Couchbase

The Modern Database for Enterprise Applications

Simplify & Accelerate Database Modernisation Journey

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Regional SE- ANZ

Regional SE - ANZ, Couchbase

With a career spanning over a decade, my professional journey has encompassed roles as a Consultant and Architect, with a specialization in the domains of DevOps and MLOps.

Connect with me on Linkedin

Agenda

1 Cloud Journey Challenges

2 How Couchbase can help?

3 Couchbase Mobile / IOT

4 Demos

5 Next Steps

A day in Life

What do customers want?

Customers & The Market: Application Needs Have Changed

Deliver Great Experiences

- Personalized & responsive
- Anywhere & everywhere
- Real time info & inventory
- Ensuring dependable transactions

Develop Efficiently

- Simplify & accelerate development
- Tap my skills (SDKs & SQL)
- Support best practices
- Avoid data sprawl

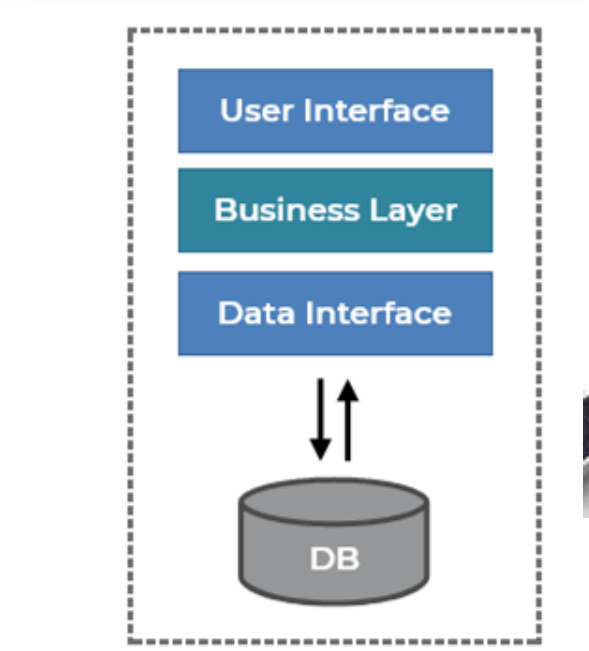
Deploy Effectively

- Support hybrid clouds, Edge, 5G
- 100% uptime & global scale
- Flexible management options
- Cost effective

