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DIE COMMUNITY SEITE für alle Anwender & Interessierte der Red Hat OpenShift Container Plattform

Couchbase on Red Hat OpenShift

How to avoid big database pain in microservices

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Speaker Intro

Steffen Schneider
Senior Solutions Engineer
Couchbase – Central Europe

- Cross disciplinary functional-technical profile
- Over 10 years professional experience on end-customer side esp. executive department
- Execution as Technical Lead with extended Project Management and Leadership experience
- Dedicated responsibilities in the areas of
  - Business Intelligence
  - Data Warehousing
  - Data Processing/ETL
  - Processes
  - Technology Tools
- Since 2017 on software vendor side as Solution Architect
- Finally switch into Big Data world to Couchbase as leading NoSQL technology platform vendor

Agenda

1. Setting the Stage – Technology
2. Setting the Stage – Real World Use Cases
3. Challenges of today’s Corporate Architectures and its Solutions
4. Prerequisites
5. Containerized Database Handling for Microservices
6. Q&A

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Couchbase – Brief Company Overview

- Founded 2011
- >500 Empolyees
- 70%+ new business growth
- 100%+ growth in total contract value
- 55%+ billings growth
- 50%+ growth in average deal size

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Santa Clara, CA 95054
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450 Mission Street #200
San Francisco, CA 94105
United States

London
11-21 Paul Street
London EC2A 4JU
United Kingdom

Paris
40 Rue du Collisée
75008 Paris
France

Manchester
1A Tariff St
Manchester M1 2FF
United Kingdom

Bangalore
10 Museum Road
Bangalore 560001
India

Couchbase Behind Today's Business-Critical Applications

	LinkedIn	TESCO	amadeus	COMCAST	UNITED
Customers					
Application	Caching & session store for single view	Real-time pricing, product catalog, inventory management	Flight availability, booking, pricing analytics, etc.	Customer 360 single view, unified notes	Real-time crew management, scheduling and resources
Performance	**2M+** reads/sec. **10M** queries/sec.	**10M+** unique SKUs **35K** requests/sec.	**15M** ops / second **<2.5ms** response time	**210M** documents **100K** users	**41K** pilots and crew **148M** travelers in 2017

Infrastructure

Developer Agility | Performance at Scale | Manageability

Security + Availability

A Proven Enterprise Solution Chosen by Industry Leaders

Retail & E-Commerce	Travel & Hospitality	Financial Services	Healthcare	Telecom	Media & Entertainment	Gaming	Industrial IoT
Walmart	Marriott	ADP	WebMD	COMCAST	sky	EA	verizon
cars.com	amadeus	FICO	everyday HEALTH	KDDI	THOMSON REUTERS	betfair	Numerex
Fanatics	Sabre	CONCUR	BD	at&t	FANDANGO	zynga	CHAMBERLAIN
Office DEPOT OfficeMax	ORBITZ	PayPal	Cochlear	Viber	GANNETT	BLIZZARD ENTERTAINMENT	GE
STAPLES	tripadvisor	WELLS FARGO	MONSENSO	Telefónica	Dushkin McGraw-Hill	Playtika	
TESCO	skyscanner	VISA			Disney	SGN	
QVC					nielsen		
BEST BUY							
3 of the Top 10 eCommerce Companies	**3 of the Top 3** GDS Companies	**3 of the Top 3** Credit Reporting Companies	**3 Fortune 500** Healthcare Companies	**6 of the Top 10** Broadcast Companies		**6 of the Top 10** Online Casino Gaming Companies	**2 of the Top 2** IoT Platforms

Value Proposition for Red Hat & Couchbase

Escape the common struggles of cloud deployments

Database silos

Businesses that adopt a microservices architecture for their applications find it difficult to manage and scale database clusters in siloed systems.

Vendor lock-in

Switching between cloud providers can be extremely complicated because there is little industry standardization.

High operational costs

Deploying and managing thousands of application and database instances across multiple geographies increases cost, effort, and complexity.

Couchbase is cloud-native and cloud-agnostic

Interoperability with any cloud has never been so easy

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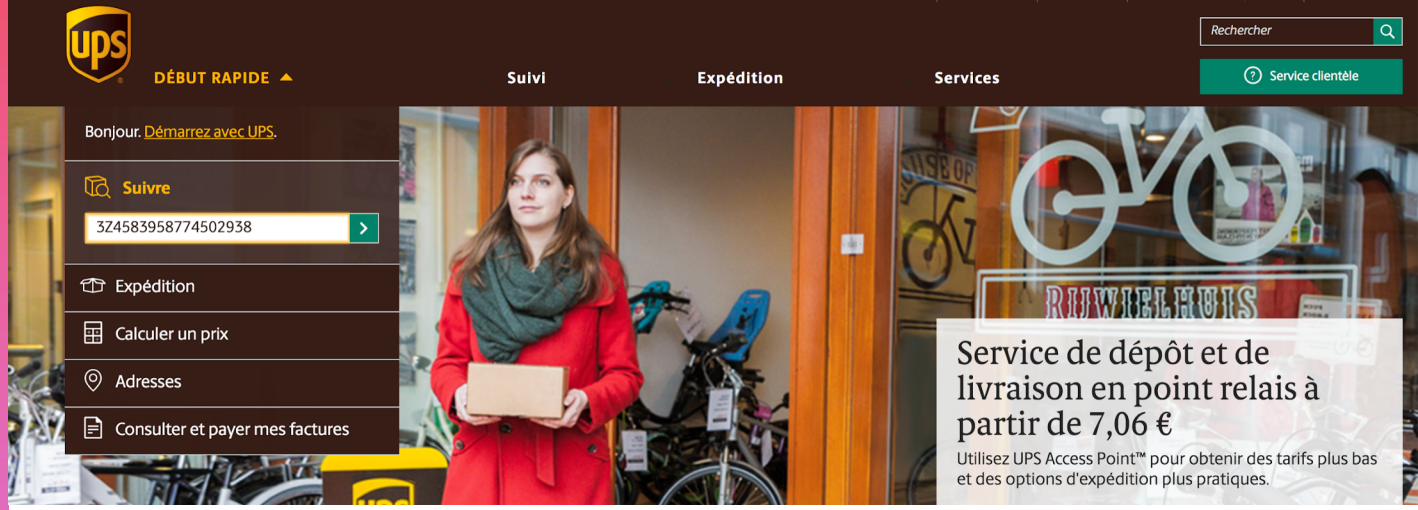
SOLUTION:
Field Service

APPLICATION:
Package tracking

USE CASE(S):
Caching
Document store
Operational dashboarding

ABOUT:
United Parcel Service is an American multinational package delivery and supply chain management company.



