



Couchbase

Architecture and Administration Basics

Introduction



1

Interactions vs Transactions

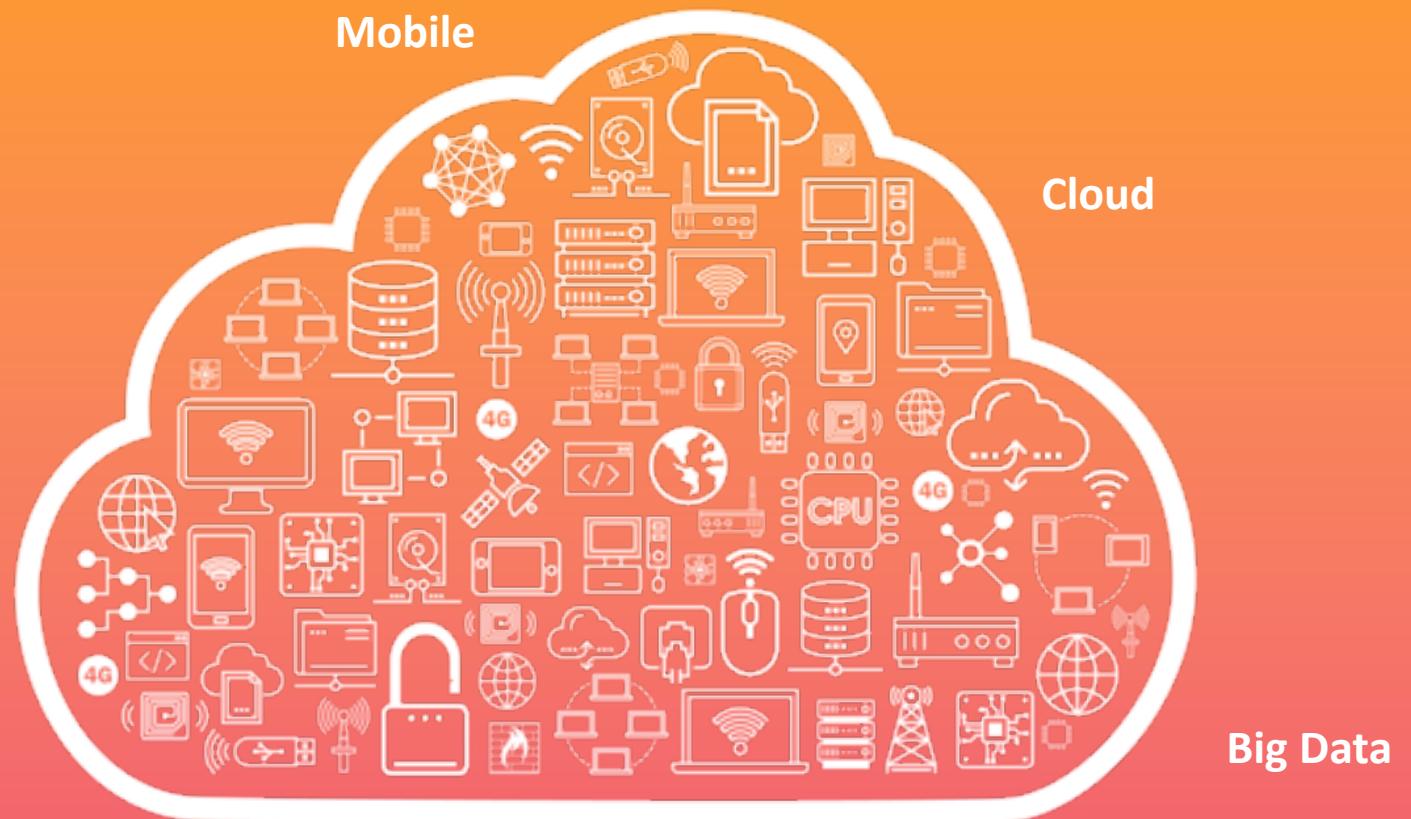
A photograph of a young child with brown hair, seen from the side and slightly from behind, reaching up towards a shelf of colorful children's books. The background is blurred, focusing on the child's action.

**CHANGE IS
HAPPENING: THE
WAY WE ENGAGE
HAS EVOLVED**



Technology is Further Driving Digital Innovation

Internet of Things





Customers now expect exceptional digital experiences



Personalized

Feature-rich

Quick

Anywhere

Anytime

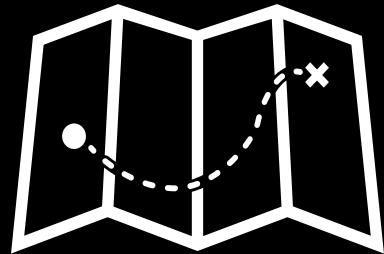


Customers spend
more time interacting
than transacting...



INTERACTIONS

TRANSACTIONS



Look

Searching for a flight or hotel room
Comparing deals
Personalizing the experience



Book

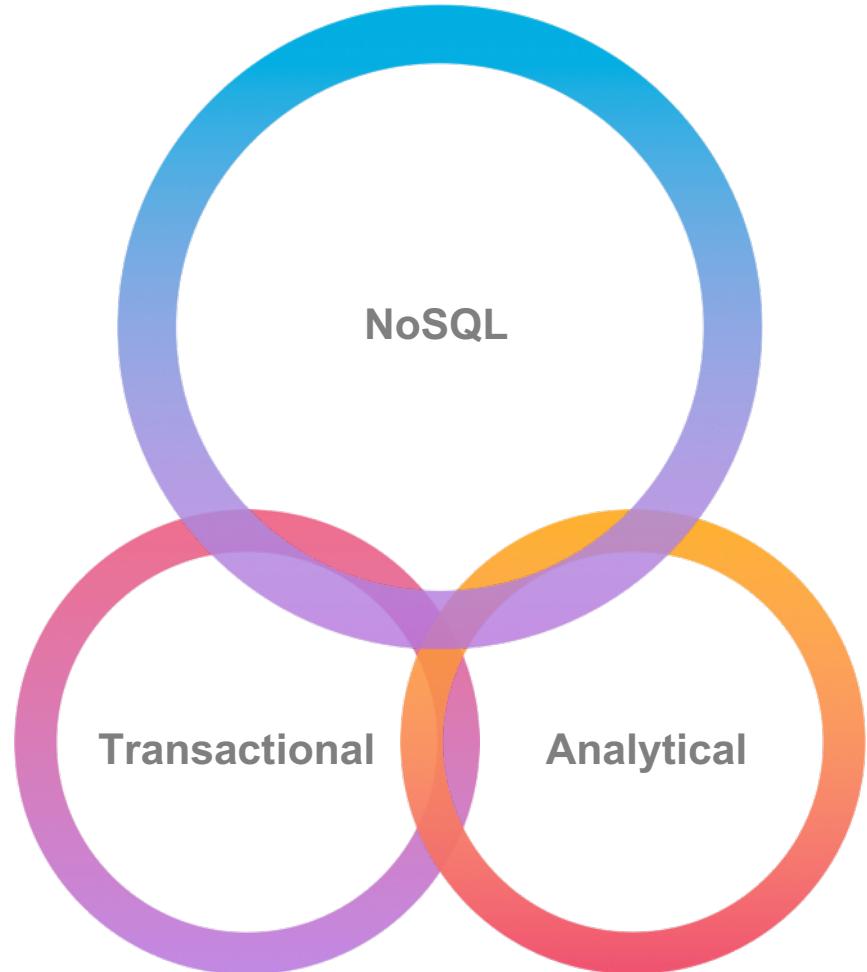


**Building a great looking app
is just the beginning.**



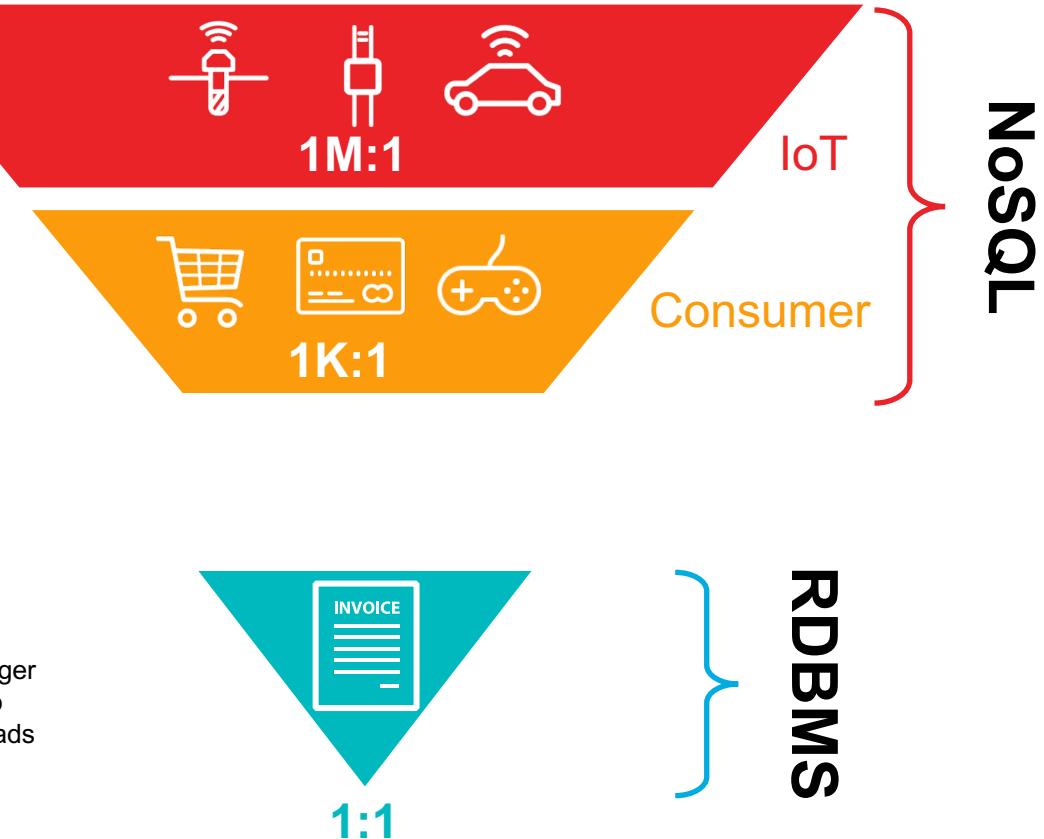
**Liberating data, fast, and at scale
takes the experience to the next
level**

New Applications Fundamentally Different – Relational Databases Insufficient



Interactions Transactions

Microservices architecture supports web, mobile and IoT experiences at scale, with performance to match



ATTRIBUTES OF AN ENGAGEMENT DATABASE



Hello cloud,
hello world



Seamlessly
mobile



Built-in
smarts



Built for change
- at scale



Always on,
always fast



Secure, secure,
secure



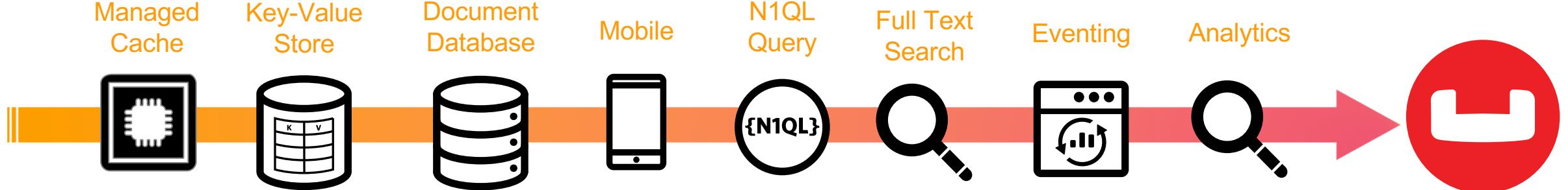
2

What is Couchbase?



