello-world/start-using-sdk.html](https://docs.couchbase.com/java-sdk/current/hello-world/start-using-sdk.html). The page title is "Start Using the Java SDK".

**Left Sidebar:** A navigation sidebar titled "SDKS" lists various SDKs: .NET SDK (version 3.5), C SDK, Go SDK (version 2.8), and Java SDK (version 3.6). Under "Getting Started", the "Start Using the Java SDK" link is highlighted in blue.

**Page Content:**

- Section Header:** "Start Using the Java SDK" with a "TUTORIAL" button.
- Text:** "A quick start guide to get you up and running with Couchbase and the Java SDK."
- Text:** "The Couchbase Java client allows applications to access a Couchbase database. It offers synchronous APIs as well as reactive and asynchronous equivalents to maximize flexibility and performance."
- Text:** "In this guide, you will learn:"
  - How to [connect to Couchbase Capella or Couchbase Server](#).
  - How to [add and retrieve Documents](#).
  - How to [lookup documents](#) with the [SQL++ \(formerly N1QL\)](#) query language.
- Section Header:** "Hello Couchbase"
- Text:** "We will go through the code sample step by step, but for those in a hurry, here's the complete code:
- Code Sample:** A box containing two tabs: "Couchbase Capella Sample" (selected) and "Local Couchbase Server". Below the tabs, it says: "If you are connecting to [Couchbase Capella](#), you'll need to know the endpoint address, as well as a username and password." At the bottom of the box, it says: "This example requires the Travel Sample Bucket. The Couchbase Capella free trial version comes with this buck-
- Right Sidebar:** Includes links like "Hello Couchbase", "Quick Installation", "Prerequisites", "Step by Step" (with sub-links for Connect, Add and Retrieve Documents, SQL++ Lookup, Execute), "Next Steps" (with sub-links for Additional Resources and Troubleshooting), and "Is this page helpful?". There are "Yes" and "No" buttons for feedback, and a "Leave Additional Feedback?" link.
- Bottom Right:** A "Ask me about Couchbase!" button with a speech bubble icon and a small profile picture.

# Vector Search Demo

별첨 문서 : Couchbase Vector Search RGB Demo.pdf

# And then ...

>



# Next Capella Webinar

구분	일자	Webinar 주제
시리즈 1	2024-09-25	벡터 검색을 활용한 AI Powered 어플리케이션 구축
시리즈 2	2023-10-30	벡터 검색을 활용한 LLM/RAG 어플리케이션 구축
시리즈 3	2024-11-27	벡터 검색을 활용한 Mobile On-Device AI 어플리케이션 구축

# Couchbase Academy

<https://learn.couchbase.com/store>

The screenshot shows the 'Couchbase | NoSQL | Training' section of the website. At the top, there's a navigation bar with icons for home, search, and account. Below it is a header with the URL 'learn.couchbase.com/store'. The main content area features a large banner with two women working at a computer, overlaid with the text 'Welcome to the Couchbase Academy instructor-led and eLearning training options! Couchbase Certification Exams for 2023, now without a proctor requirement.' Below the banner is a search bar with a placeholder 'Search by keyword' and a red 'Search' button. To the right of the search bar are buttons for 'All Types and topics' and 'Questions?'. Further down, there's a section titled 'Upcoming Sessions' for 'February 20'. A specific session is listed: 'CD410: Advanced N1QL Course: Tuning and Optimization - APAC Virtual (GMT+8)' starting on 02/20/2024 at 09:00 AM (GMT+08:00) in Singapore and ending on 02/23/2024 at 05:00 PM (GMT+08:00) in Singapore. The session type is 'Multi-day Session'.

The screenshot shows the 'Courses' section of the website. It displays four course cards, each with an orange circular icon containing a developer-related icon (Node.js, Java, Database, or Android), the course title, a brief description, and a 'Read More' link. Each card also includes a 'Rating' (4.5 stars), 'Difficulty' (easy), 'Content' (9 modules), and 'Price' (Free) section, along with an 'Add' button. A red dashed circle highlights the first course, 'CB130n: Couchbase Associate Node.js Developer Certification With Capella Course'.

- CB130n: Couchbase Associate Node.js Developer Certification With Capella Course**  
This newly revamped course shows how to leverage the full power of Couchbase 7 as a service with Couchbase Capella. The following 8 courses provide a fundamental understanding of the Couchbase NoSQL database and essential functionality. Throughout these courses, we share the basics of SQL vs. NoSQL, how to sign up for Couchbase Capella, modeling data to the benefit of Couchbase, and an example application you will build. Learners will also walk through the basics of Couchbase Capella. [Read More](#)
- CB130j: Couchbase Associate Java Developer Certification With Capella Course**  
This newly revamped course leverages the full power of Couchbase 7 and supports Couchbase Capella. The following 8 courses provide a fundamental understanding of the Couchbase NoSQL database and essential functionality. Throughout these courses, we share the basics of SQL vs. NoSQL, obtaining and downloading Couchbase, modeling data to the benefit of Couchbase, and an example application you will build. Learners will also walk through the basics of Couchbase's N1. [Read More](#)
- CB131: Couchbase Associate Architect Certification With Capella Course**  
This newly revamped course demonstrates the full power of Couchbase 7 and the fully-managed Database as a Service (DBaaS); Couchbase Capella. The Couchbase Associate Architect Course shares a fundamental understanding of the Couchbase NoSQL database and essential functionality as accessed through the Couchbase Capella user interface. It discusses modeling data to the benefit of the database and application, as well as how to write and implement SQL. [Read More](#)
- CB140a: Couchbase Associate Android Developer With Capella Course**  
This course showcases and demonstrates how to create a new Android application using Couchbase Mobile and Couchbase Capella, our fully managed DBaaS service. The following 7 modules provide fundamental instruction on building an Android application with or without a pre-existing database. To that end, we walk through the essential functionality of Couchbase Capella, the benefits of a fully managed NoSQL database, and how that database interacts with Couchbase Mobile products. [Read More](#)



# Thank you!



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**Couchbase**