Requirements

- Changing state and serving inquiries for billions of packages
- Billions of documents
- Tens of terabytes of data
- Tens of thousands of operations per second
- 30+ million document inserts and updates per day

Outcomes

- Persistent caching with Couchbase (3rd generation of tracking architecture)
- Near-linear scalability
- Flexibility in supporting new requirements using N1QL
- Better TCO with reduction in the number of nodes from ~100 to ~20

amadeus

SOLUTION:
Customer 360
Catalog & Inventory
Field Service

APPLICATION:
Inventory/price
Reservation & PNR
Crew services

USE CASE(S):
User profile store
Mobile wallet
Pricing
Product catalog

ABOUT:
Leading provider of travel software and technology solutions for the global travel industry.

Requirements

- **Optimize performance as "look to book" ratio continues to climb**: 7m requests per sec., 300k data requests before a booking
- **Growth of over 100% annually**
- **Decrease operational costs** for Memcached and MySQL nodes
- **Simplify management and replication**

Outcomes

- **Fast performance delivers superior customer experience:** 8m ops/sec., 99% <2.5 ms response time
- Multidimensional scaling adds **improved agility**: 17TB data set, 180TB usable storage
- **Data replicated via XDCR** to provide data locality in the Google East data center

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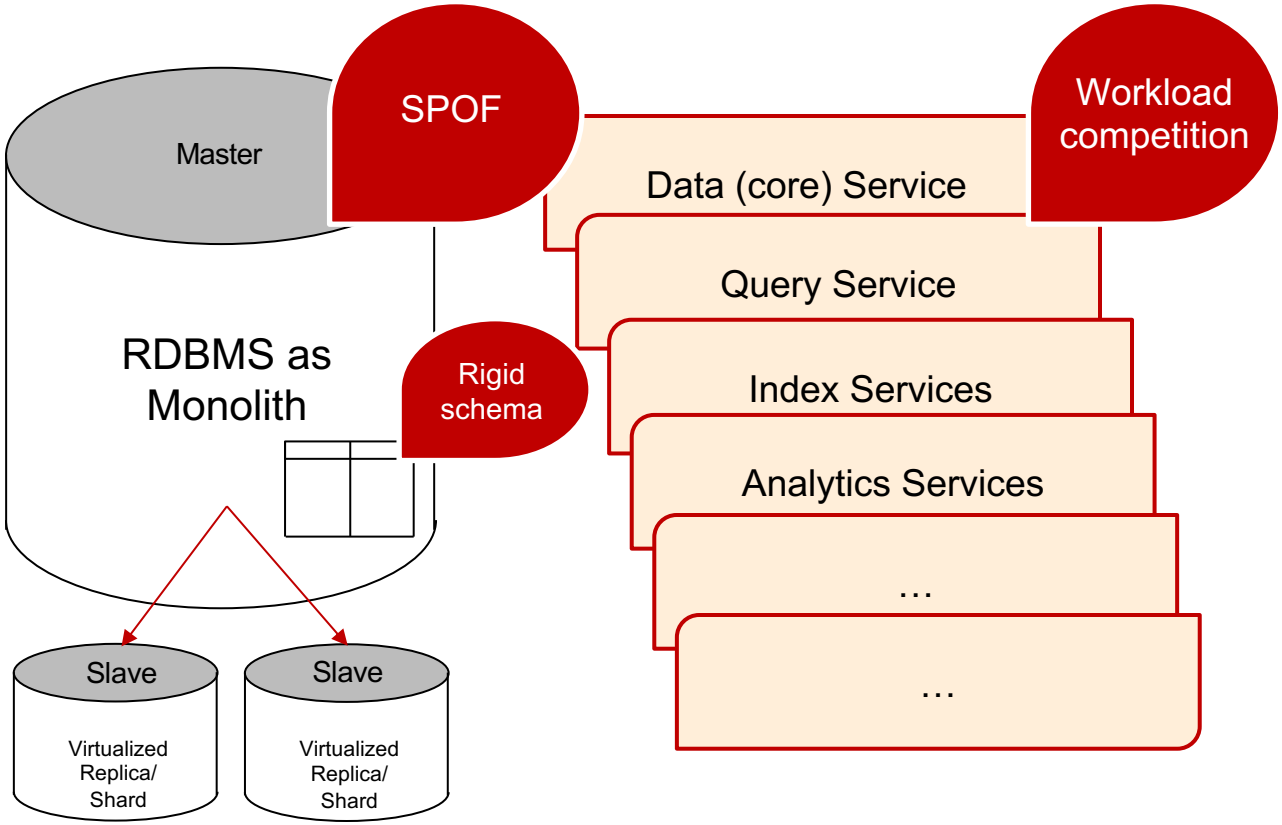
Challenges with a classic RDBMS for microservices