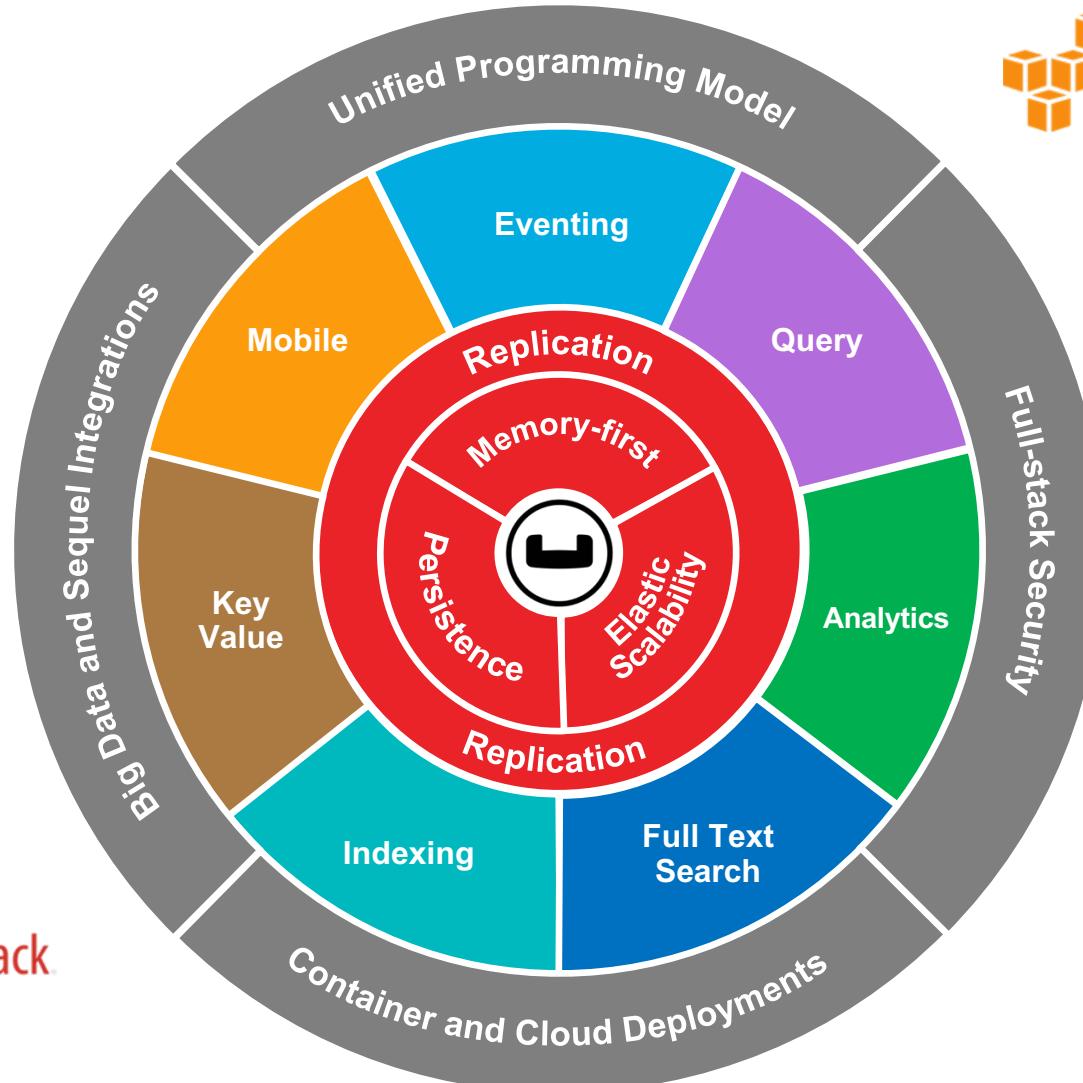
Couchbase: Core Principles Driving Evolution

- True auto sharding
- JSON-based flexible data model
- Memory-first Architecture
- Asynchronous everything
- Scale workloads independently



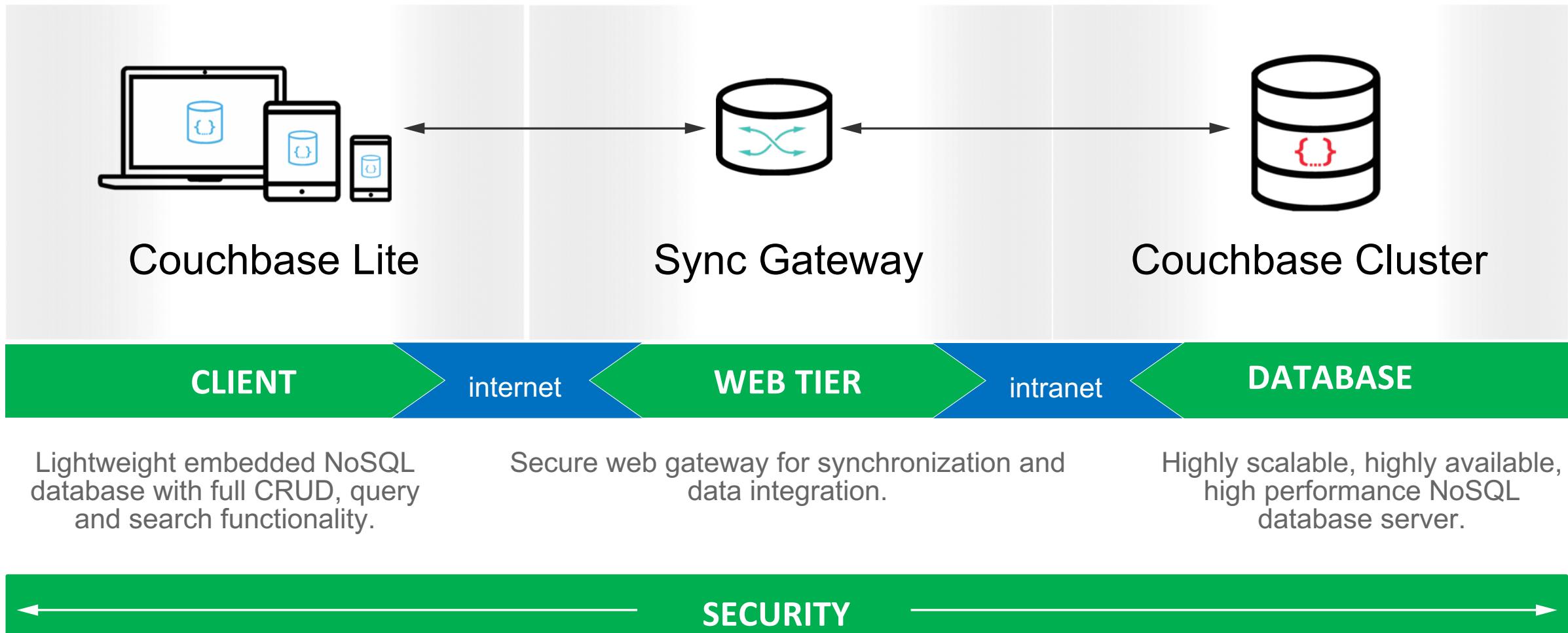


The Couchbase Data Platform



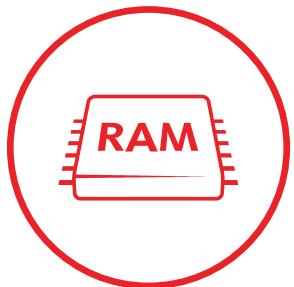


Couchbase Mobile: Full Stack Data Management





Why choose Couchbase?



**Memory-first
Architecture**



**Query
Language**



**Active-Active
Global Replication**



**Multi-Dimensional
Scaling**



Mobile



Platform agnostic



Developing with Couchbase

Couchbase supports a wide range of frameworks, languages, platforms and infrastructure choices.

FRAMEWORKS

LINQ



MOBILE



LANGUAGES



php

PLATFORMS



MOBILE



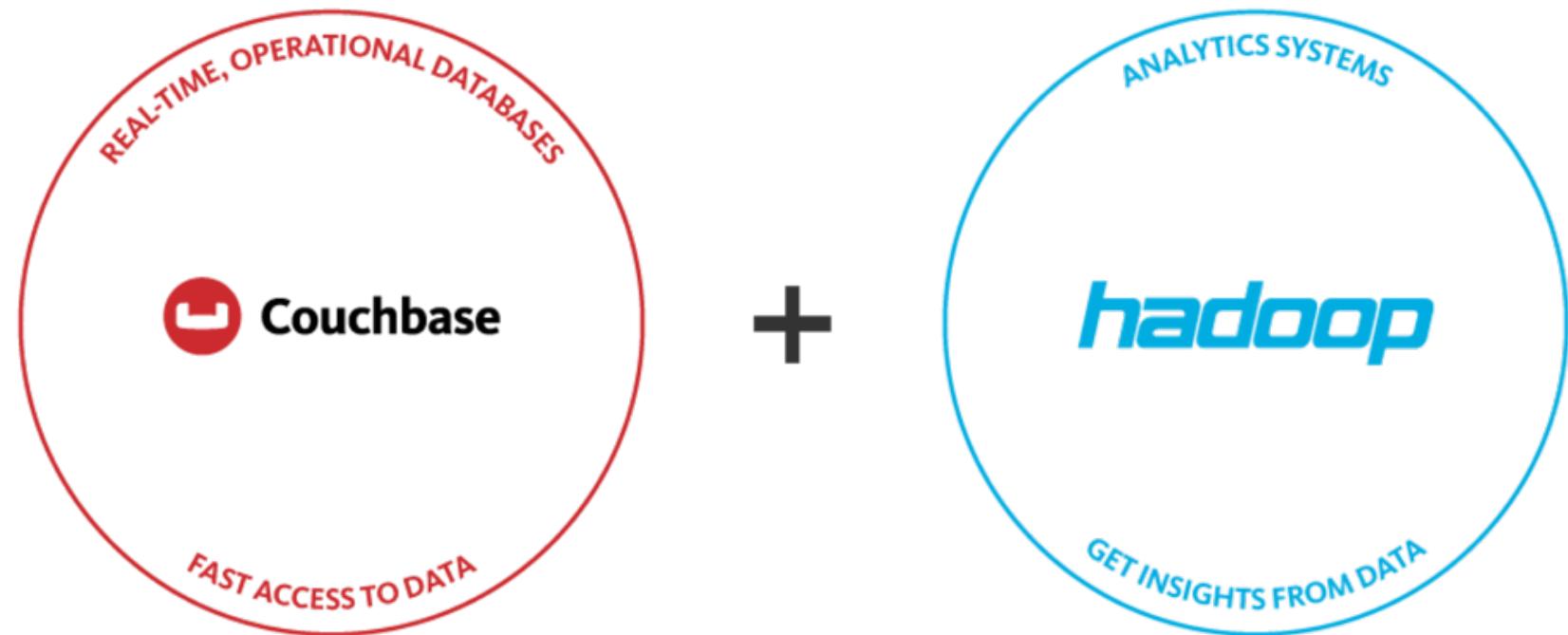
INFRASTRUCTURE





How does Couchbase fit with Big Data?

Couchbase and Hadoop
are complementary.



EXAMPLES:

cloudera  Hortonworks  MAPR 



3

Couchbase – Who are we?

Couchbase, by the Numbers



300+
EMPLOYEES

100%
OPEN SOURCE

500+
CUSTOMERS



500+ Digital Businesses Run on Couchbase



6 of the Top 10
E-Commerce
Companies
in the US

Walmart

TESCO

STAPLES

cars.com

Office DEPOT
OfficeMax

FANATICS

QVC



The top 3
GDS Companies

3 of the Top 10
Airlines

AMADEUS

Sabre

Travelport

UNITED

RYANAIR

Emirates



6 of the Top 10
US & European
Broadcast
Companies

BT

sky

Telefónica

COMCAST

verizon

at&t

Red Bull TV



6 of the Top 10
Online Casino
Gaming
Companies

UNIBET

playtech
SOURCE OF SUCCESS

Ladbrokes

betsson

betfair



The Top 3
Credit Reporting
Companies

Experian

TransUnion

EQUIFAX

VISA

PayPal

CITI



Evolution from Memcached and CouchDB

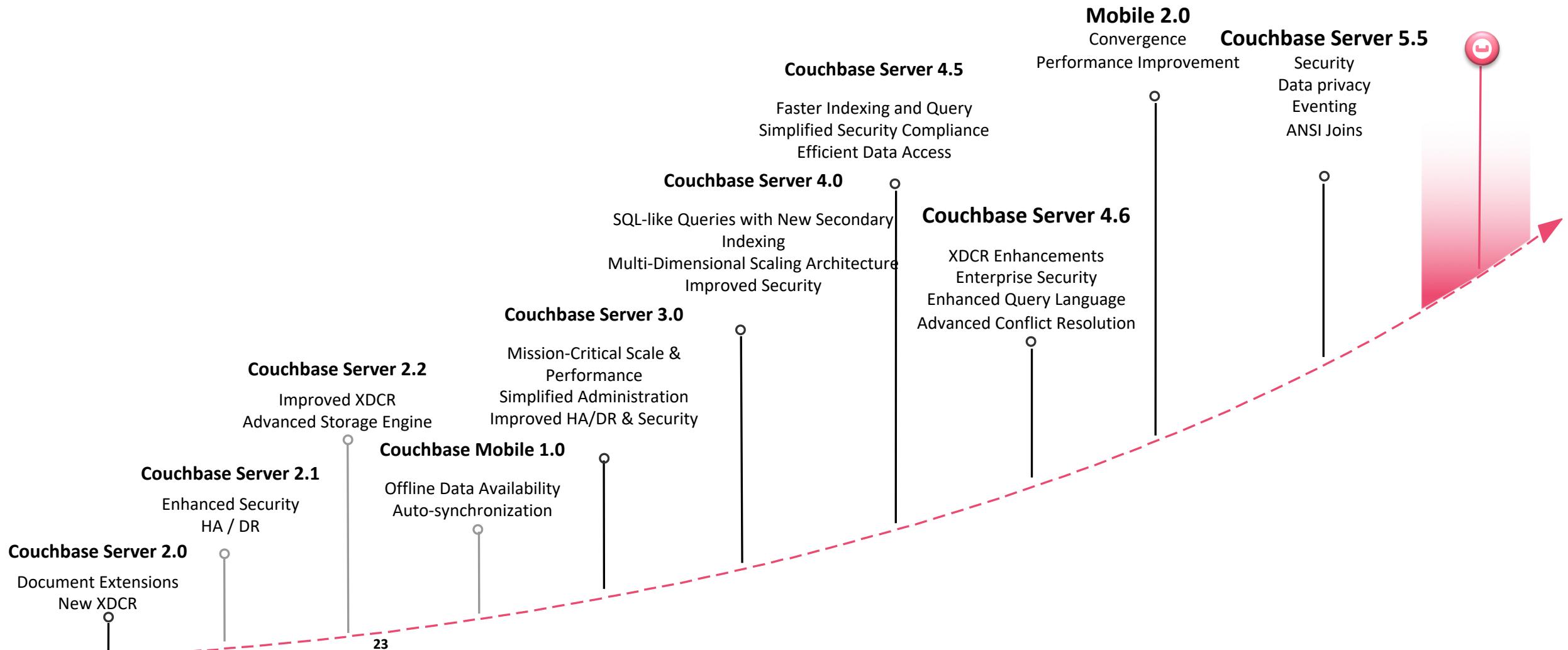


- Founders were key contributors to memcached, CouchDB
- Memcached evolved into Membase, a distributed and *persisted* key-value store
- Merge with CouchDB to evolve into Couchbase Document Store with JSON support and Map-Reduce Indexes, Elastic Search Integration, and Cross-Data Center Replication
- N1QL continues the evolution with SQL data access