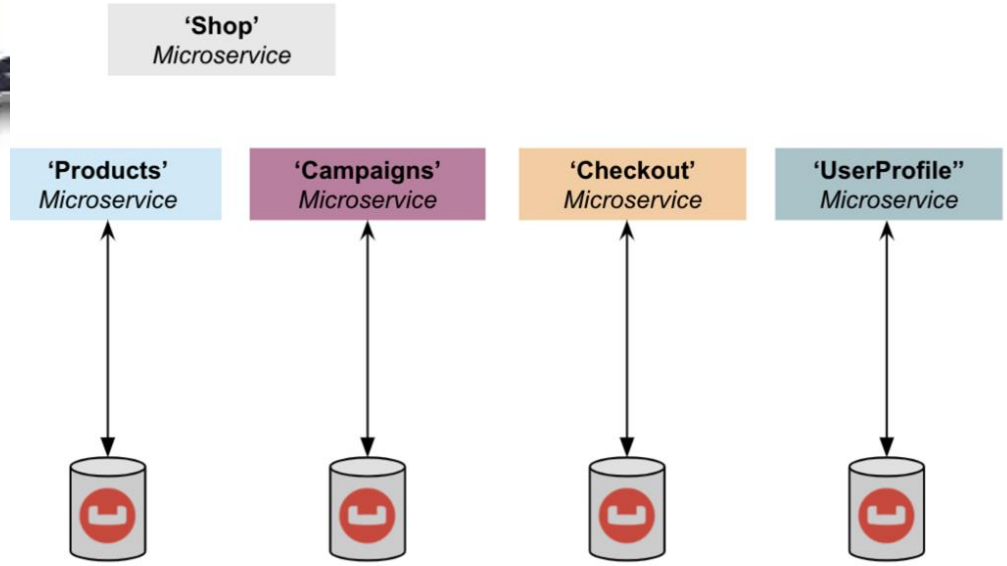
The Reality

Modernization is a Journey

Legacy

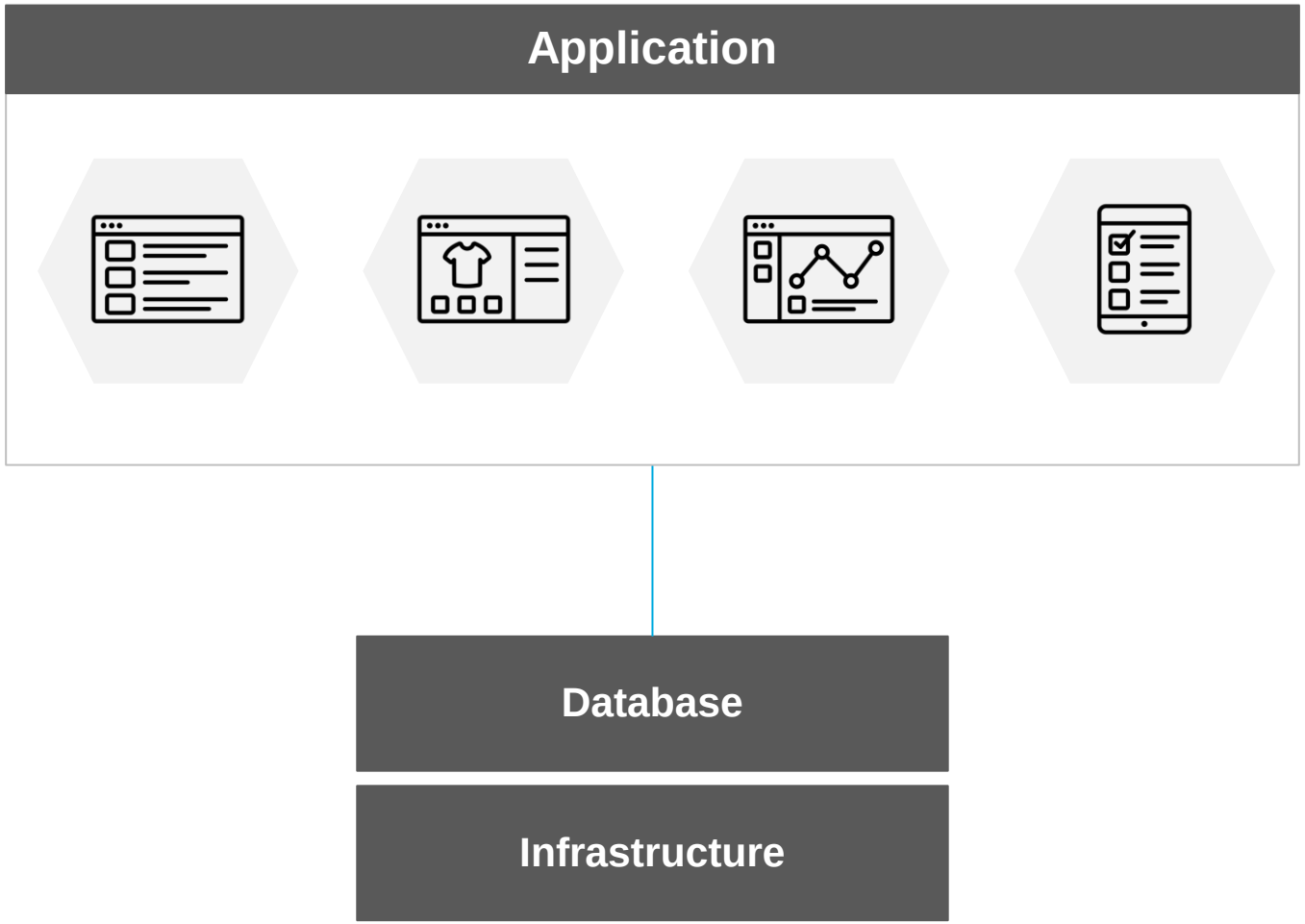


Modern

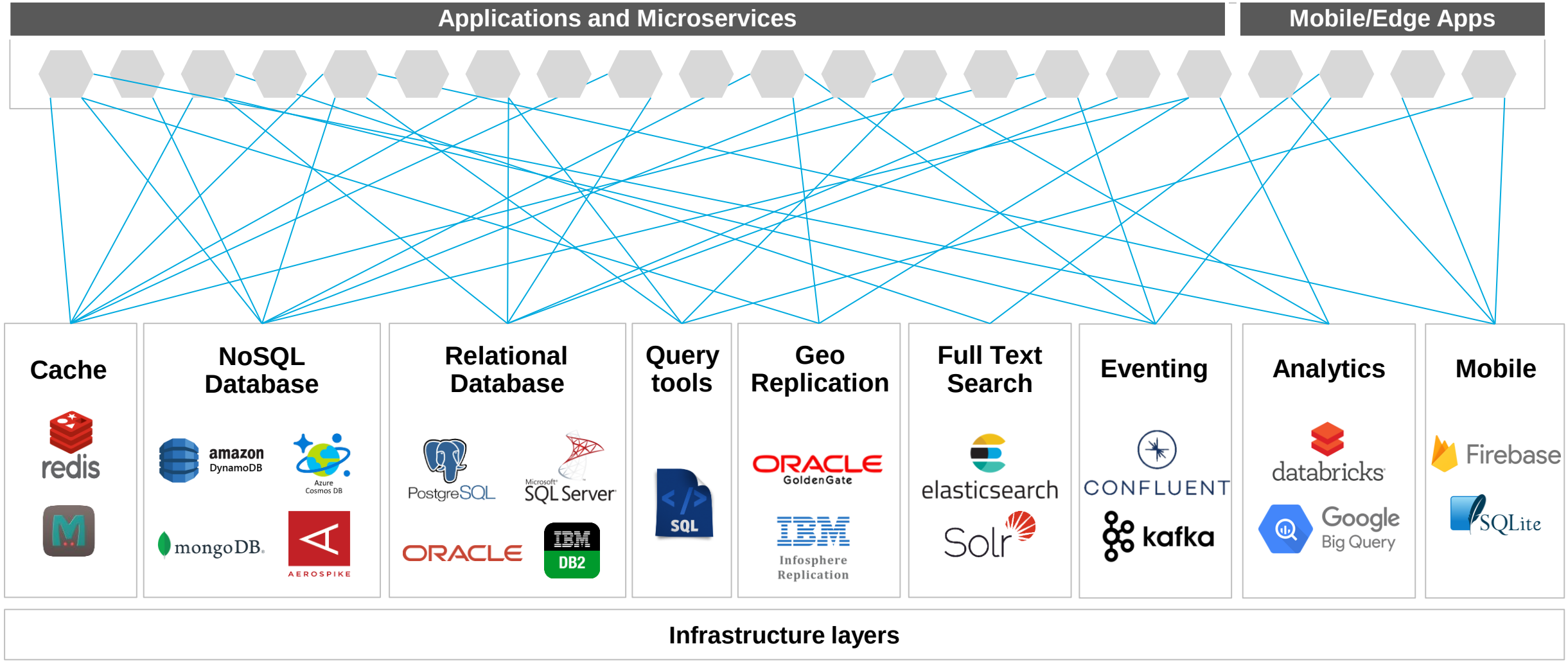


Simplistic View: Data Management For Applications

Functional Requirements



Reality: Data Sprawl & Management Challenges



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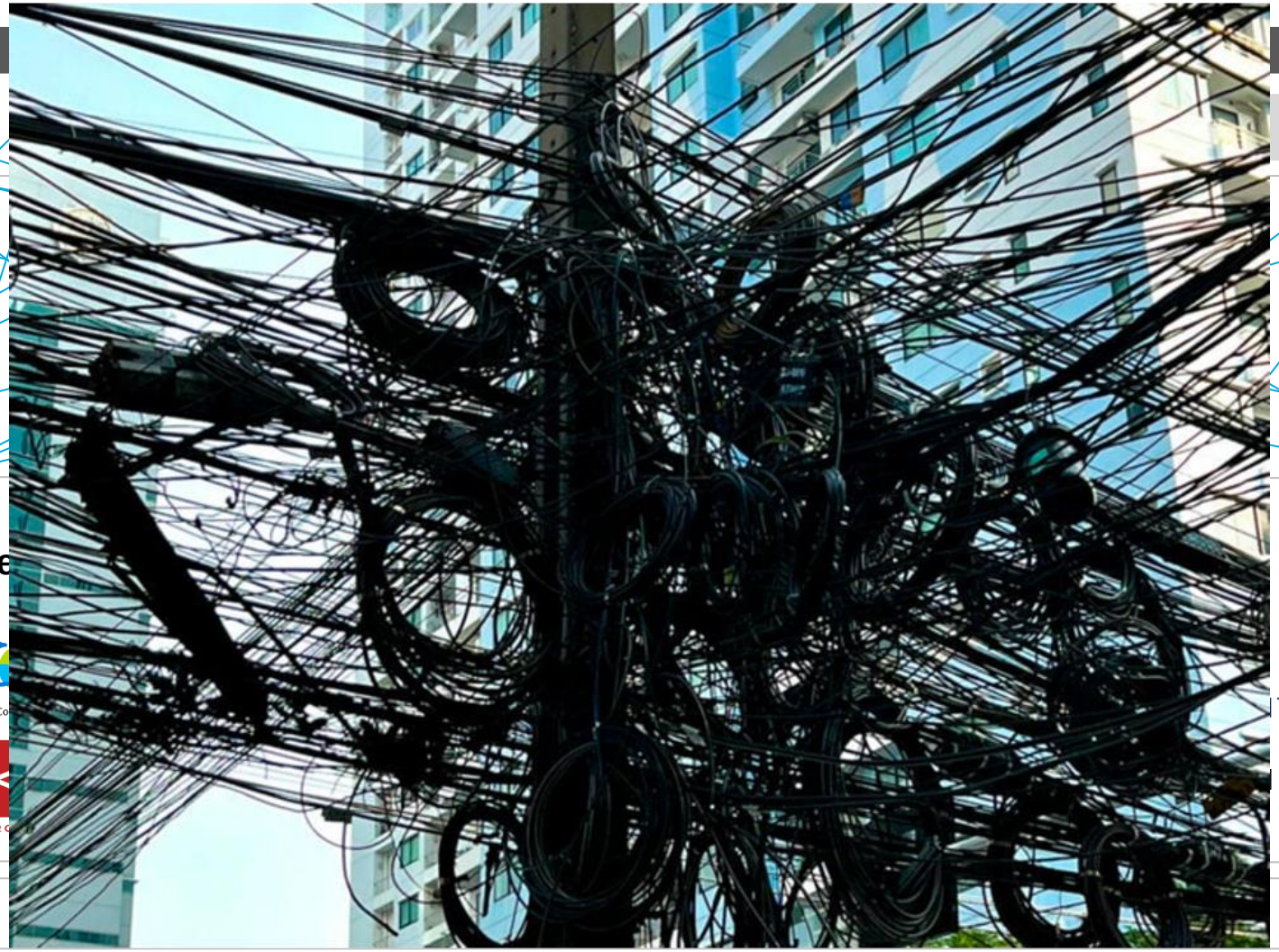


Mobile/Edge Apps

Cache

redis

NoSQL Database

amazon DynamoDB

mongoDB.