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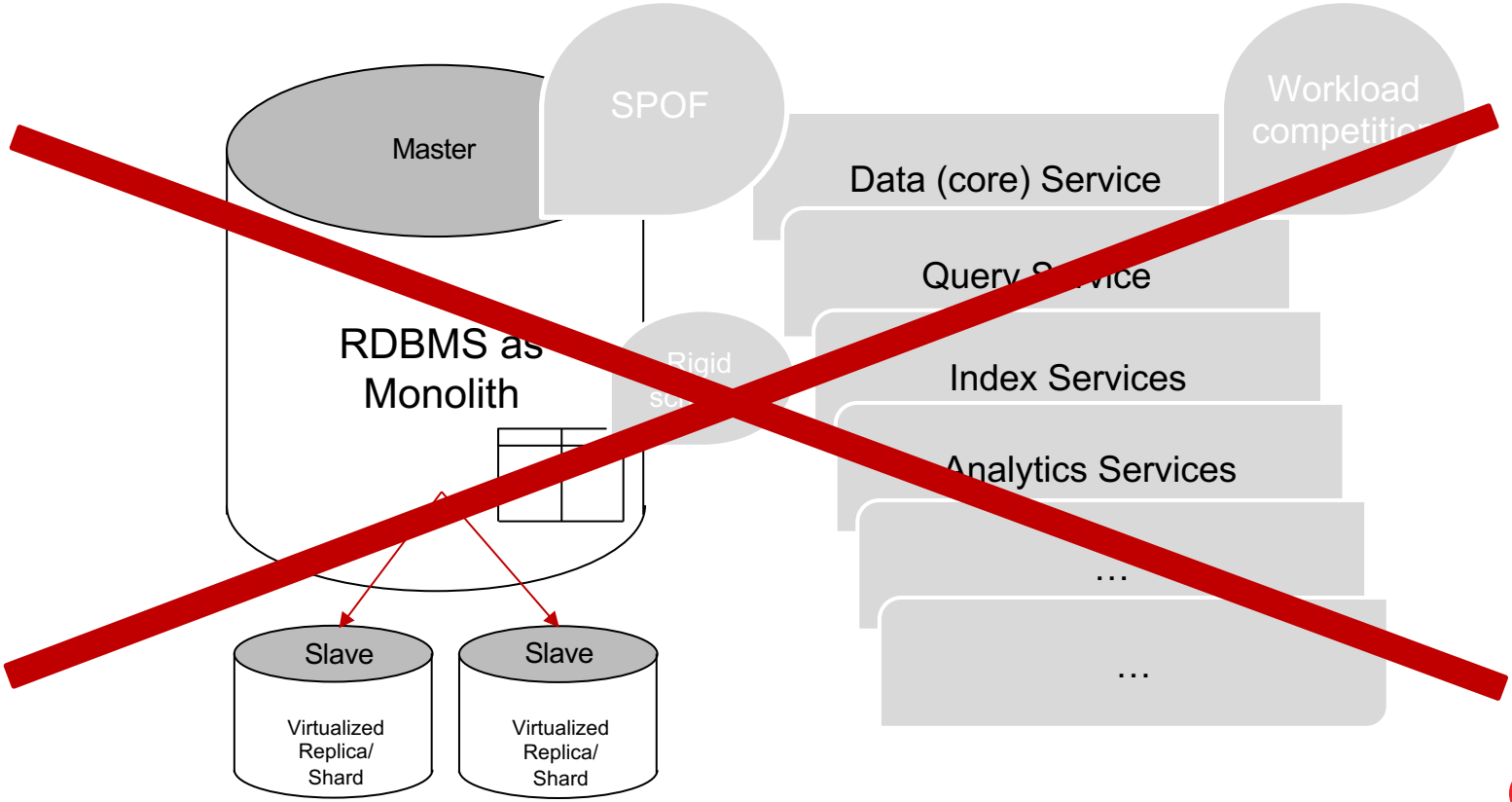
Break database challenges with **cloud-native behaviors**

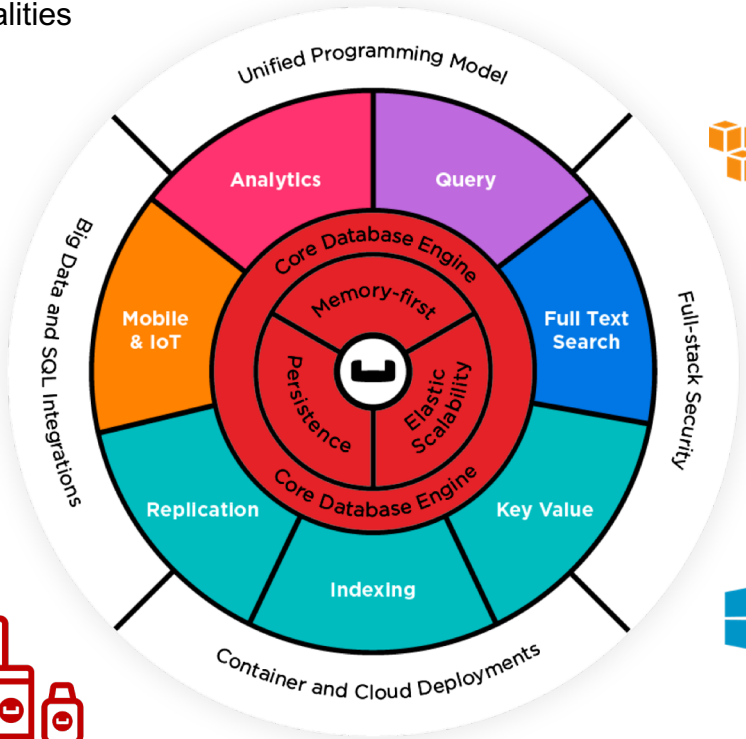


DEVELOP WITH AGILITY, DEPLOY AT ANY SCALE

CLOUD-NATIVE DATABASE Architecture

ANY CLOUD,
ANY DEVICE,
MANY SERVICES

Couchbase is **ONE technical product**!
Combining natively integrated microservices
Interlinked via native stream
Accessible with preferable tool: UI, CLI or SDK (all REST based) providing same functionalities

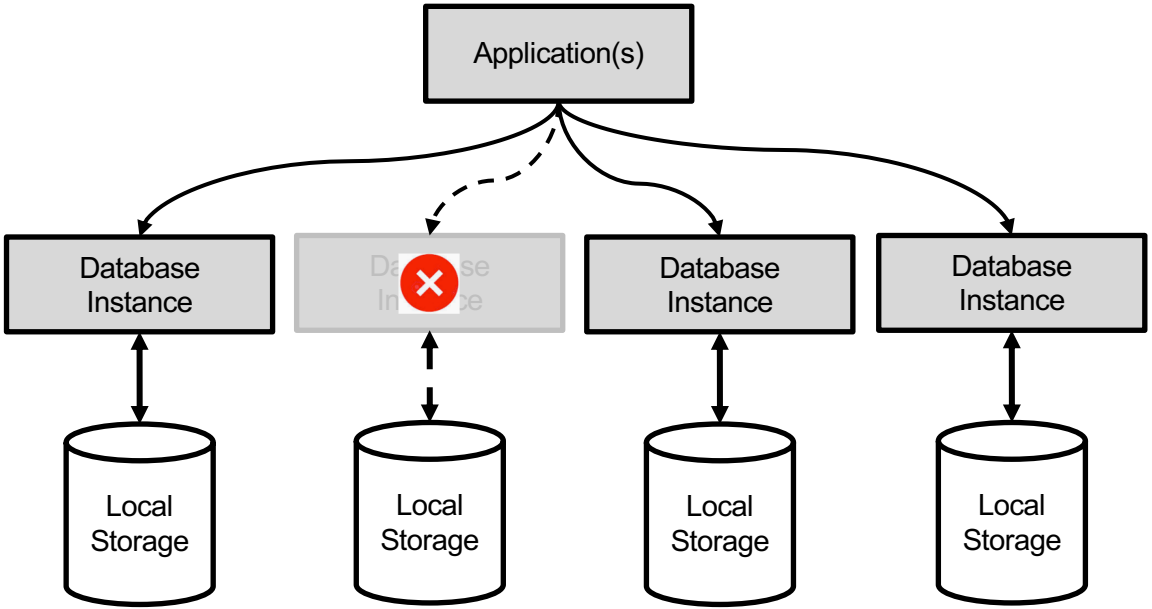


Designed for Cloud (native)