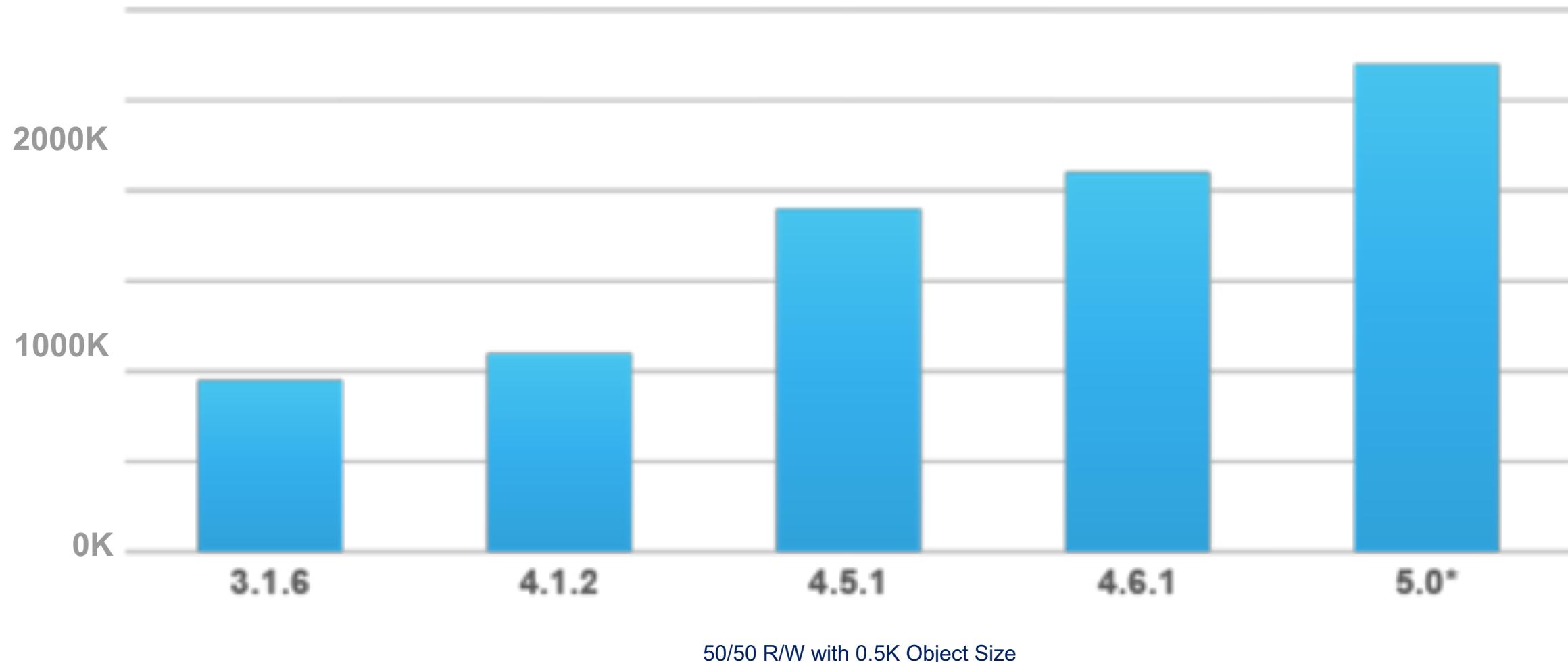
The Journey thus Far

Focused on Technical Innovation





Even at its CORE - Key-Value Keeps Getting Faster



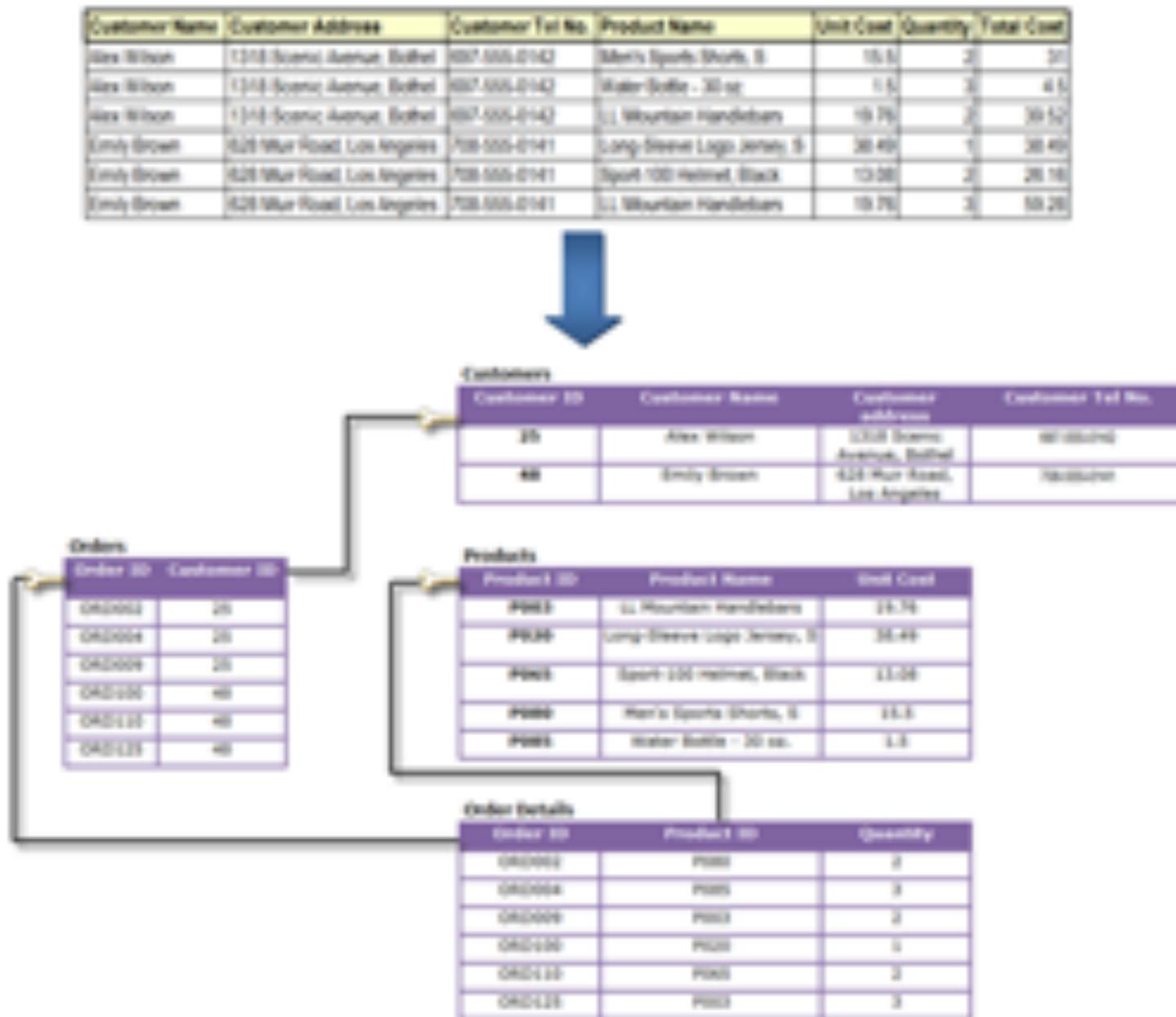


4

From RDBMS to NoSQL



RDBMSs "normalize" the data



What was the key driver behind the RDBMS?



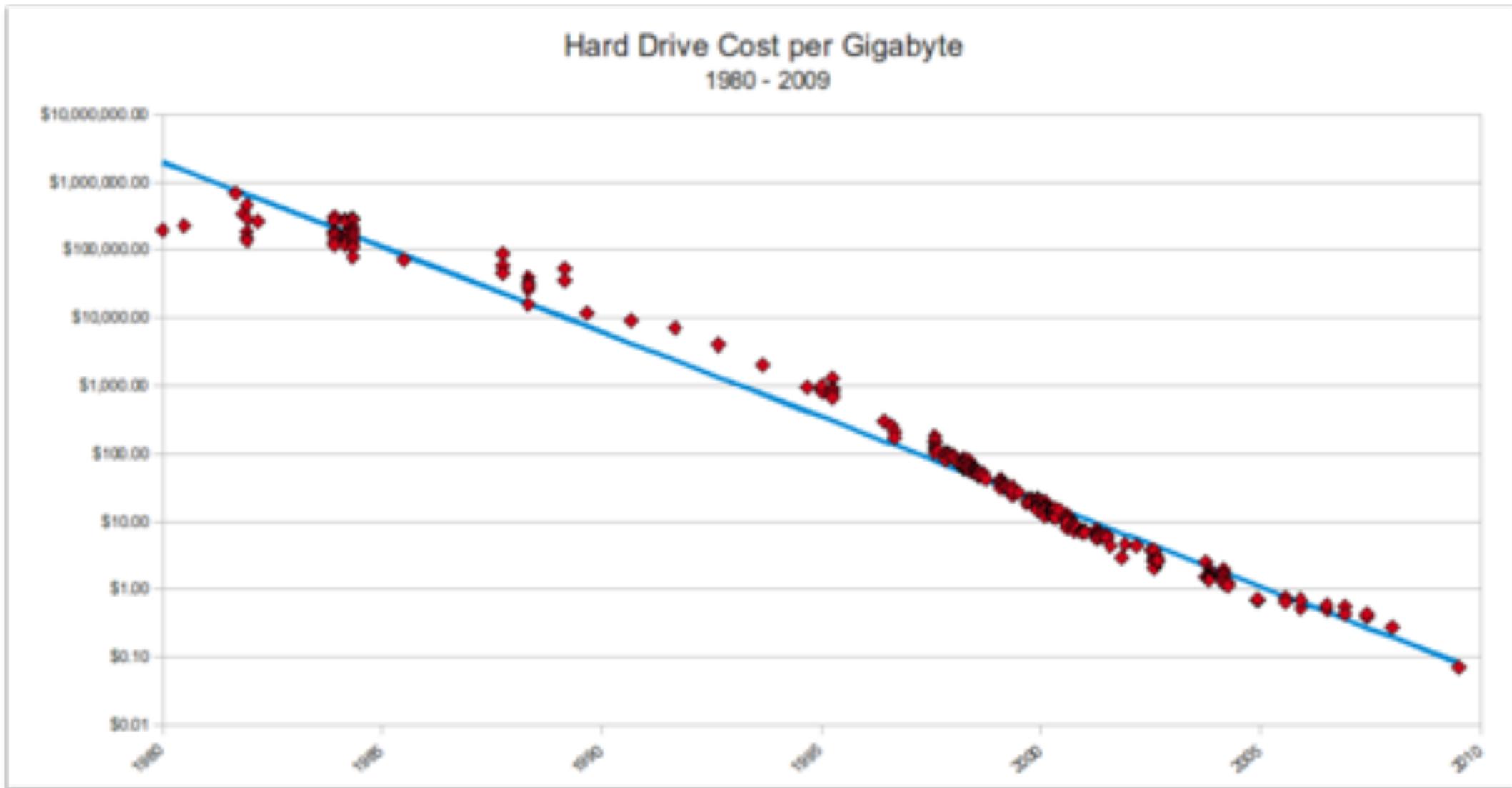
- The number “967” takes 10 bits to store
- The word “computer” takes 64 bits to store

(01100011 01101111 01101101 01110000 01110101
01110100 01100101 01110010)

How much was 1 Gig of Storage in 1980?