Analytics

databricks

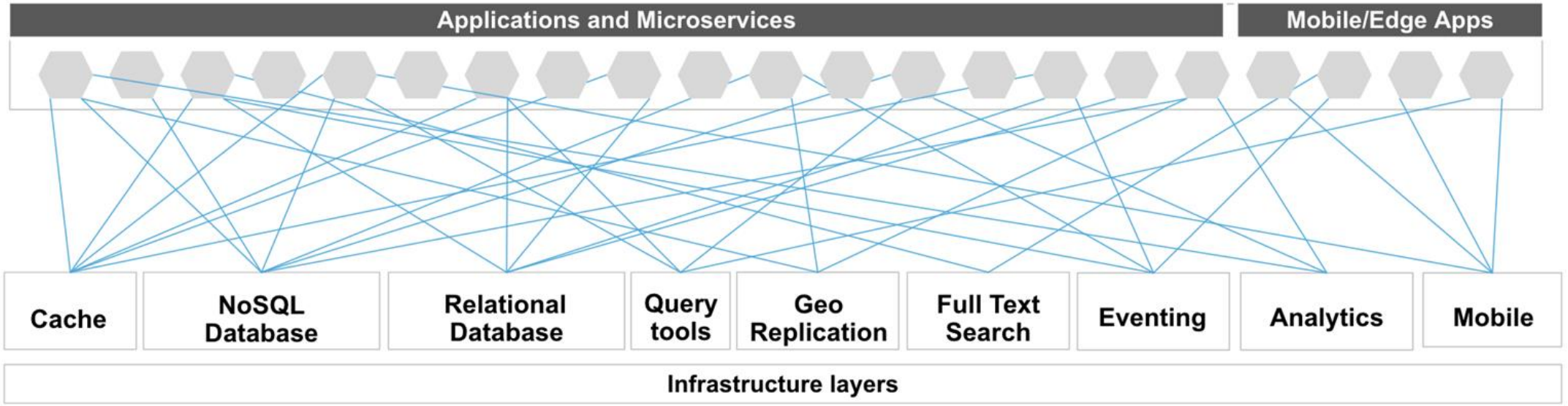
Google Big Query

Mobile

Firebase

SQLite

The Challenges In Our Cloud Journey



Different Management and Security Systems

Separate platform with multiple interfaces

1. Independent deployment and management
2. Different data model and programming interfaces
3. Integration between multiple products
4. Support tickets with different vendors

Per product factors (Financial, time, & effort)

1. License & agreement
2. Training for Developers and Operations teams
3. Support
4. Build API or connector to database
5. Purchase infrastructure

COSTS

- Infrastructure
- Licenses
- Integration
- Training
- Operational
- Support costs

How Couchbase is different?

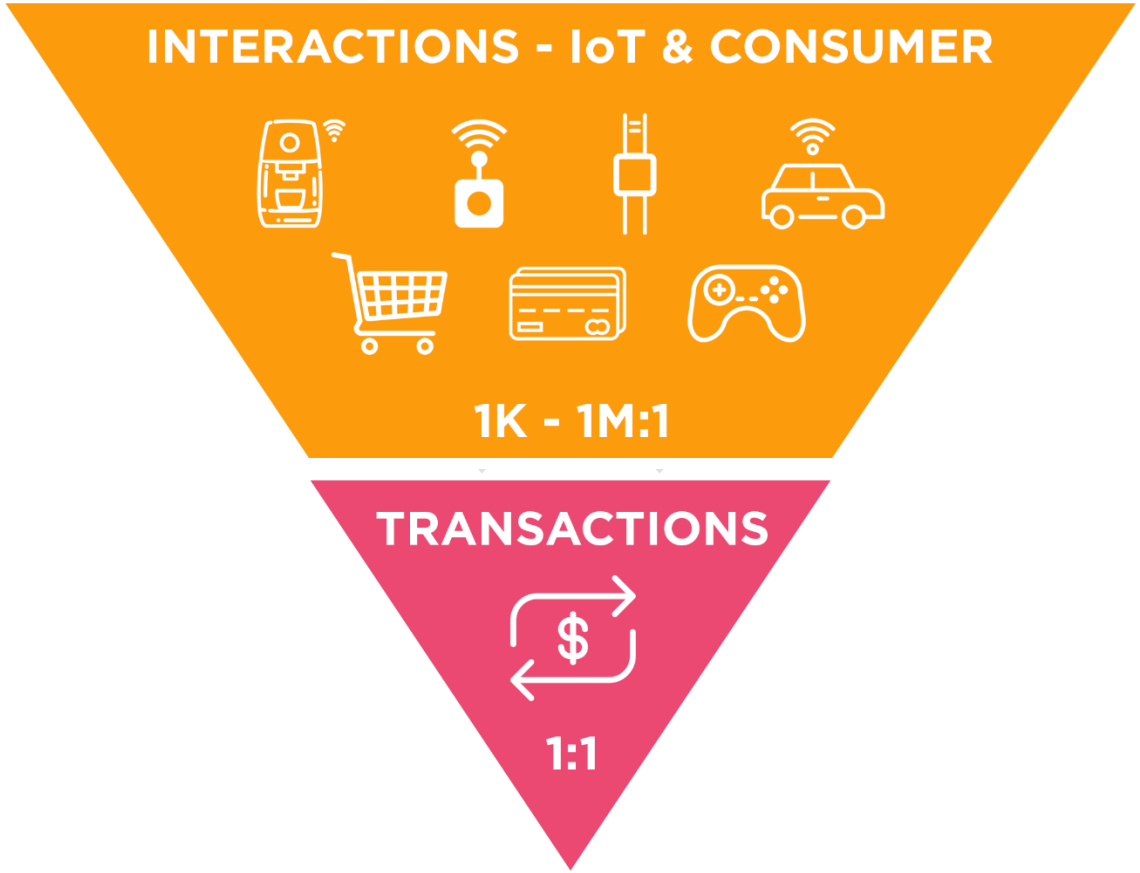
Modern Database Requirements Have Changed Too

Modern Demands (NoSQL)

- Massive data and users
- Scale & performance to match
- Flexibility for agile development
- Microservices architecture
- Web, mobile & IoT experiences

Legacy Demands (Relational)

- Small number of users
- Built to run on a single server
- Transactions, consistency, ACID properties, integrity
- Storage efficiency



Couchbase

IDC "The amount of data created over the next 3 years will be more than the data created over the past 30 years." May 2020

A Modern Database that Fuses Relational & NoSQL

Strengths of Relational Databases

- Flexible data schema
- Enterprise security
- Distributed SQL transactions
- SQL++ query language
  - JOINs across Collections & Documents
  - User-defined functions for PL/SQL
  - Cost-based query optimizer
  - Query memory quota assignment
- Change-data-capture, eventing & streaming
- Index Advisor (in-database & online)
- Broad SDK support and Integrations

Flexibility and Performance of NoSQL

- Multimodel access
- Multidimensional scaling (MDS)
- 100% uptime during (un)planned maintenance
- Mobile & edge storage & sync
- Deploy anywhere—cloud(s), edge & embedded
  - Capella DBaaS
  - Shared-nothing, scale out architecture
  - Automatic partitioning, data rebalancing & backup
- Cloud-native Kubernetes-based deployment and automation

Couchbase Helps Customers Innovate Faster

Performance

Databases are failing modern demands

Flexibility

Significantly improve agility

Mobile/IoT

Deliver incredible experiences

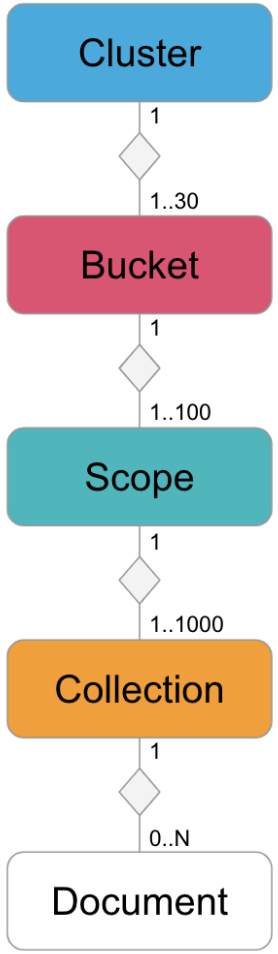
Cloud cost

Drive down cloud TCO

- Speed Up Legacy
- Product Catalog
- Profiles & Personalization
- Customer 360
- Operational Analytics
- Mobile & IoT Applications

Accelerate Your Journey

Simple Mapping from RDBMS to Couchbase



Relational Model	Couchbase
Server	Cluster
Database	Bucket
Schema	**Scope**
Table	**Collection**
Row	Document (JSON or BLOB)

Develop Faster: Integrated Platform Capabilities

Less to learn, code, integrate and maintain.
Fewer tools to license, deploy and support.