Automatic failover

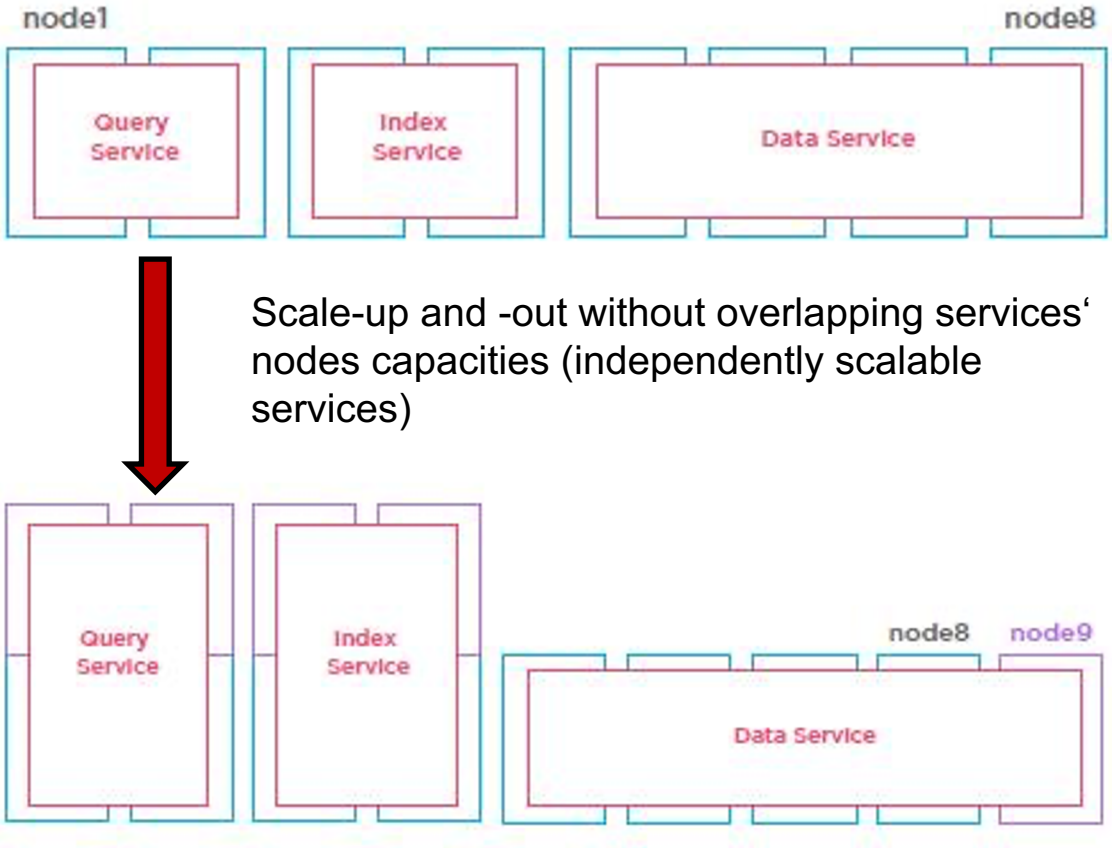
Shared-nothing architecture

No Single Point of Failure



High Performance and scalability:

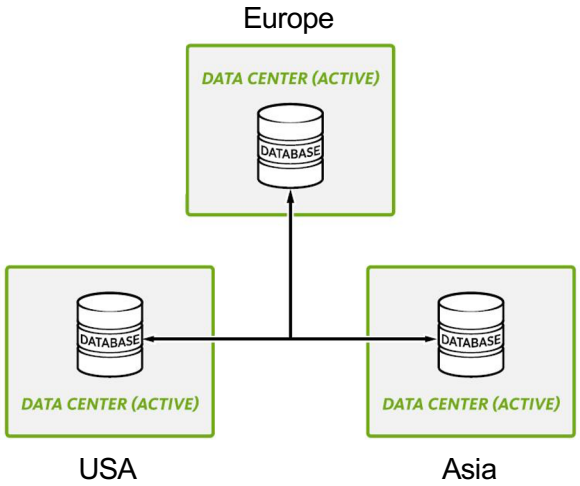
Modern Architecture – Multi-Dimensional Scaling