The Cost of Disk



The Cost of 1 Gigabyte of Disk – Yesterday vs. Today



1980

\$500,000

2016

\$.06

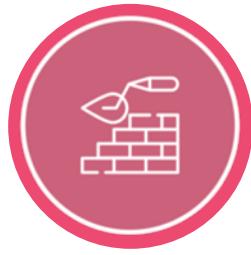
Traditional databases are holding businesses back



Inability to scale



Performance challenges



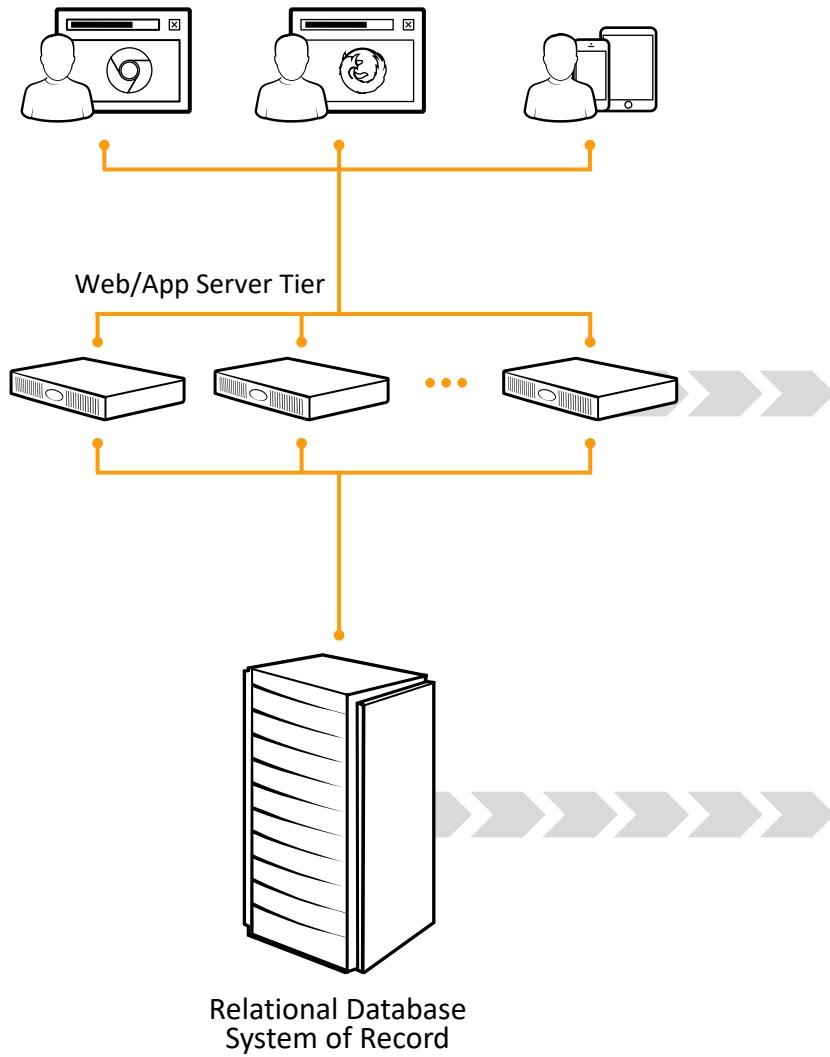
Rigid schemas



Cost



Relational Technology Scales Up



APPLICATION SCALES OUT

— SYSTEM COST
— APPLICATION PERFORMANCE

USERS

RDBMS SCALES UP

Get a bigger, more expensive server

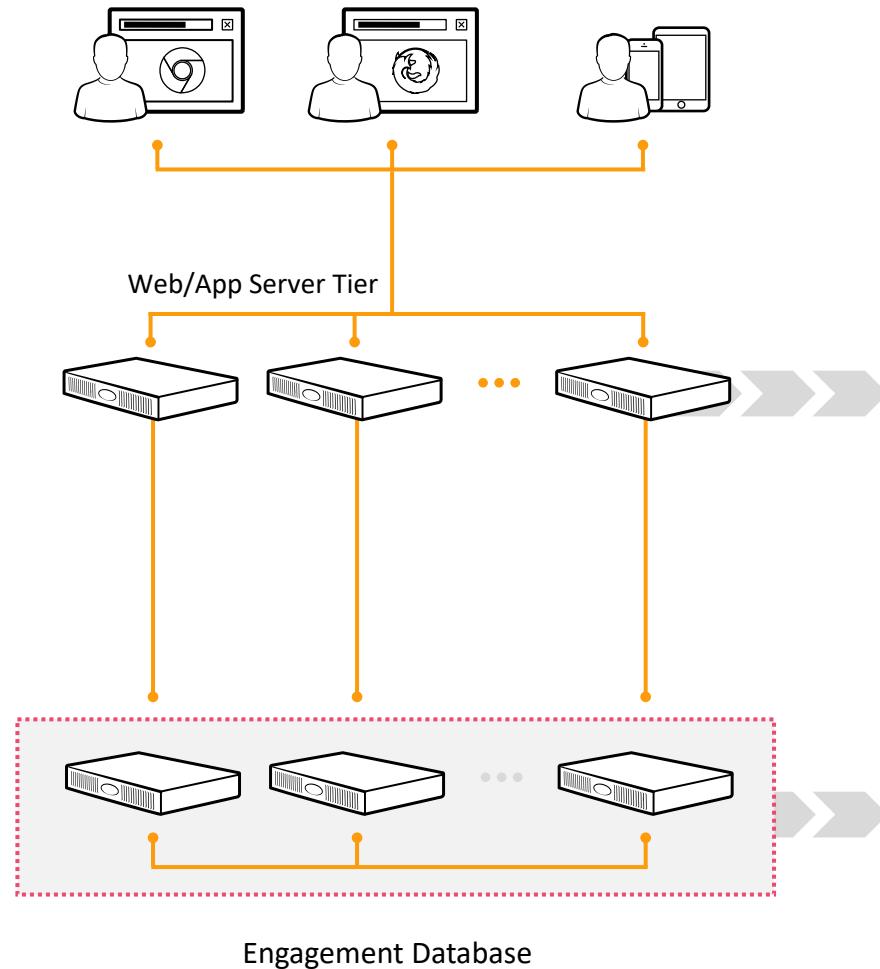
— SYSTEM COST
— APPLICATION PERFORMANCE

USERS

← WON'T SCALE BEYOND A POINT



A different approach is needed to power engaging experiences



APPLICATION SCALES OUT

— SYSTEM COST
— APPLICATION PERFORMANCE

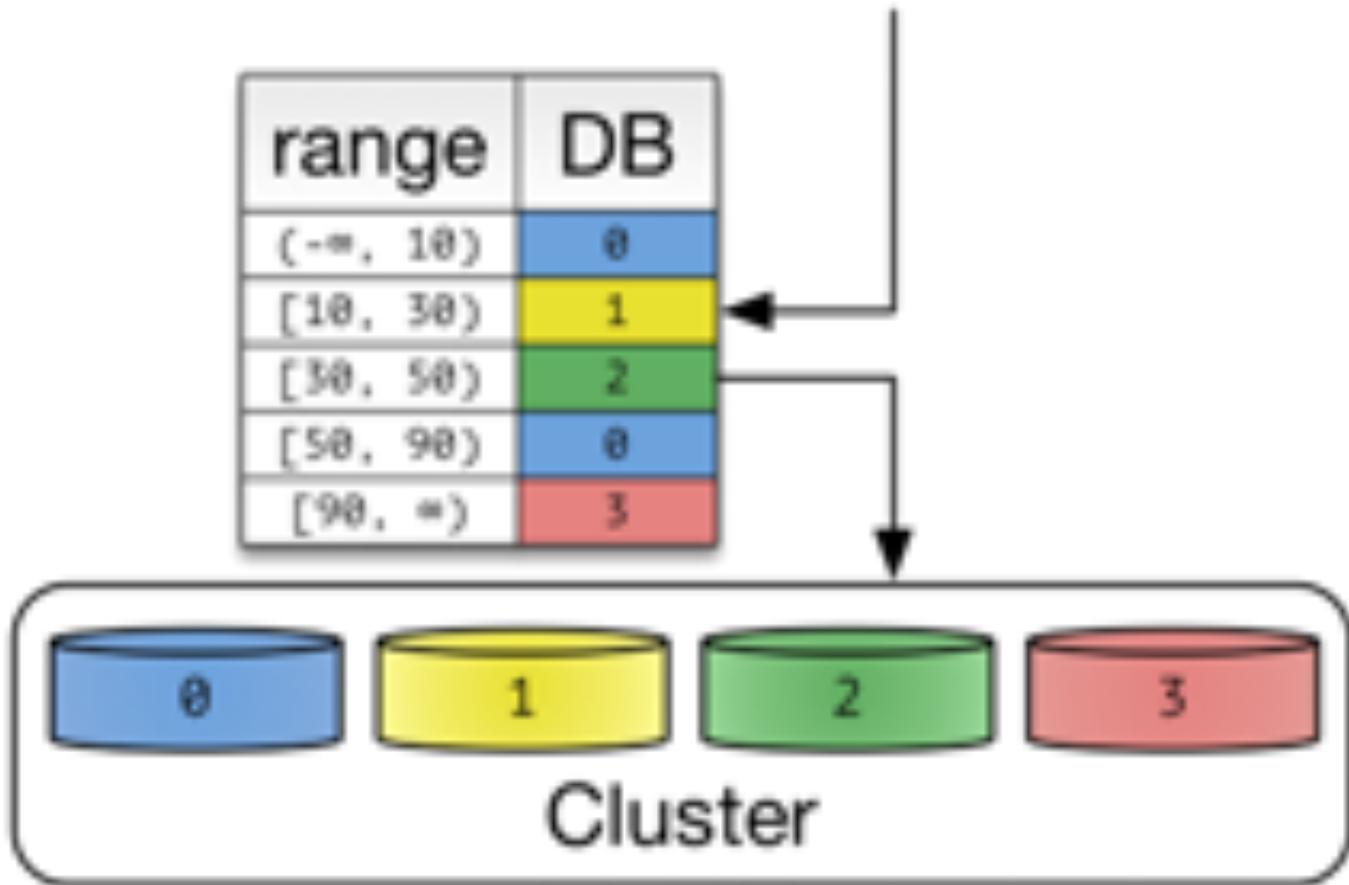
USERS

COUCHBASE SCALES OUT

— SYSTEM COST
— APPLICATION PERFORMANCE

USERS

The Problem With Sharding



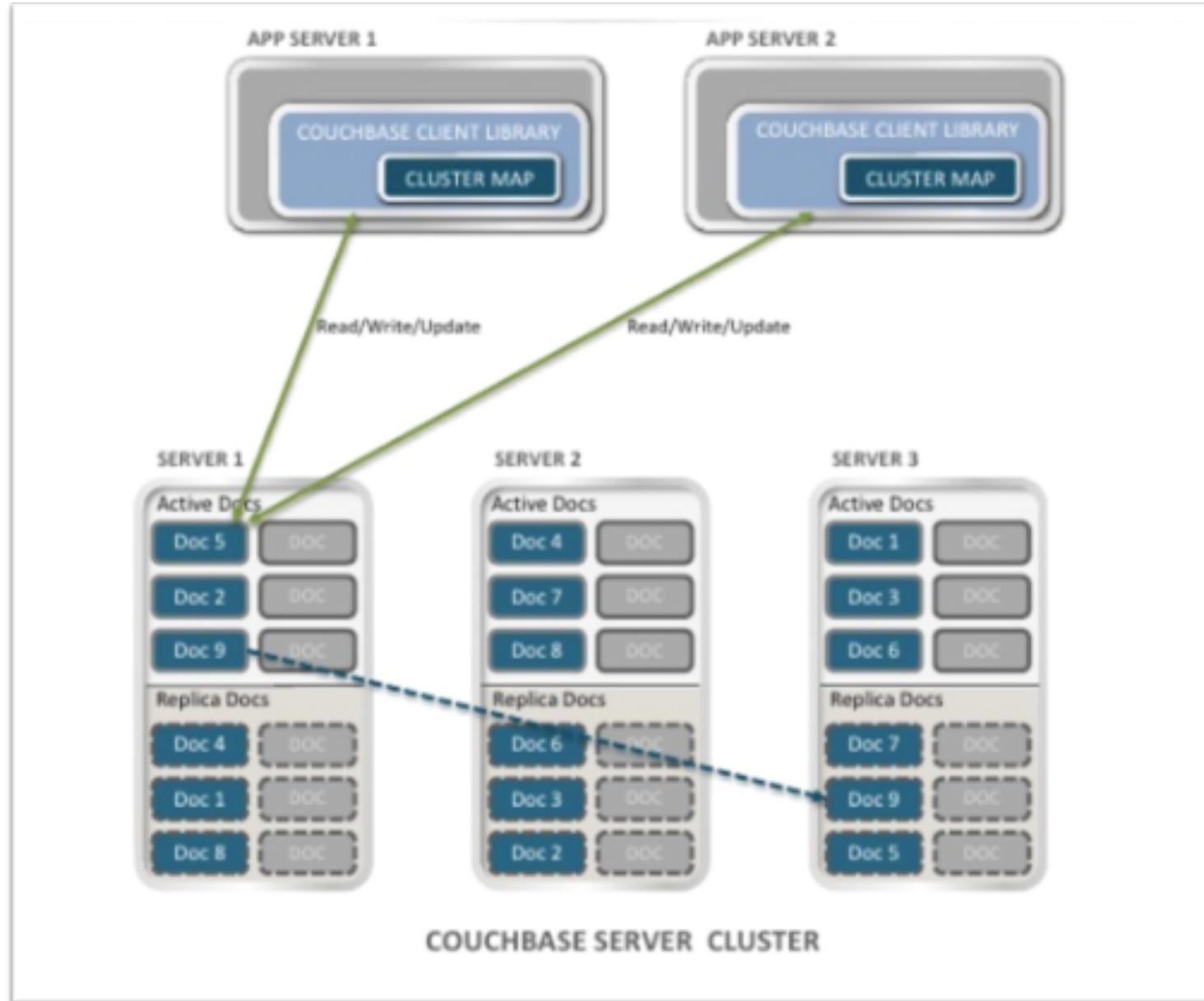
- Disruptive
- Manual
- Inefficient



“Sharding in Oracle 12c Release 2....is a feature aimed to the ‘top 5%’ of Oracle customers where price isn’t the issue but they want Oracle to scale to the size of clusters supported by Hadoop and NoSQL. Time will tell how well it’ll work and what it’ll cost.”