Develop Faster: Couchbase SQL++

Familiarity of SQL, leveraging skill sets: Developers, Architects, DBAs, Analysts, IT

- Known SQL syntax
- Supporting
  - ANSI standards
  - JOINs
  - Sub-queries
  - Nested objects
  - Arrays

Relational SQL

```
SELECT ac.industry,
 SUM(CASE WHEN a.activitytype = 'Task'
    THEN 1 ELSE 0 END ) task,
 SUM(CASE WHEN a.activitytype
='Appointment'
    THEN 1 ELSE 0 END ) appts
FROM crm.activity a
  INNER JOIN crm.account ac
     ON (a.accid = ac.id)
WHERE a.startdate BETWEEN '2018-10-01'
          AND   '2018-12-31'
GROUP BY ac.industry
```

Couchbase - N1QL

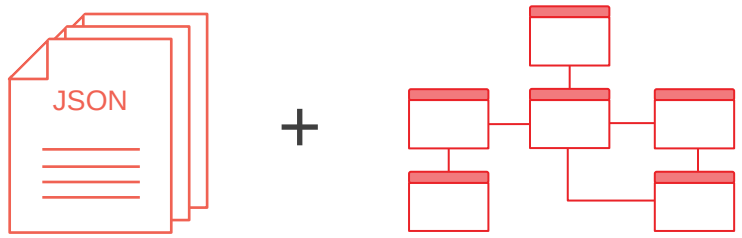
```
SELECT ac.industry,
  SUM(CASE WHEN a.activityType = 'Task'
    THEN 1 ELSE 0 END) task,
  SUM(CASE WHEN a.activityType =
'Appointment'
    THEN 1 ELSE 0 END ) appts
FROM crm a
  INNER JOIN crm ac ON a.accid = ac.id
        AND ac.type='account'
WHERE a.type='activity'
  AND a.startDate BETWEEN '2018-10-01'
     AND '2018-12-31'
GROUP BY ac.industry
```

MongoDB Query Language

```
db.activity.aggregate(
 { $match: { startDate: { $gt: '2018-01-01',
                $lt: '2018-12-31' } } },
 {$lookup: {
        from: "account",
        localField: "accid",
        foreignField: "id",
        as: "account_docs"
          }
 },
 { $match: { "account_docs": { $ne: [] } } },
 { $unwind: "$account_docs" },
 {
   $project: {
    item: 1,
    task: { $cond:{if:
     { $eq: ["$activityType", "Task"] }, then: 1,
         else: 0 } },
    appt: { $cond: { if:
     { $eq: ["$activityType", "Appointment"] },
then: 1,
         else: 0 } } }
  },
  {
     $group: {
         _id: "$account_docs.industry",
         tasks: { $sum: "$task" },
         appointments: { $sum: "$appt" }
  } }
);
```

Develop Faster: JSON Documents & Dynamic Data Structures

Fusing the agility and scale of NoSQL with the transactional trusted strengths of an RDBMS



Advantages of NoSQL + Relational

- JSON format for easy application modification
- Unstructured, semi-structured, structured, analytics
- Familiar, easily mapped relational schemas
- Supporting distributed ACID transactions
- 10 programming language SDKs

Flexible Cloud and Edge Options: Delivering Consistency

Capella

Database-as-a-Service

- Maximize convenience
- Easy to start, manage, and scale
- Industry leading price-performance
- Highly available and secure

Server

Self-Managed-Cloud

- Maximize control & customizability
- Leverage DBA's & OPS team skills
- Choose management strategy & tools
- Deploy via Kubernetes if you choose

Mobile

Edge & IoT

- Offline first design for max uptime
- Extreme speed and reliability
- Data integrity: secure, automated sync
- Broad SQL and device support

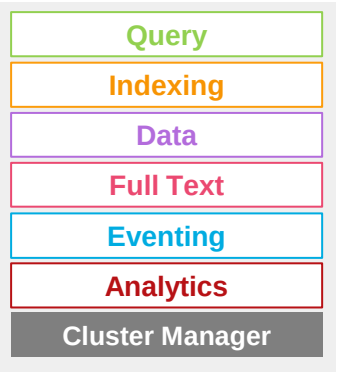
"We wanted a solution that seamlessly works across server and mobile, without lots of retraining. No other solutions came even close to Couchbase."

Aviram Agmon
Chief Technical Officer
Maccabi

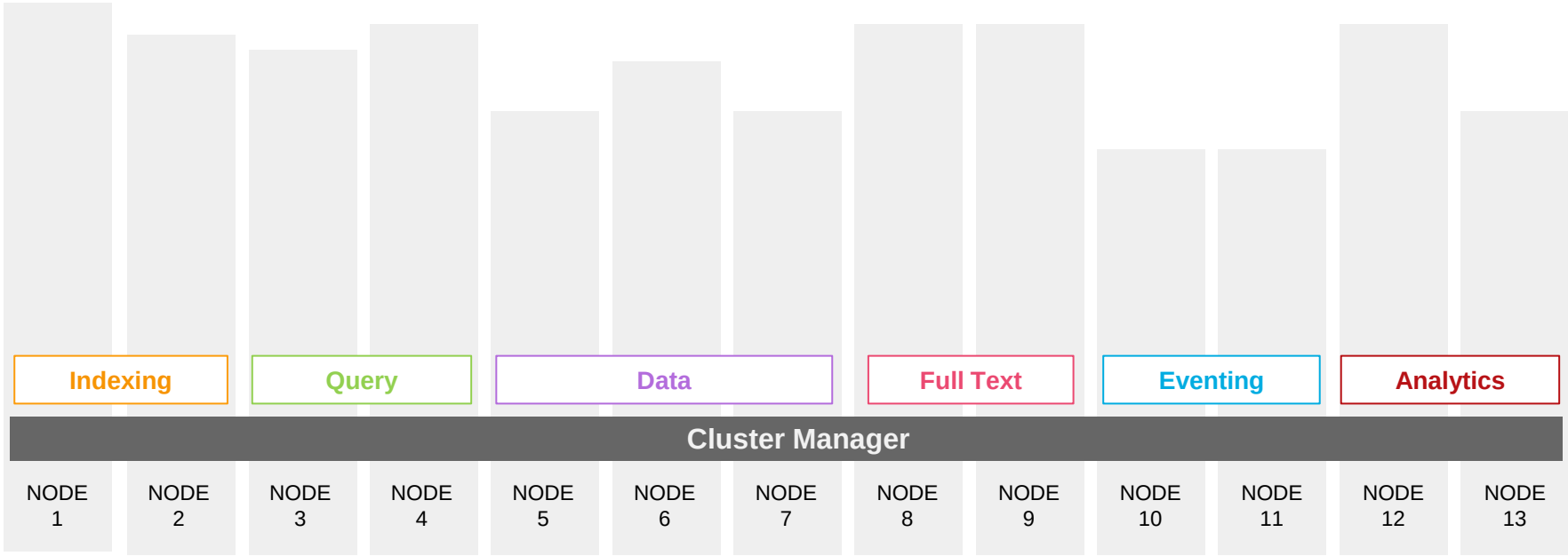
Deploy anywhere: Workload Isolation & Optimization