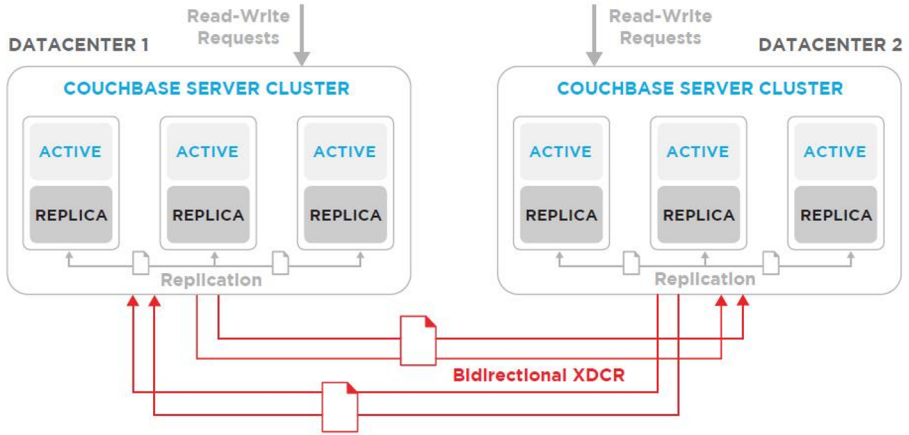


Data Everywhere for High availability and Disaster Recovery

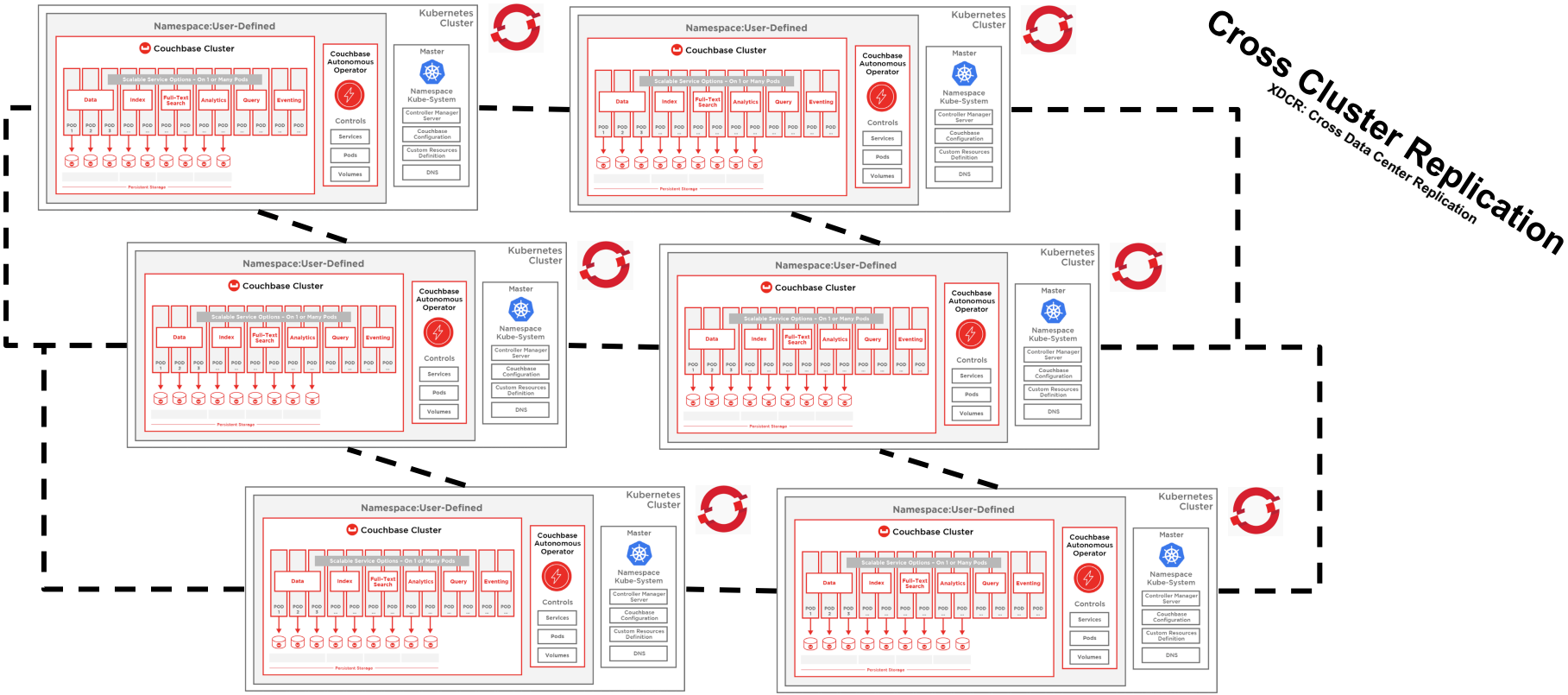
Cross-cluster (data center) active-active replication (XDCR)

No need for replication software because it is already built-in





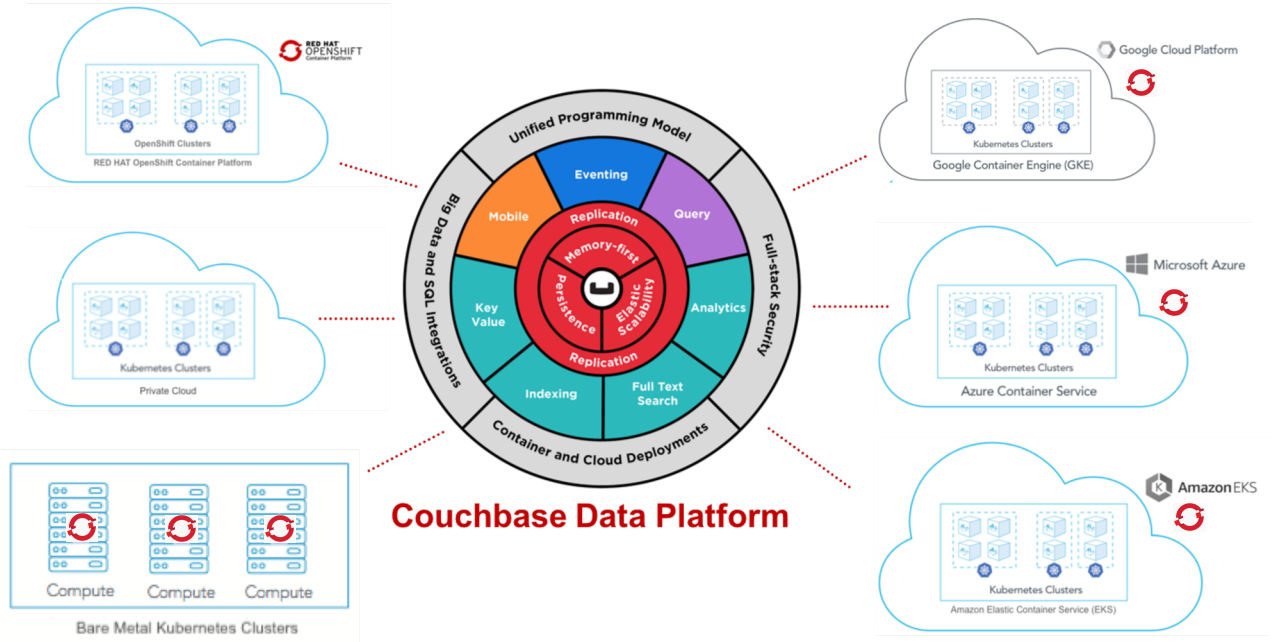
Red Hat OpenShift with Couchbase Autonomous Operator



Infrastructure-Agnostic – No Vendor Lock-In

Hybrid Cloud & Multi-Cloud Strategy

- Cloud-agnostic application deployment + management platform
- Treats cloud providers like commodities
- Enables you to migrate between clouds freely



Easy Data Access: fully compliant SQL for JSON flexible data schema

Input: SQL query

```
SELECT c.name, o.order_date
FROM customers AS c
LEFT OUTER JOIN orders AS o
  ON c.custid = o.custid
WHERE c.custid = "C41";
```

Output: JSON document

```
{
 "results": [
    {
      "name": "R. Duvall",
      "order_date": "2017-04-29"
    },
    {
      "name": "R. Duvall",
      "order_date": "2017-09-02"
    }
  ]
}
```