In NoSQL, data is “sharded” by design





Quora

In summary, joins are "bad" because (1) they are inherently computationally expensive, (2) the unsophisticated implementations in typical big data environments make them even *more* expensive, and (3) the lack of effective parallelization for those implementations means that you can't increase throughput simply by adding more hardware.

RDBMSs are Strict with Schema



Iteration 1 — First, Last

Schema Utilized

USERS

ID	First	Last
----	-------	------

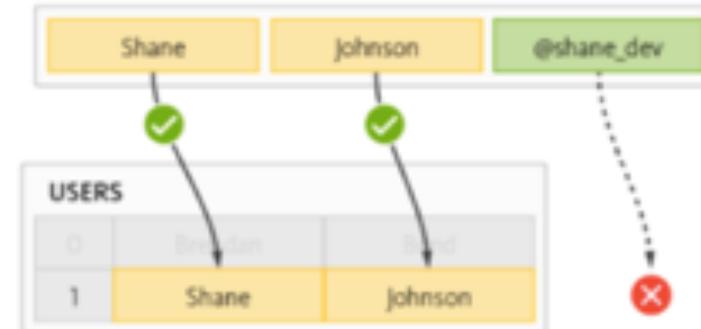


Iteration 2 — First, Last, Twitter

Schema Utilized

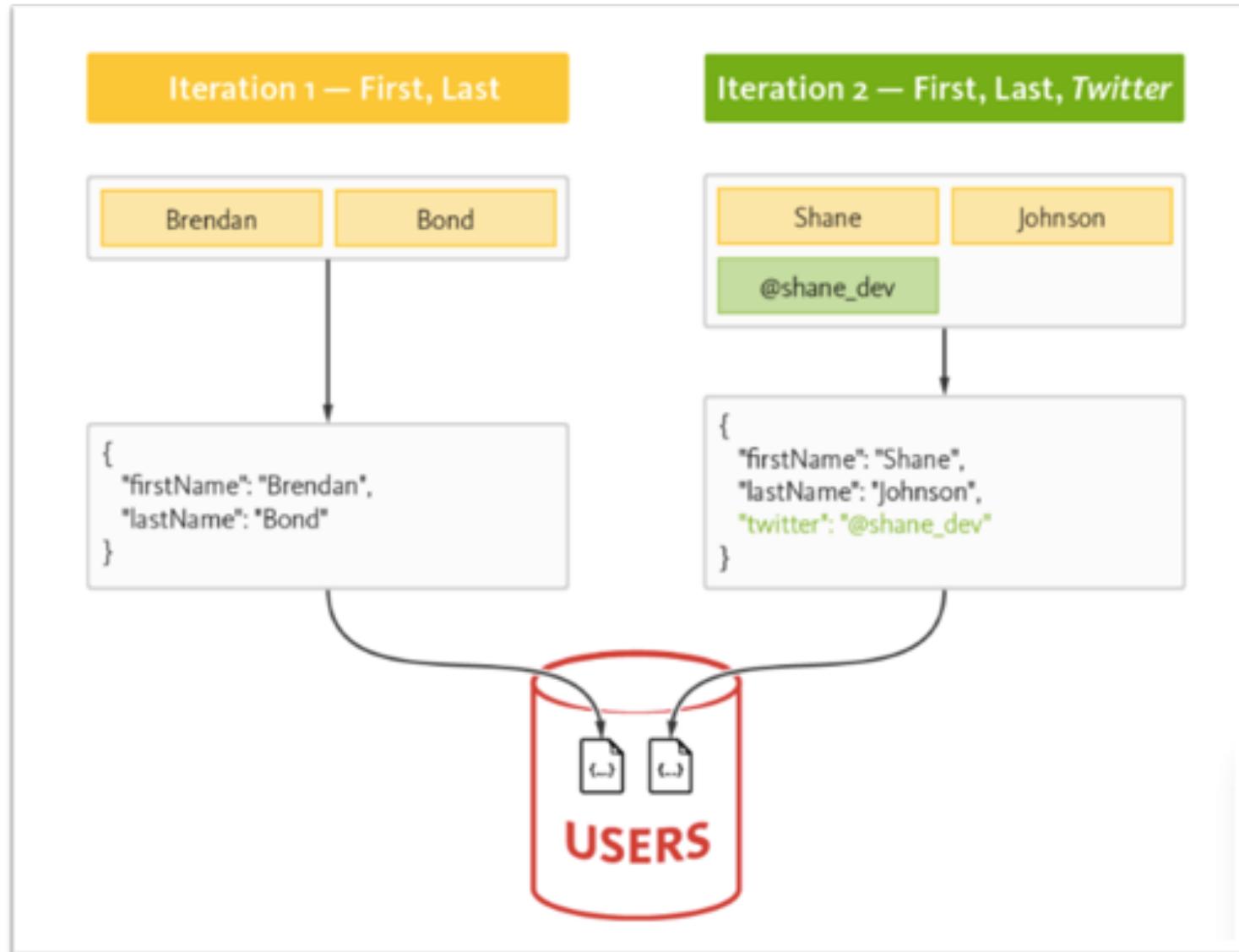
USERS

ID	First	Last
----	-------	------

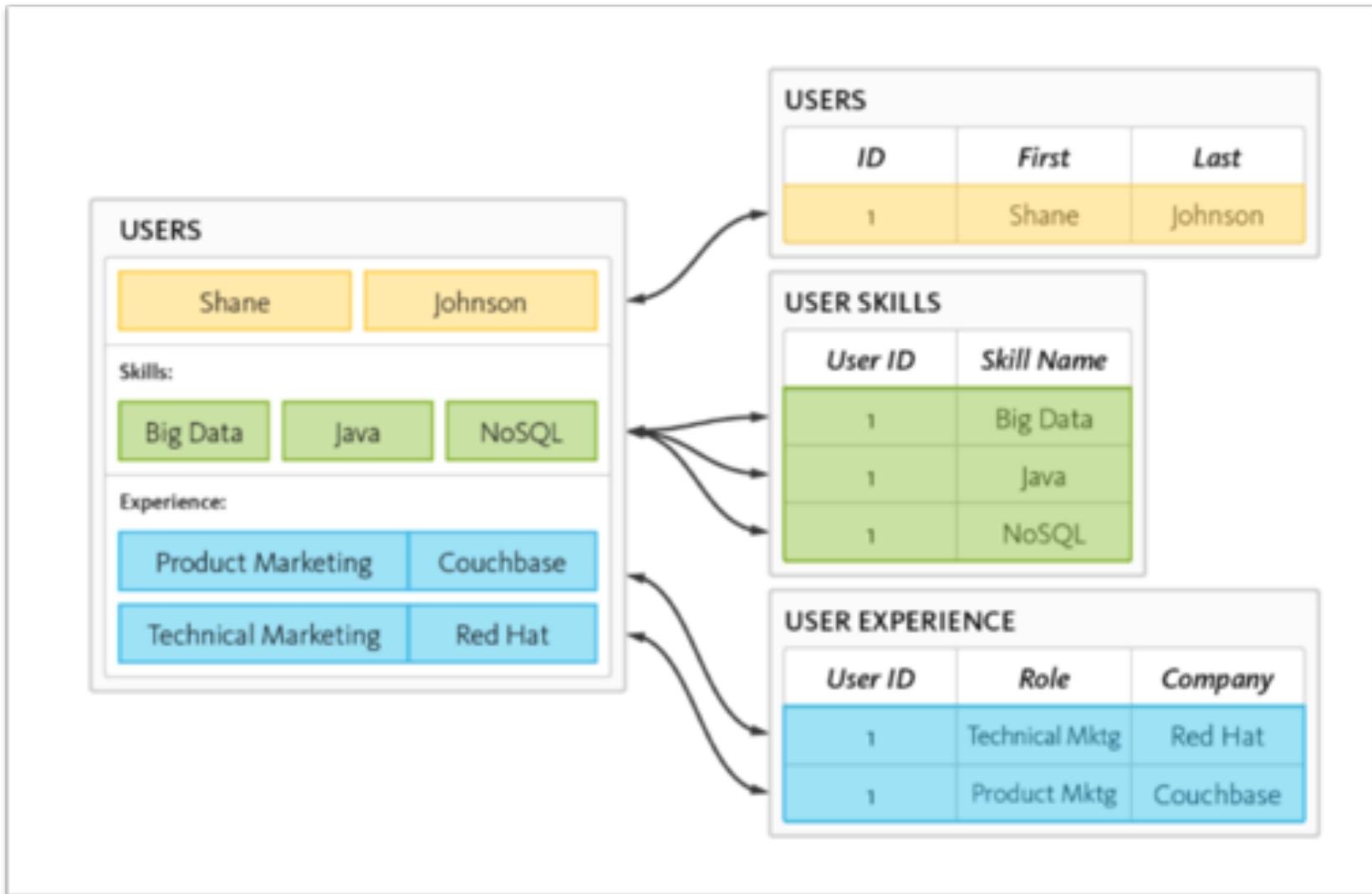


- Disruptive
- Time-consuming
- Change impact on apps?