Scale services independently with growing demand

Develop



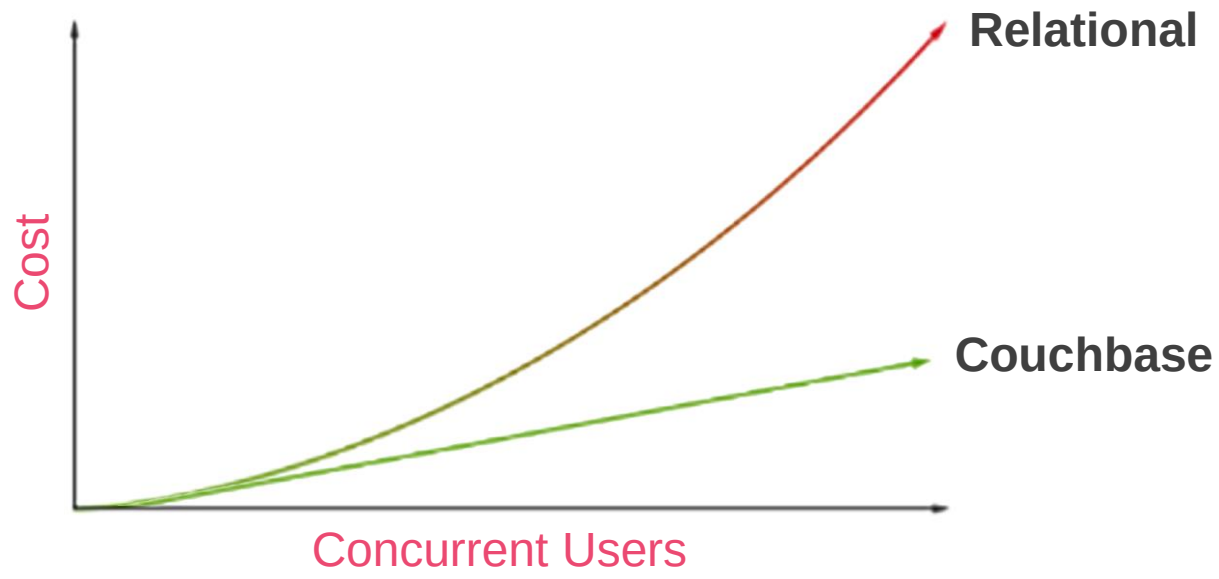
Deploy



Performance at Scale: Horizontal Scaling

Meet demand need, with lower total cost of ownership

- Add more servers only as needed
- Price per user linear with growth



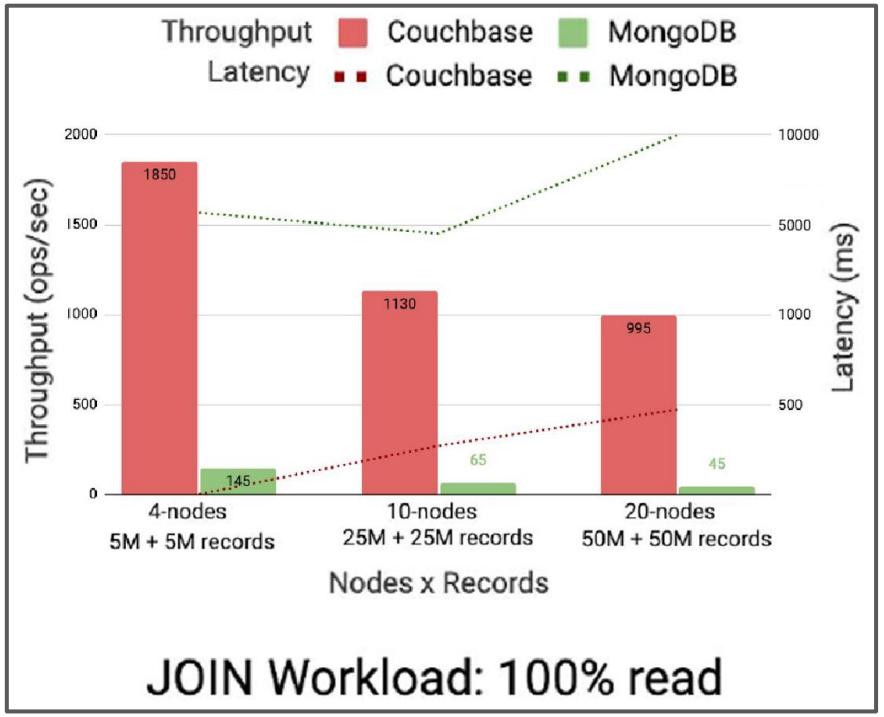
Performance at Scale: Memory First Architecture

Extremely low latency and high throughput ensures responsiveness

Supported by

- Memory and network centric architecture
  - Every node is active
  - No read-only nodes or write slowdowns
  - Asynchronous communication
- High performance indexing
- Sub-millisecond responses for all workloads
  - Read-heavy
  - Write-heavy
  - Mixed workloads

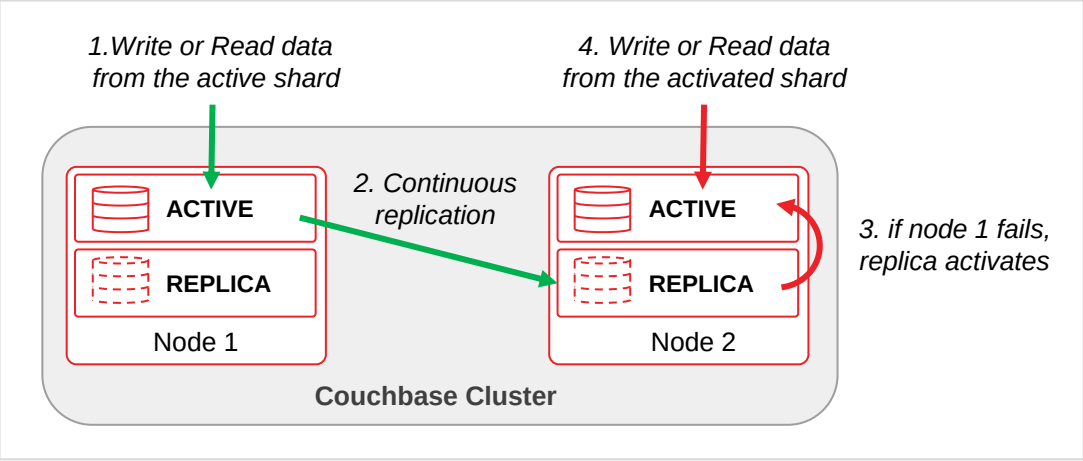
Altoros Benchmark



High Availability based on Replication

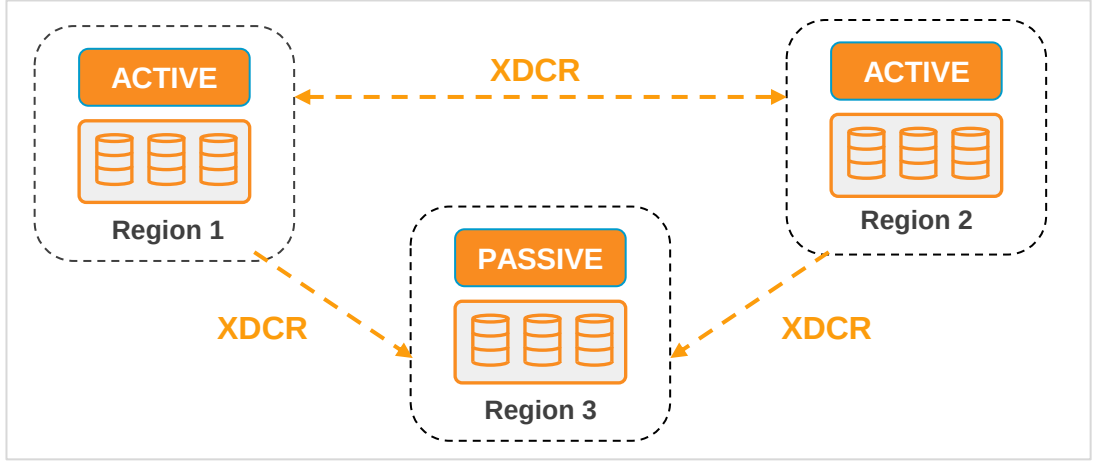
Couchbase Server ensures the availability of data across the nodes of a cluster and between clusters

Intra Cluster Replication



- Auto-sharding provides even distribution of data
- Data updates on the active shard are continuously replicated to their replica shards
- A replica is promoted in case of a node failure