Combination of all advantages of flexible JSON data with all common SQL query commands for example

- SELECT/FROM/WHERE/GROUP BY/ORDER BY/LIMIT
- JOINs

incl. extensions for handling JSONs

- USE KEYS (From clause)
- NEST (From clause)
- UNNEST (From clause)
- MISSING (Where-clause)

- DDL (e.g. CREATE) and DML (e. g. UPDATE) are also supported

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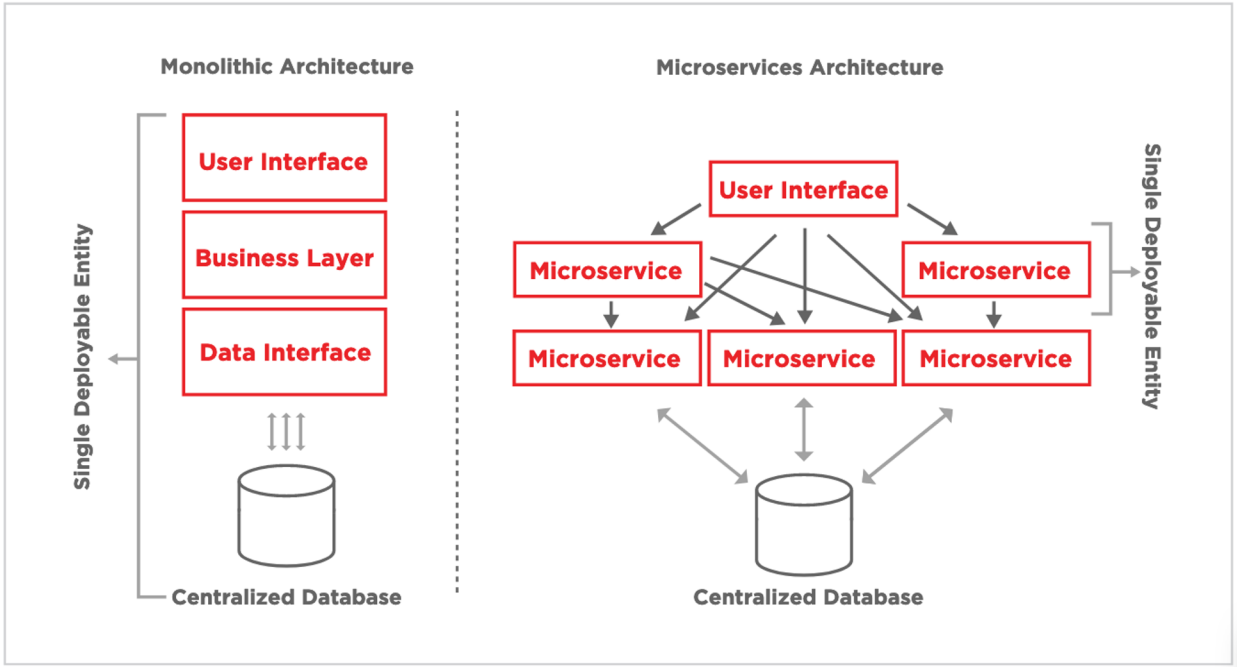
Does this modernization challenge sound familiar?
What happens with the database?

- Should we put it in a VM on the Kubernetes cluster?
- Let’s just put it into a container - there are options for persistence, right?
- Hm, what about security, performance, licensing …
  - And what’s the benefit?
  - Let’s start with the low-hanging fruits and leave it as-is for now?

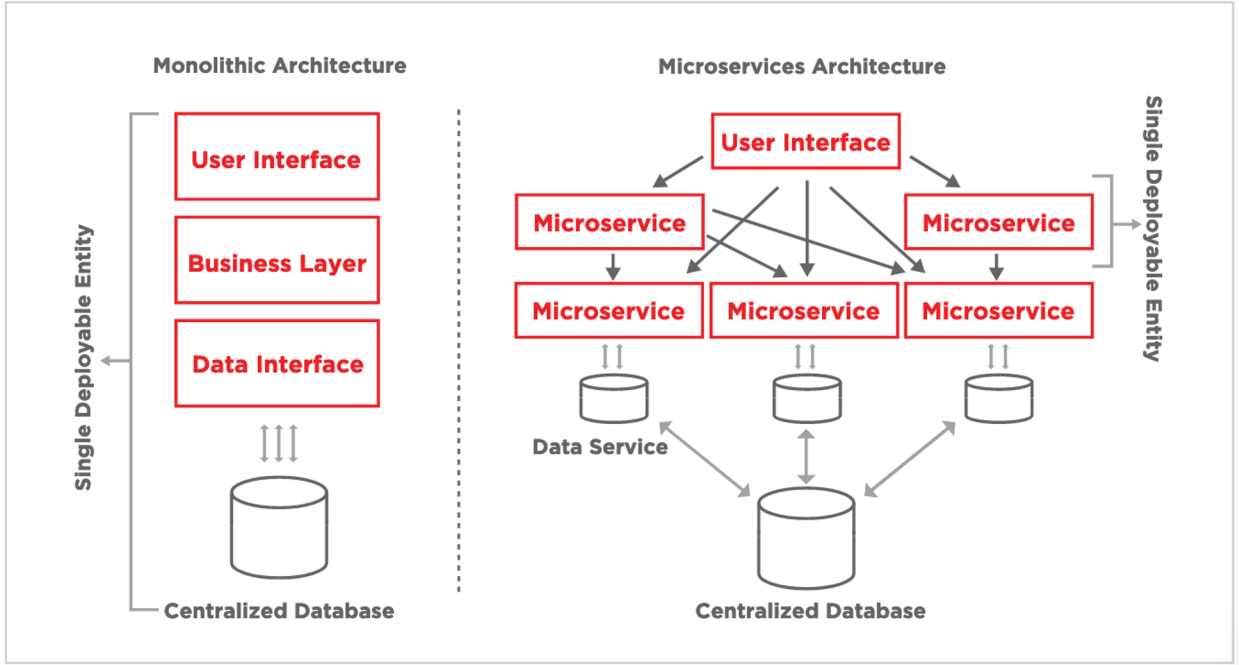
Modernization Phase 1:

Keep the database as is, but close to the new platform



Source: https://resources.couchbase.com/c/kubernetes-ebook?x=qDJUDM

Modernization Phase 2:
Redesign data layer according to microservices principles

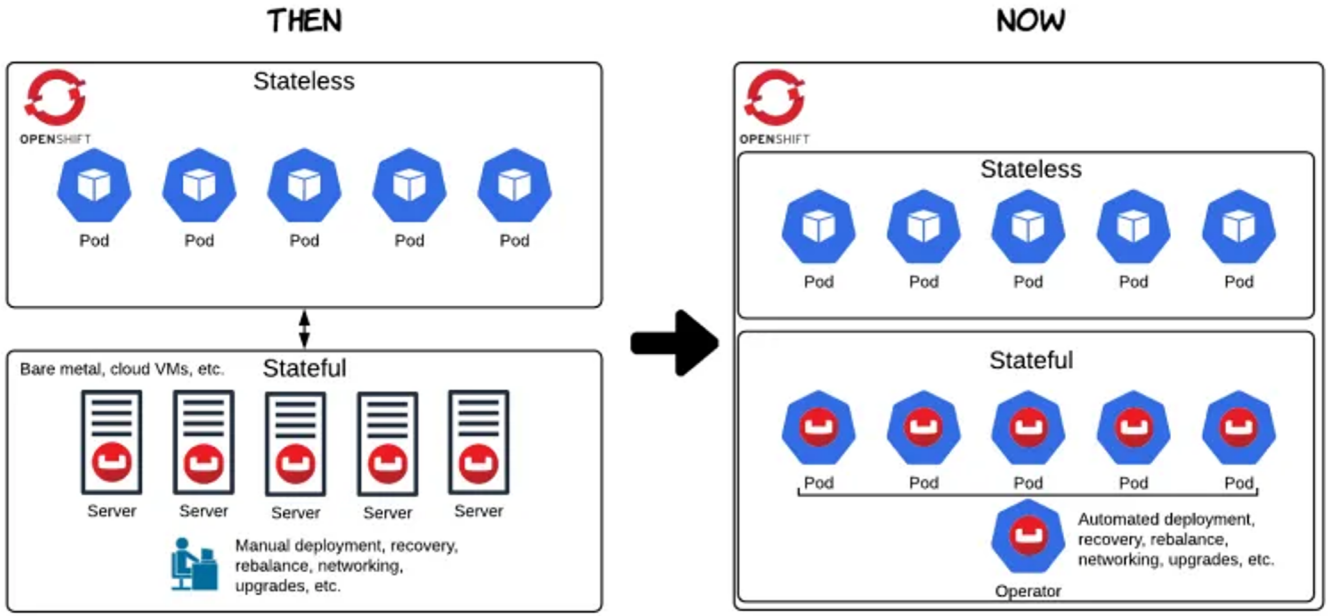


Source: https://resources.couchbase.com/c/kubernetes-ebook?x=qDJUDM

Full Kubernetes Adoption for database shown with Couchbase Clusters

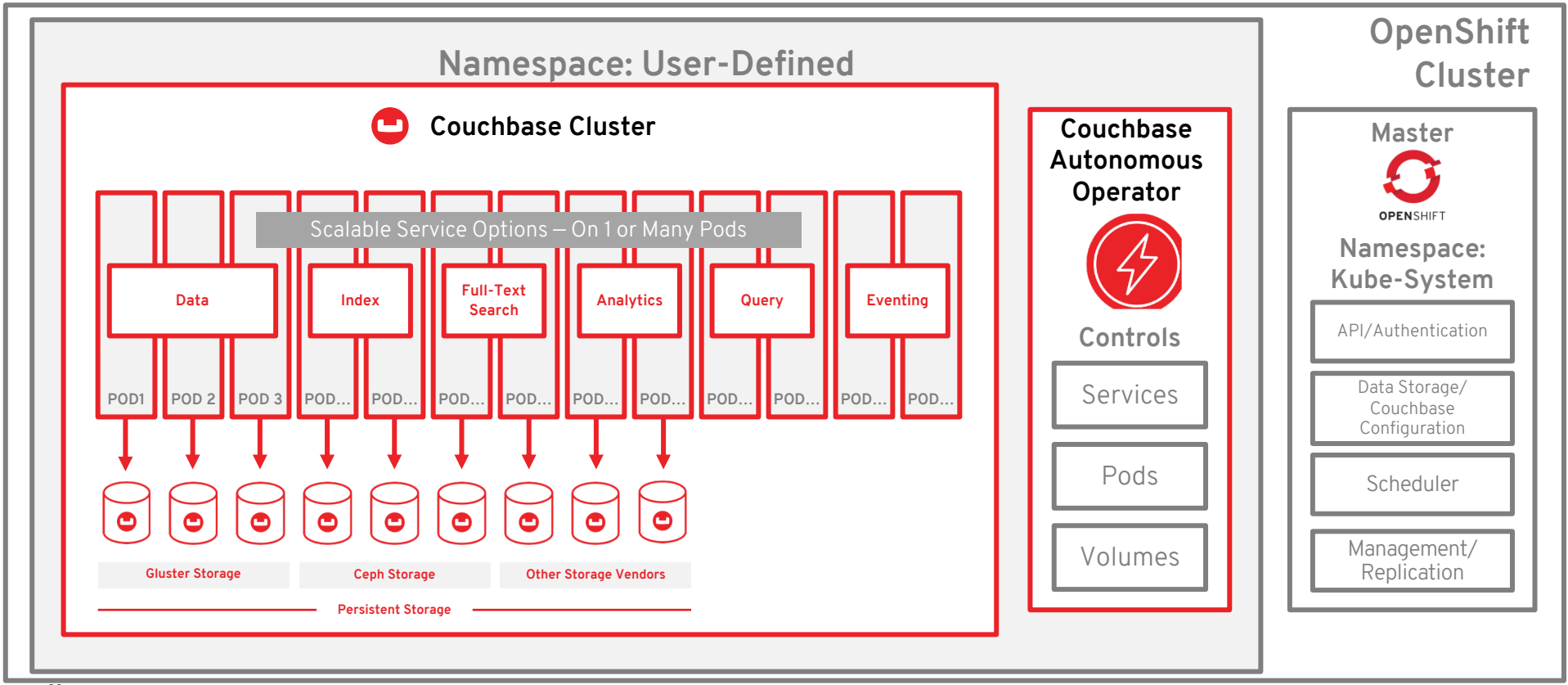
Data-oriented Microservices

- **Reduced DevOps workload (TCO)**
- Running Couchbase as a fully managed stateful database application
- Next to your microservices applications on the same container platform