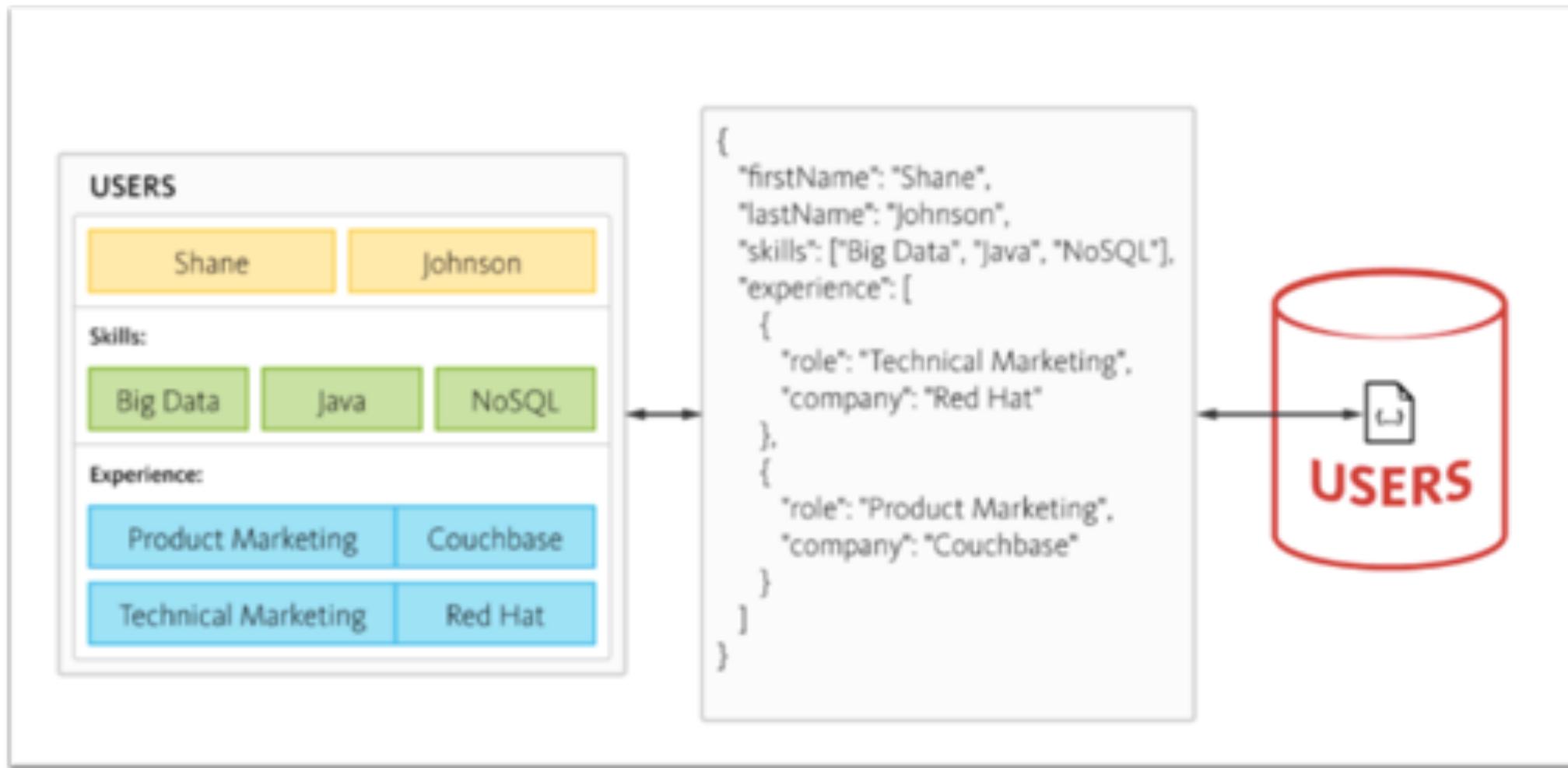
NoSQL offers Schema Flexibility



RDBMSs = Impedance Mismatch



NoSQL matches application with data



Oracle vs. Couchbase Feature Comparison



Capability Provided	Oracle Option	Couchbase
Clustered DB deployments	Real App Clusters	<i>Included</i> in CE & EE
Standby DB	Data Guard & Partitioning	XDCR <i>included</i> in CE and EE
Encryption	Advanced Security	<i>Included</i> in EE
Role Based Access Control	Database Vault	<i>Included</i> in EE
High performance	In Memory/Cache	<i>Included</i> in CE and EE

Example – Oracle List Pricing



		Oracle Database			
		Named User Plus	Software Update License & Support	Processor License	Software Update License & Support
Database Products					
Oracle Database					
Standard Edition 2	350	77.00	17,500	3,850.00	\$47,500
Enterprise Edition	950	209.00	47,500	10,450.00	
Personal Edition	450	101.20	-	-	
Mobile Server	-	-	23,000	5,060.00	
NoSQL Database Enterprise Edition	200	44	10,000	2,200.00	
Enterprise Edition Options:					
Multitenant	350	77.00	17,500	3,850.00	\$70,500
Real Application Clusters	450	101.20	23,000	5,060.00	
Real Application Clusters One Node	200	44.00	10,000	2,200.00	
Active Data Guard	230	50.60	11,500	2,530.00	\$93,500
Partitioning	230	50.60	11,500	2,530.00	
Real Application Testing	230	50.60	11,500	2,530.00	
Advanced Compression	230	50.60	11,500	2,530.00	\$108,500
Advanced Security	300	66.00	15,000	3,300.00	
Label Security	230	50.60	11,500	2,530.00	
Database Vault	230	50.60	11,500	2,530.00	\$120,000
OLAP	450	101.20	23,000	5,060.00	
Advanced Analytics	450	101.20	23,000	5,060.00	
Spatial and Graph	350	77.00	17,500	3,850.00	
TimesTen Application-Tier Database Cache	450	101.20	23,000	5,060.00	
Database In-Memory	450	101.20	23,000	5,060.00	
Retail Data Model	800	176.00	40,000	8,800.00	
Communications Data Model	1,500	330.00	50,000	11,000.00	
Airlines Data Model	800	176.00	40,000	8,800.00	
Utilities Data Model	800	176.00	40,000	8,800.00	
Database Enterprise Management					
Diagnostics Pack	150	33.00	7,500	1,650.00	
Tuning Pack	100	22.00	5,000	1,100.00	
Database Lifecycle Management Pack	240	52.80	12,000	2,640.00	
Data Masking and Subsetting Pack	230	50.60	11,500	2,530.00	
Cloud Management Pack for Oracle Database	150	33.00	7,500	1,650.00	
Enterprise Edition					
Real App Clusters					
Data Guard & Part.					
Advanced Security					
Database Vault					
In-memory/Cache					
Total Price: \$166,000					



Example – Oracle List Pricing cont'd

		Oracle Database			
		Named User Plus	Software Update License & Support	Processor License	Software Update License & Support
Database Products					
Oracle Database					
Standard Edition 2		350	77.00	17,500	3,850.00
Enterprise Edition		950	209.00	47,500	10,450.00
Personal Edition		450	101.20	–	–
Mobile Server		–	–	23,000	5,060.00
NoSQL Database Enterprise Edition		200	44	10,000	2,200.00
Enterprise Edition Options:					
Multitenant		350	77.00	17,500	3,850.00
Real Application Clusters		460	101.20	23,000	5,060.00
Real Application Clusters One Node		200	44.00	10,000	2,200.00
Active Data Guard		230	50.60	11,500	2,530.00
Partitioning		230	50.60	11,500	2,530.00
Real Application Testing		230	50.60	11,500	2,530.00
Advanced Compression		230	50.60	11,500	2,530.00
Advanced Security		300	66.00	15,000	3,300.00
Label Security		230	50.60	11,500	2,530.00
Database Vault		230	50.60	11,500	2,530.00
OLAP		460	101.20	23,000	5,060.00
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Data Masking and Subsetting Pack		230	50.60	11,500	2,530.00
Cloud Management Pack for Oracle Database		150	33.00	7,500	1,650.00

\$200,000



5

Use Cases



Who is using Couchbase ?

AMADEUS

1.1 trillion hits a day
75% of flight bookings worldwide are made through Amadeus

GANNETT

50M Unique monthly visitors
2.5B monthly page views
Replaced MongoDB

LinkedIn

> 450M members
16M entries every 5 min
10+ M queries/sec

PayPal

1 billion+ documents
10TB+ data
< 200 ms response time

Retail



Travel



Gaming



Telco



Financial Services

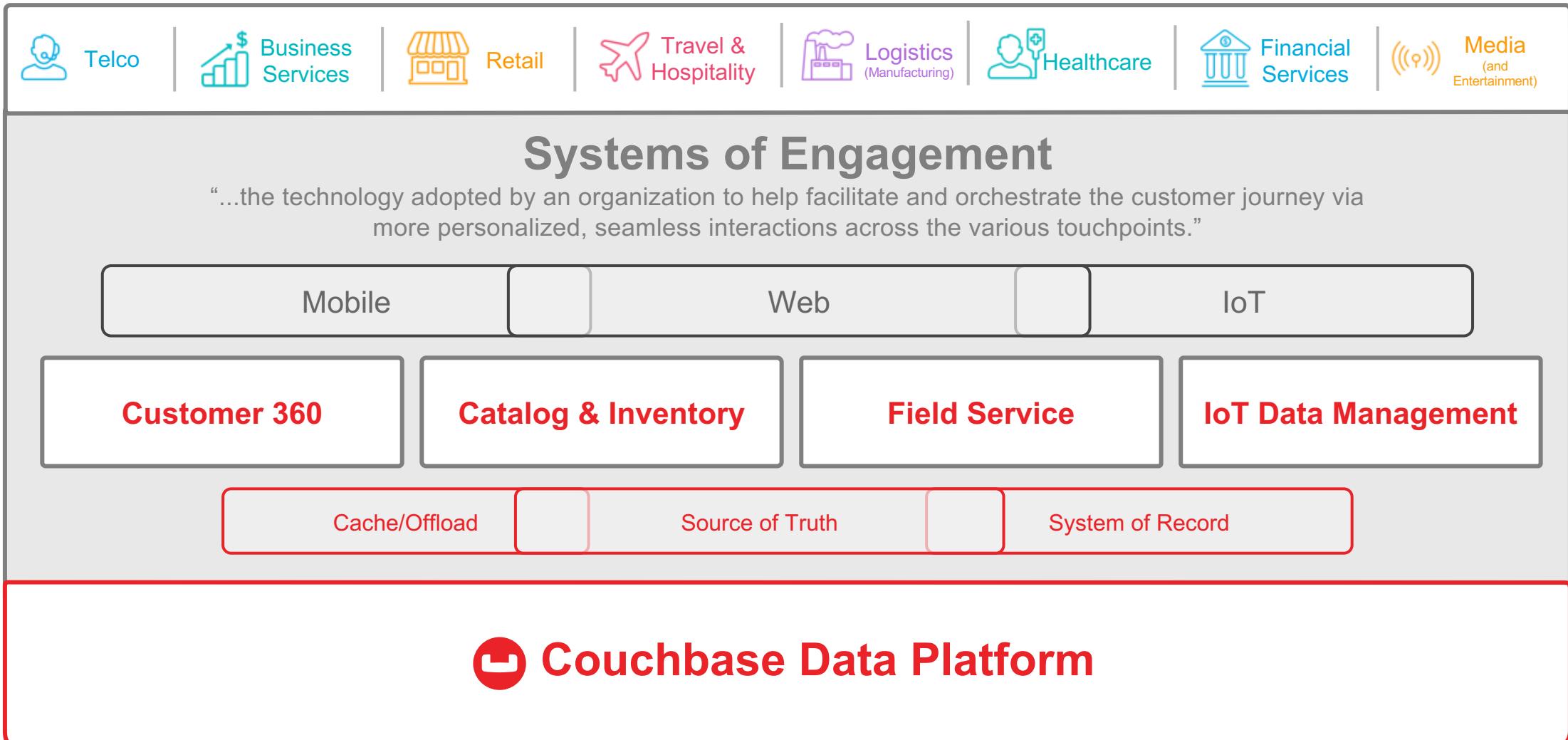
Digital Health

Digital Media

Industrial IoT



Where does Couchbase fit?





Couchbase at Amadeus

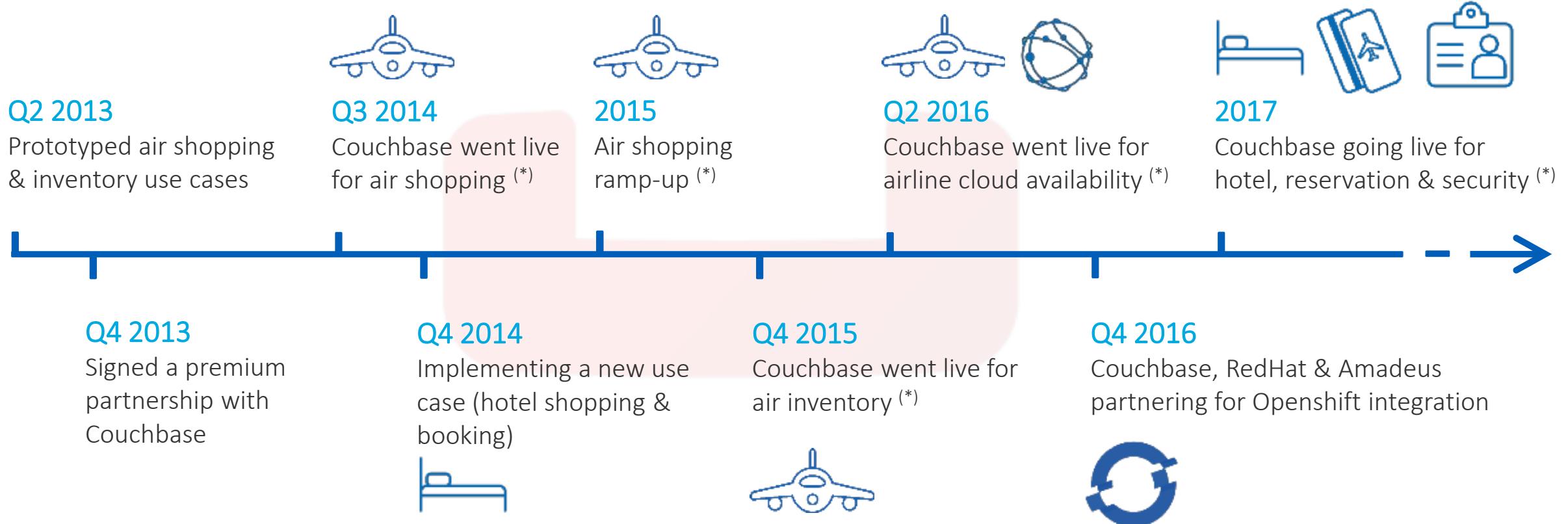
amadeus

Amadeus is the leading provider of IT solutions to the global tourism and travel industry.