Cross Data Center Replication

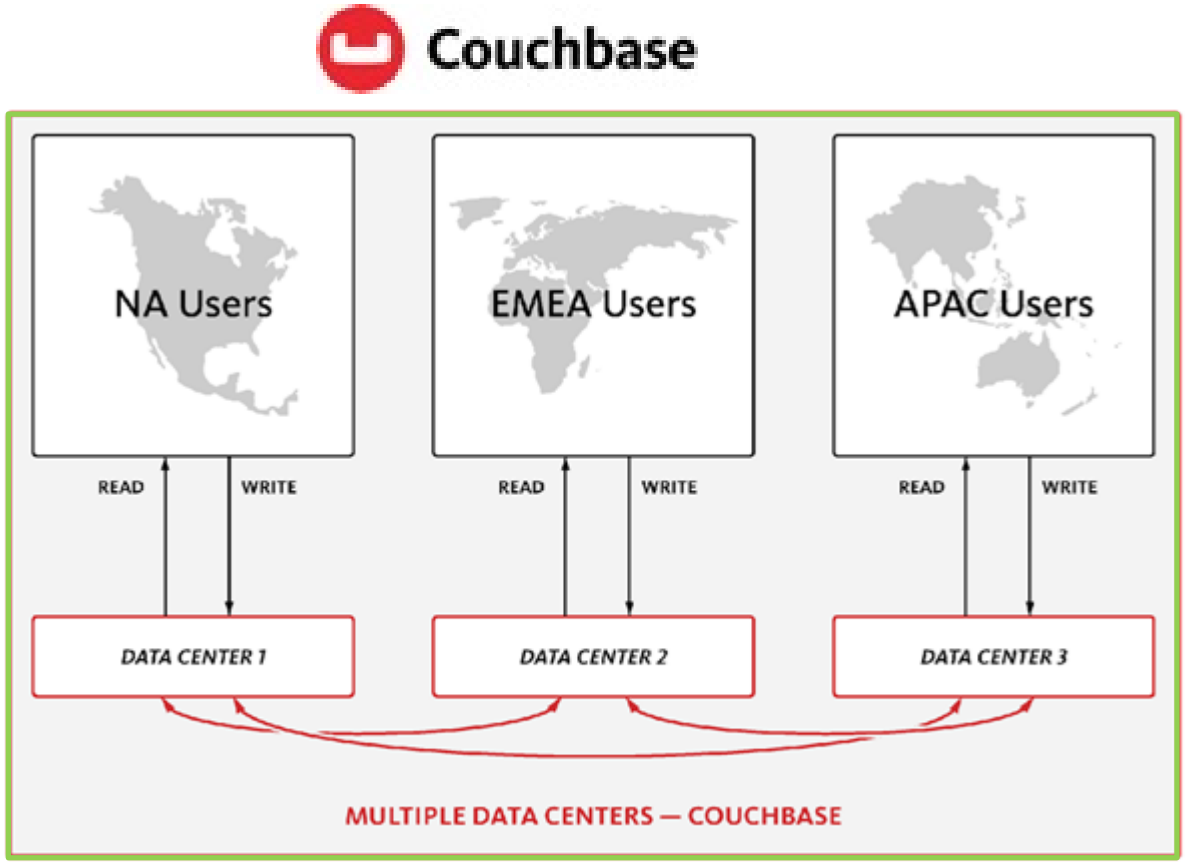


- XDCR allows data to be replicated across clusters located in different data centers
- Replication can be uni or bi-directional
- Replication can be fine-grained and filtered

Masterless, Active-Active R-W, Cross DC Replication

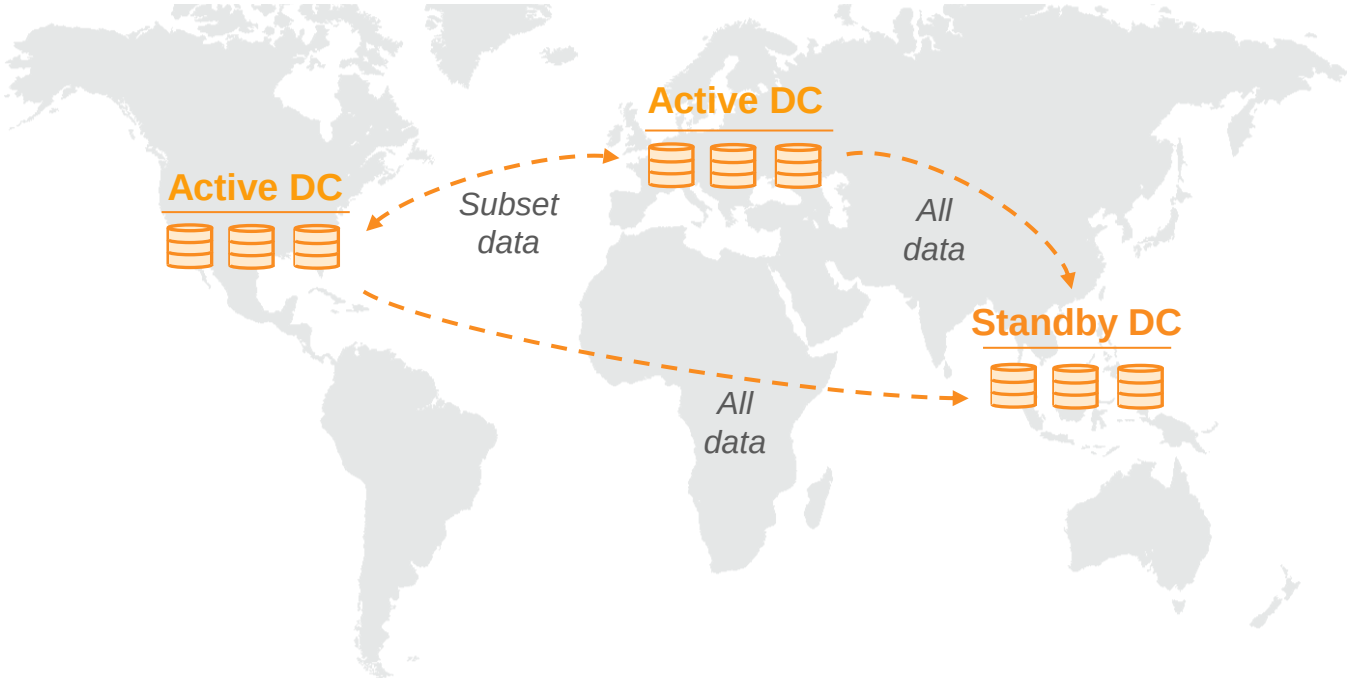
Couchbase: Key Advantages

- Active-Active global deployment
- Read and Write on all nodes at the same time using a Masterless architecture (not just read replicas)
- Memory to memory replication across clusters (data doesn't need to be pulled from disk)

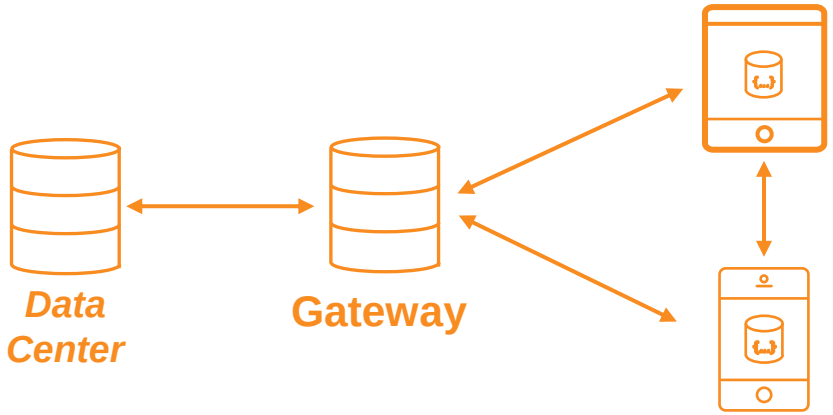


Low Latency Everywhere: Globally, to the Edge, and in Device

Replication Service



Sync Service



- Low latency to the Edge
- Peer–to-peer syncing

“There are many key factors for choosing Couchbase: scalability, high availability, and XDCR to name a few.”