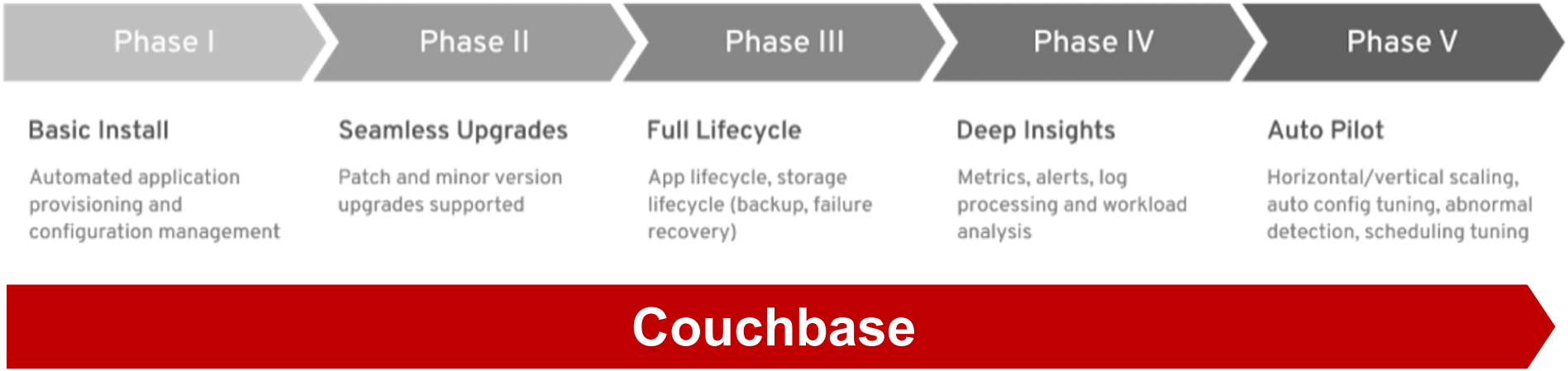


Source: https://blog.couchbase.com/why-couchbase-is-the-best-nosql-option-for-red-hat-openshift/

Containerized Database Architecture managed by Couchbase Operator



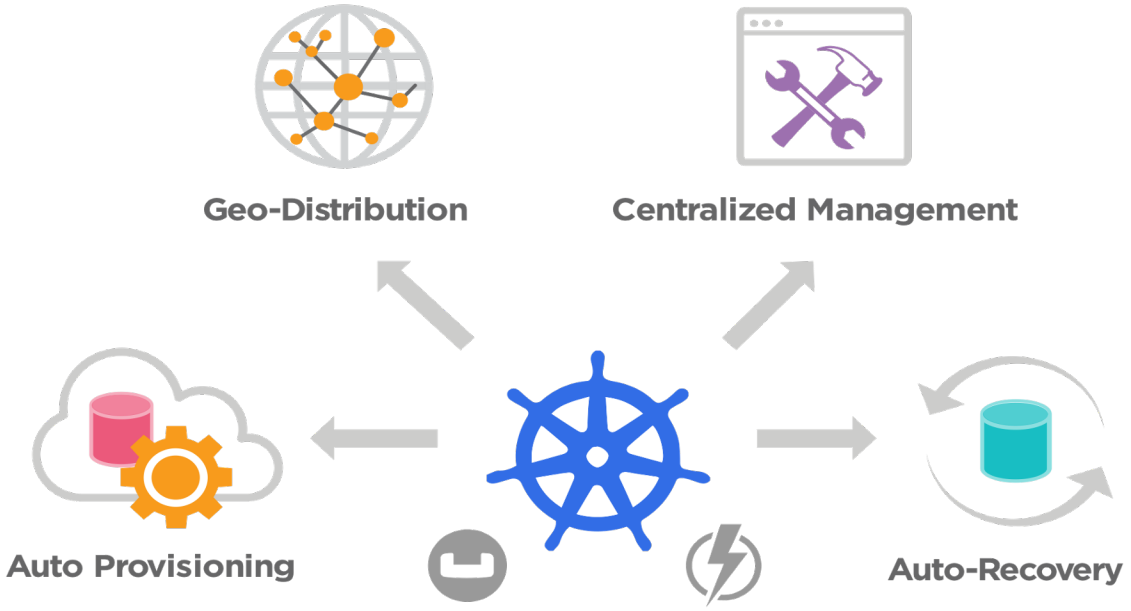
Favorable Database Operator at highest level to fully unboarden your Ops



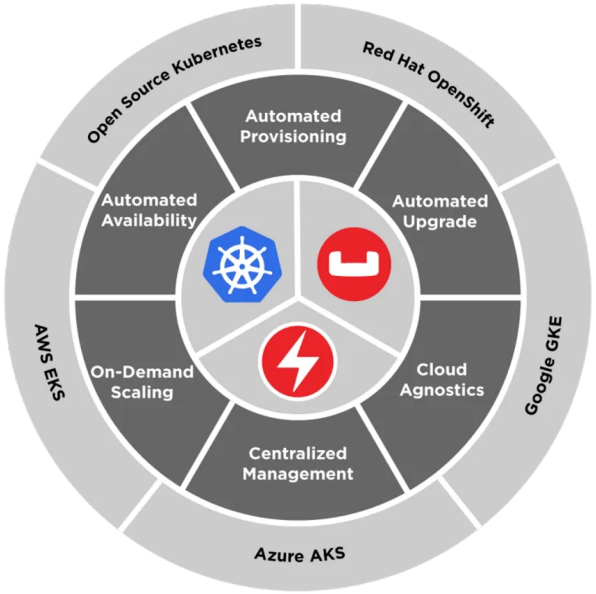
Ease Of Management – Low operational costs

Autonomous Data Platform

- Automated operational best practices
- In efficiently deploying + managing Couchbase Data Platform
- Reducing up to 95 % of operational complexity (TCO)



Couchbase Operator Usage Scenarios



- Automated cluster provisioning
- Automated failure recovery with custom Couchbase-specific automation
- Cross datacenter replication (XDCR)
- On-demand dynamic scaling
- Rack/zone awareness
- Auto-failover capabilities
- Production-grade supportability features
- Persistent storage support
- Centralized configuration management
- Enterprise-grade high availability features
- Fully automated upgrade of the Couchbase cluster
- Rolling upgrade of Kubernetes without affecting the Couchbase cluster
- Assisted deployment via Helm charts
- Logging and Monitoring (Prometheus and Grafana)
- Multi-Cluster Management

Further details at: https://blog.couchbase.com/why-couchbase-is-the-best-nosql-option-for-red-hat-openshift/

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Q & A

Your questions please :-)

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Many Thanks for your Participation & Interest

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