- 195 countries served
- 525M+ travel agency bookings processed in 2014
- >1.6B+ data requests processed per day

Couchbase & Amadeus

Partnering since 2013



Source: Amadeus presentation at Couchbase Europe 2017

(*) : for some functionalities.



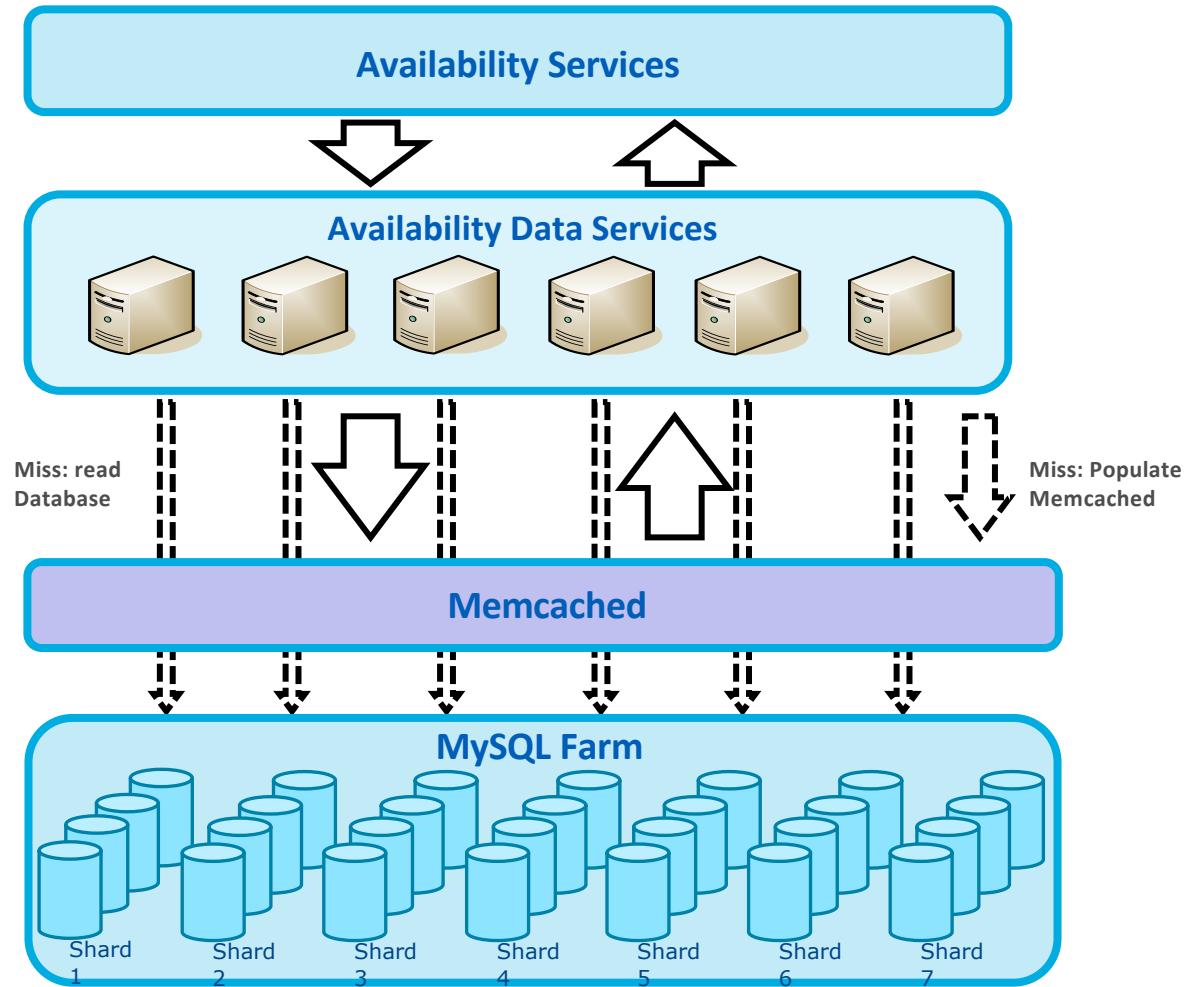
Problems Amadeus was trying to solve

- Simplifying the architecture to
 - Remove complex storage logic in the application layer
 - Decrease operational costs due to:
 - Inefficient hardware utilization
 - Administration overhead
- On-demand scaling because
 - Extending capacity is complex, requires preparation, and takes many days
- Eliminating downtime
 - Memcached outages rare, but very disruptive