Krishnan Venkatasubramanian
Head of IT Architecture
Sky

Demo

Demo: Performance and Scale

- New Application, NoSQL Database adoption.
- Preparation for performance testing.
- Creating large volume of realistic data
- Fast and high throughput

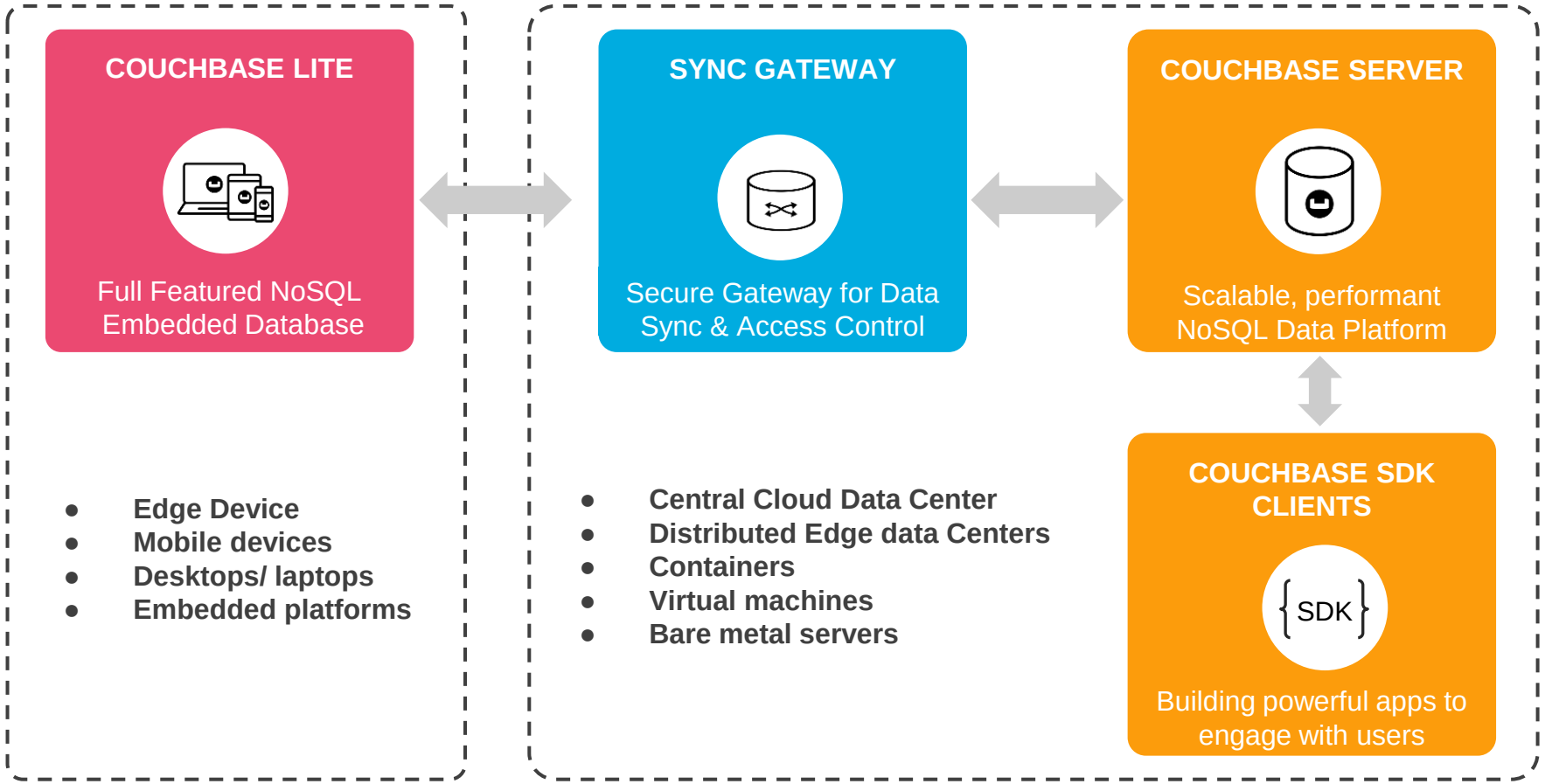
Example Document

```
{
  "cif": "05179973",
  "name": "Emily Brown",
  "accountNumber": 5587942206,
  "bankName": "Bank of America",
  "branchCode": 204
}
```

Utilize Eventing Service for Data Synthesizing

Mobile & IOT

COUCHBASE MOBILE PLATFORM



1 Local database AES-256 Encryption

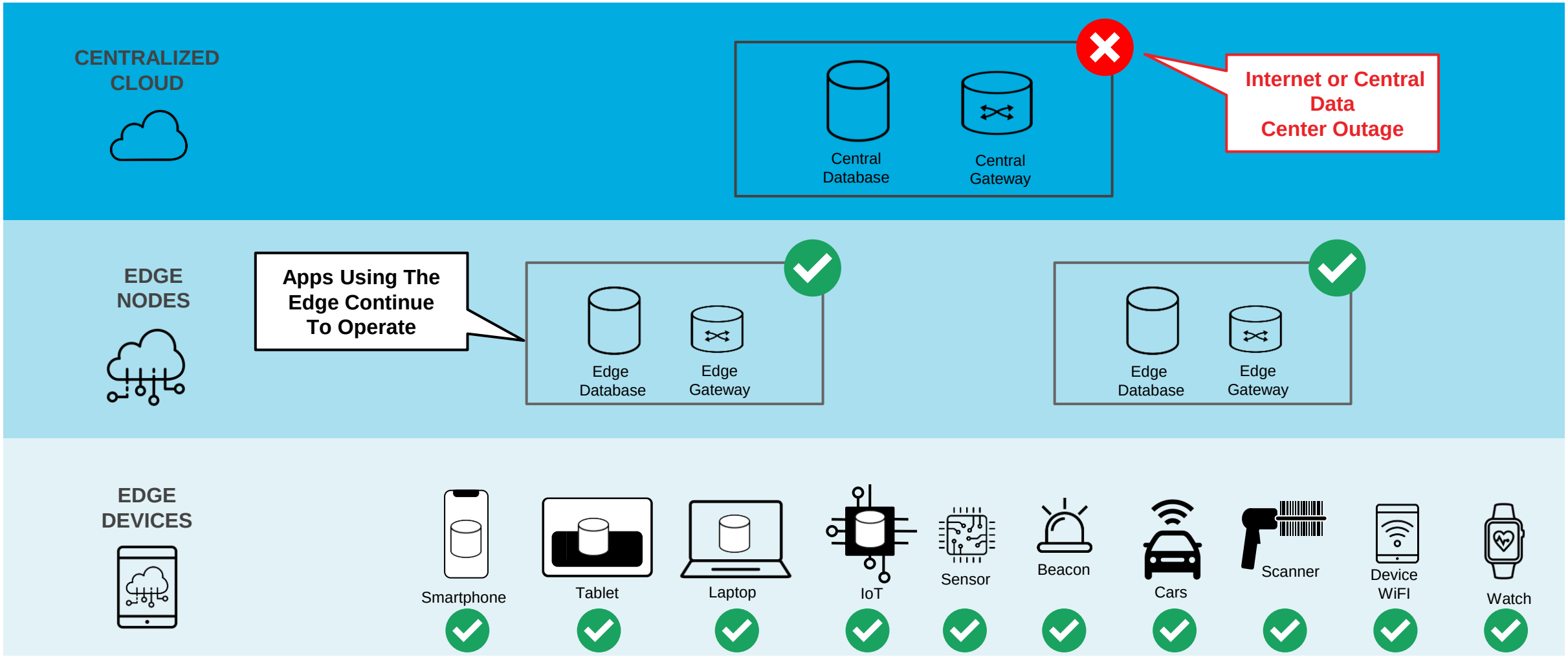
2 Secure transport over wire

3 Authentication & fine grained Access Control

2 Secure transport over wire

4 Secure database & RBAC

Edge computing architecture | More Reliable



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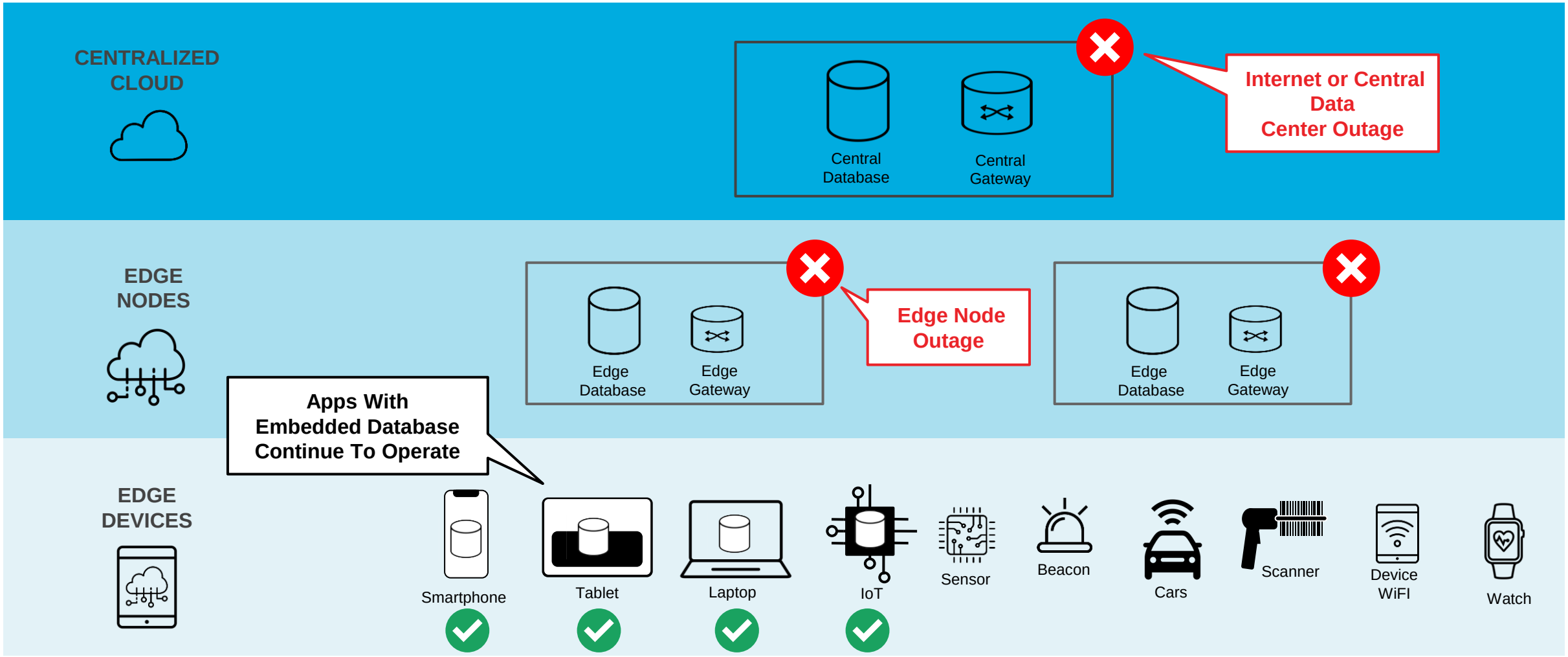
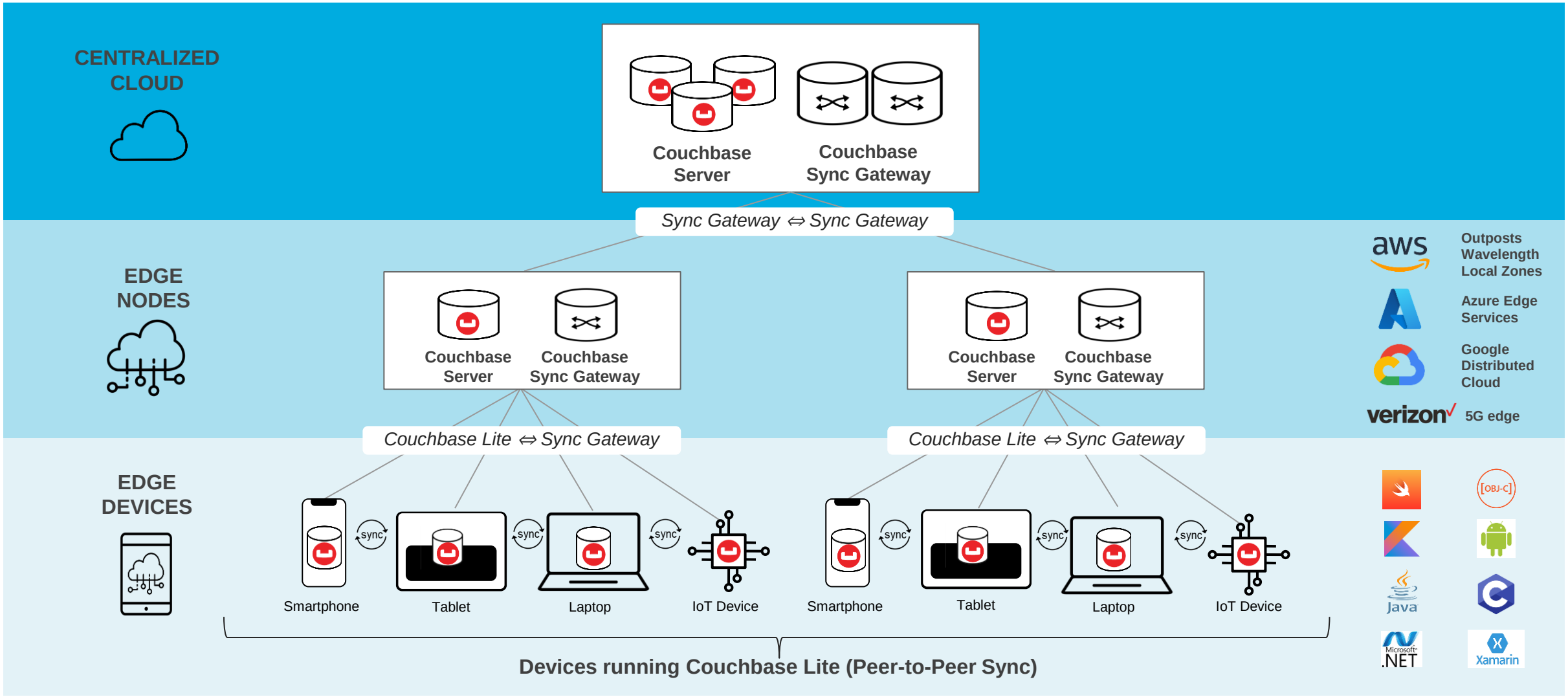


Couchbase Mobile - From Cloud to Edge to Device



Peer to Peer Sync Demo

Use Cases

Domino's

SOLUTION:
Customer Data Management

APPLICATION:
Commerce Data Hub
Data science experimentation

USE CASE(S):
Real time marketing campaigns and personalized ordering experience

ABOUT:
World leader in pizza delivery operating a network of company-owned and franchise-owned stores globally. 3M pizzas a day, 16.5K stores in 85 countries

Requirements

- Track average transaction size, annual purchase frequency and loyalty to determine customer lifetime value (CLV)
- Deliver personalized marketing campaigns, segments and reduce time to perform data science experiments
- Ability to perform data exploration on operational data in near-real time

Outcomes

- Reduction of targeted consumer offers from **weeks/months** → **hours** & analyze data in near real-time
- Enabled agile data mining models focused on order behaviors, propensity scoring and enabled flexible attribute creation
- Removed need to ETL for data science experiments

SOLUTION:
Customer 360

APPLICATION:
FICO Falcon credit monitoring and reporting

USE CASE(S):
User profile store
Caching

ABOUT:
World's #1 fraud detection platform: scores 65% of world's credit/debit cards.

Requirements

- Growing number of accounts, cards and customers means **more data needs to be tracked with <ms latency and high throughput**
- **Relational systems unable to scale** to the required throughput
- **HA/DR solutions not streamlined** – needed custom development

Outcomes

- Memory-first architecture allows **<1ms response times**
- Complete HA/DR solution delivers **24x365 application uptime**
- **Neural networking algorithms run on Couchbase** and access data as key-value pairs

CARNIVAL CORPORATION&PLC

SOLUTION:
Customer 360
IoT Data Management

APPLICATION:
OCEAN Medallion guest ID and mobile wallet

USE CASE(S):
User profile store
Personalization
Endpoint/device mgmt

ABOUT:
Carnival Corporation is currently the world's largest travel leisure company, with a combined fleet of over 100 vessels across 10 cruise line brands.

Requirements

- Power OCEAN Medallion IoT necklace and bracelet devices to deliver customized vacation experiences
- Overcome limitations of limited space and limited connectivity
- Easily scale to support rollout across Carnival fleet
- Accelerate time to market for new features

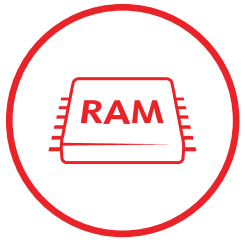
Outcomes

- High performance at scale will allow system to be deployed across entire Carnival fleet
- Automatic syncing to geographically convenient AWS data centers when ship is in range of shore
- Schemaless data model improves developer agility

Key Takeaways?

Couchbase Key Differentiators

Performance & High Availability Architecture



SQL & Full Text Search

Replication Across Data Centers

Workload Isolation

Cloud-agnostic & Containers

Offline-First Mobile

Thank you!