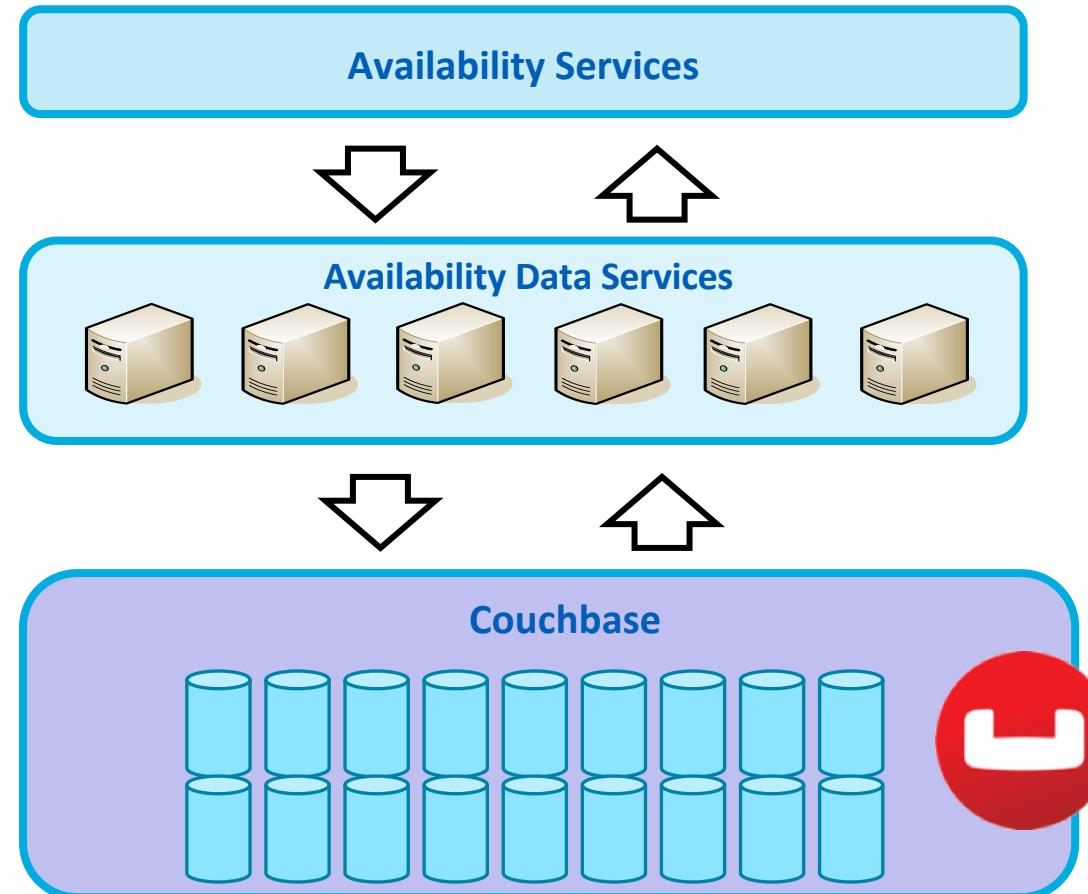


Availability Cache Architecture: Before & After

Before



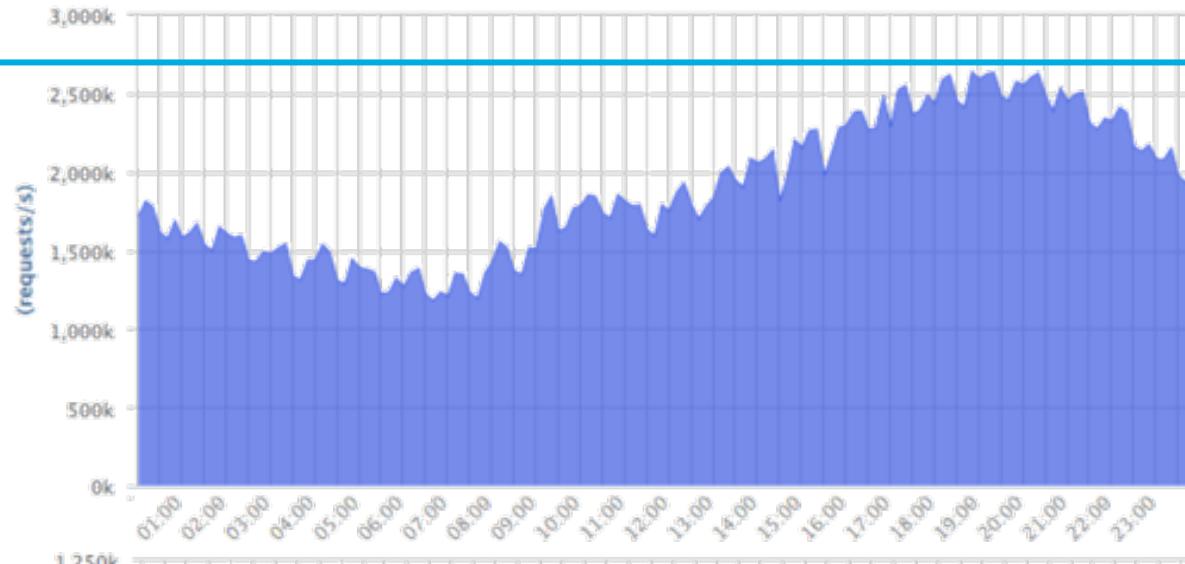
After



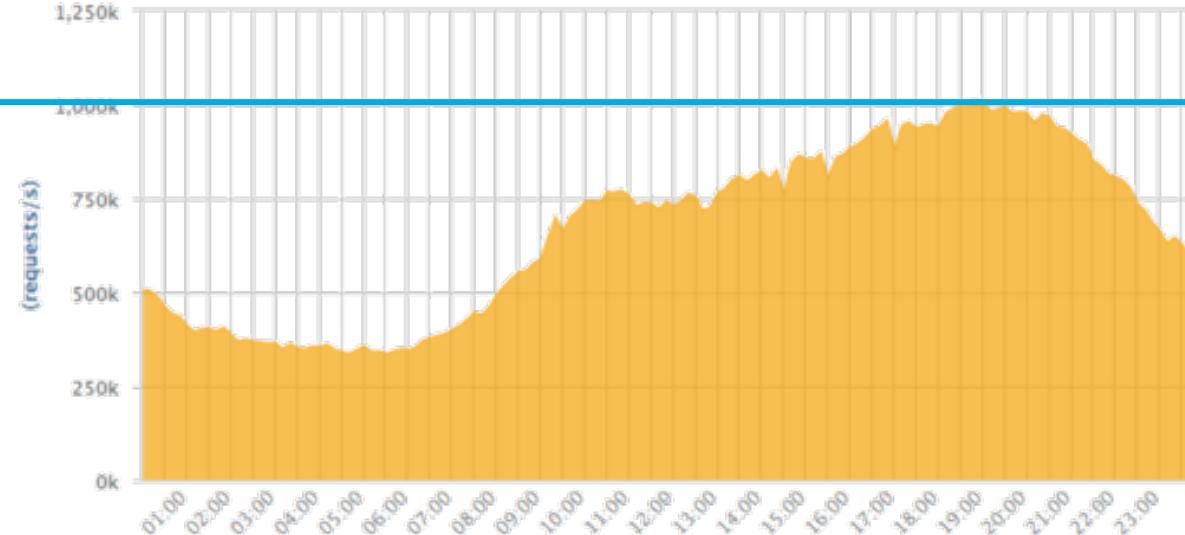


Availability Data Workloads

GET 2.6 M/s



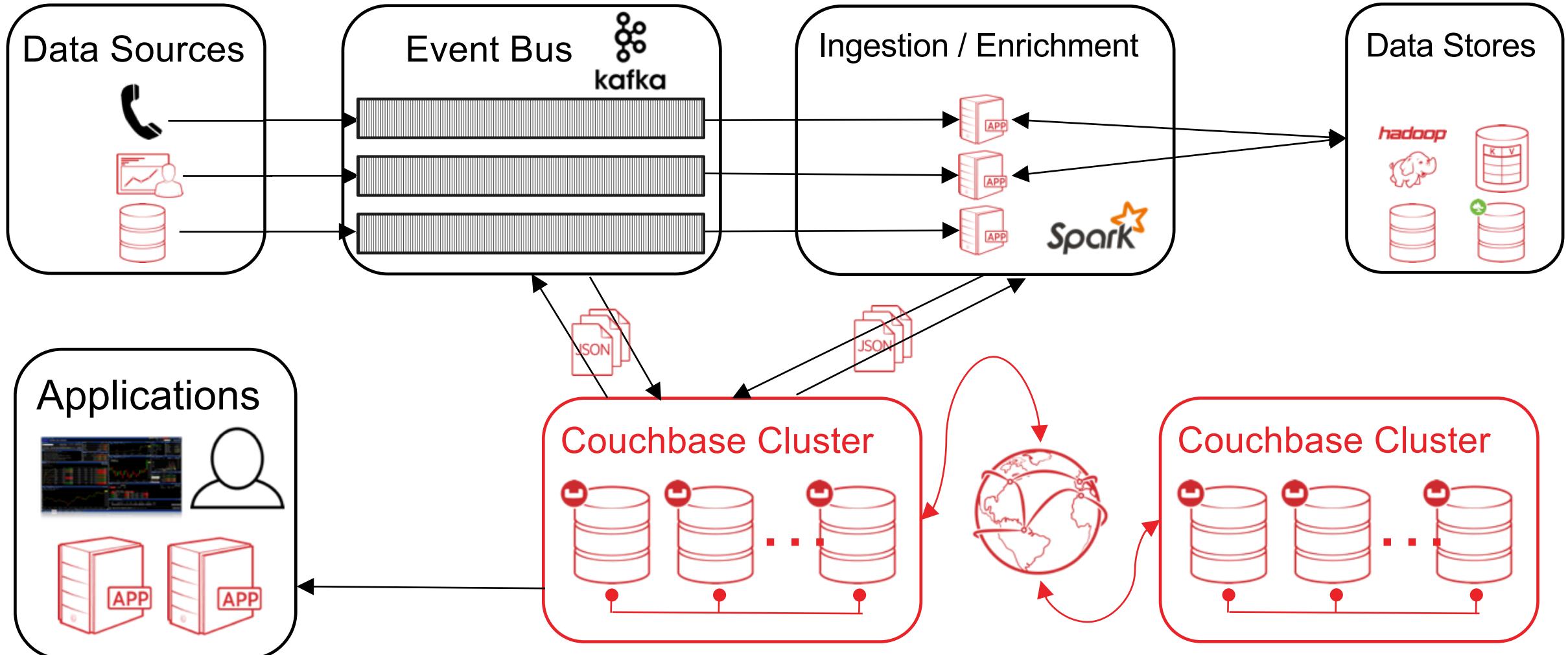
SET 1 M/s



- **Couchbase is fast**
 - Microseconds add up when performing millions of operations per second
 - Read operation latency < 0.5ms
- **Couchbase is *predictably* fast**
 - Long tail latencies would hurt application response time
 - Couchbase leverages large memory capacity
- **Couchbase online rebalancing works without impacting latency**

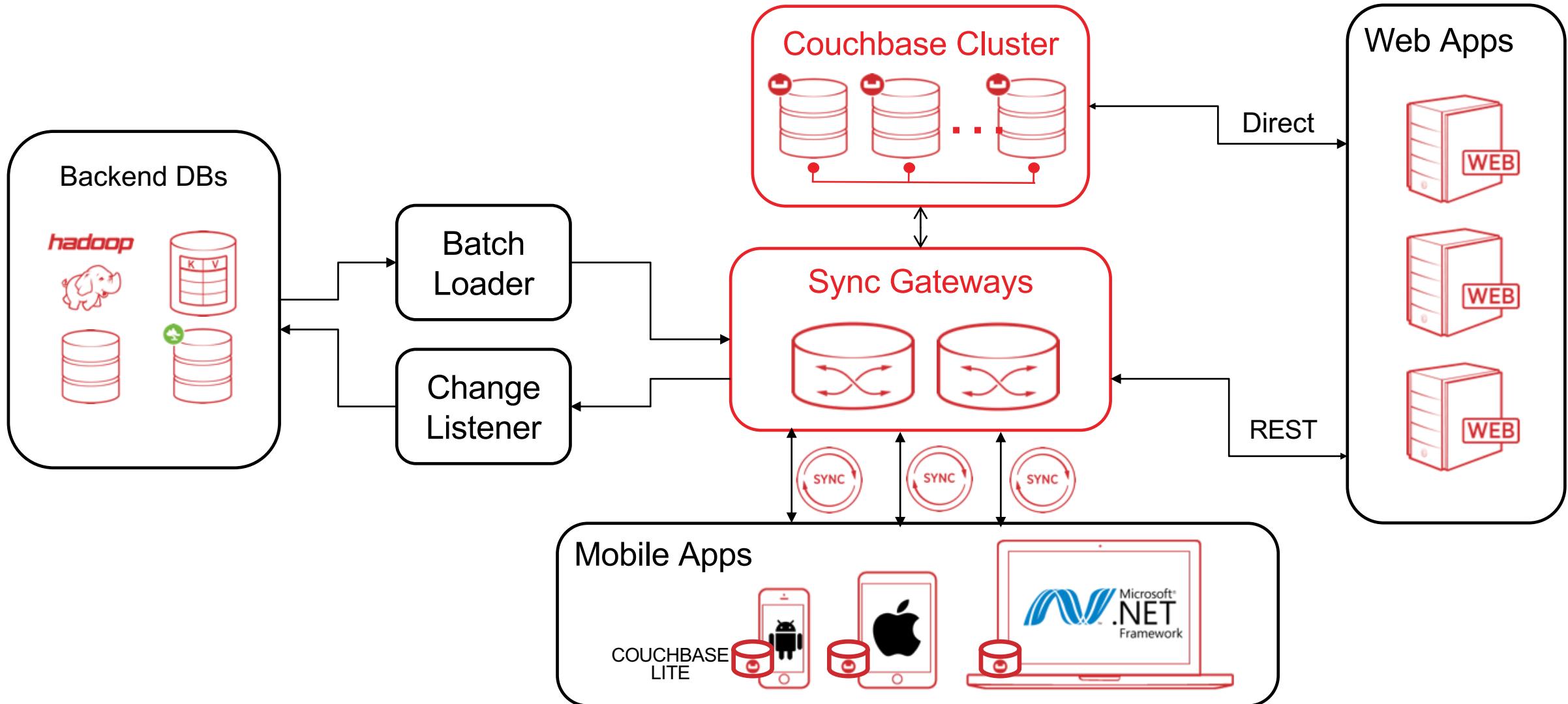


Reference Architectures: Streaming/Consolidated Data Store





Reference Architectures: Data Integration and Mobile Routing





Customer spotlight: eBay



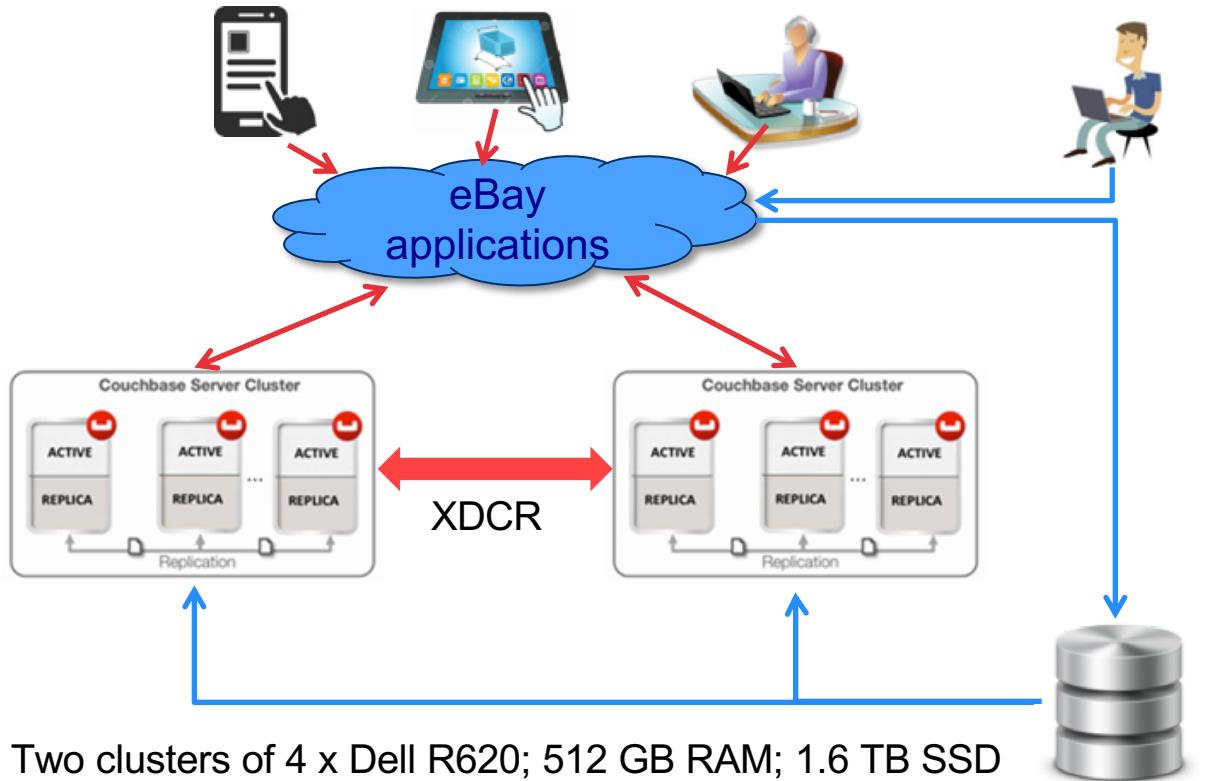
Ebay is one of the world's largest online marketplaces.

- 100+ million active buyers and sellers
- 600+ million items
- 2+ billion page views a day
- 80+ billion database calls a day
- 5+ petabytes of site storage capacity
- 80+ petabytes of analytics storage capacity

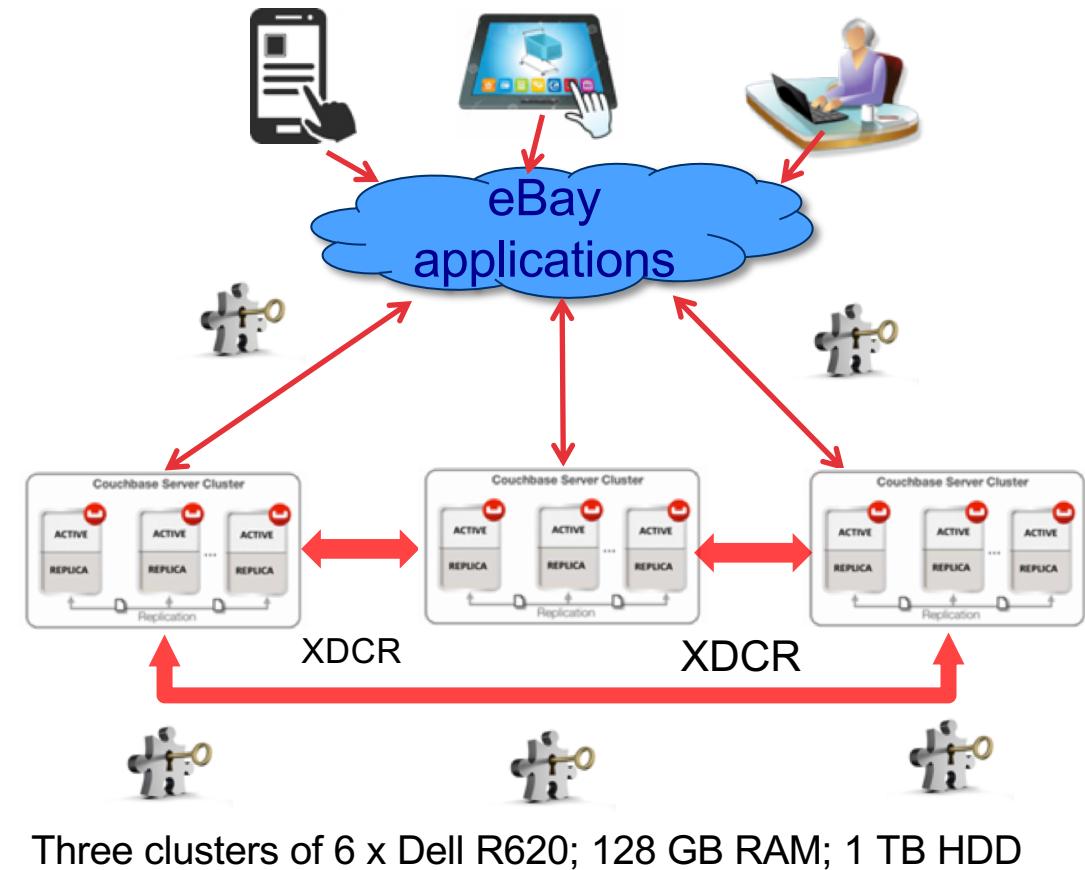


Couchbase cache deployments: Listing and Token Store

Listing Cache



Token Store



Thank you



Couchbase