

# Couchbase Multi-Dimensional Scaling

## Isolate and Optimize Query, Index, and Data Services

### KEY CONCEPTS

**Elastic Services** enable independent scaling of the data, index, and query services.

**Workload Isolation** ensures the data, index, and query services do not suffer from resource contention.

**Workload Optimization** enables enterprises to optimize the hardware for each node based on its services.

**Unified Management** enables administrators to decide whether or not to leverage Multi-Dimensional Scaling.

Couchbase Multi-Dimensional Scaling is breakthrough database technology that substantially increases application performance and dramatically reduces cost. Multi-Dimensional Scaling achieves these gains by providing the option to isolate core database services — Query, Index and Data — allowing you to independently assign and scale resources optimized for each service type. The result is that you can run more complex queries, create unlimited indexes, and scale data across distributed nodes, all while avoiding any degradation of application performance.

Other databases, such as MongoDB, Oracle, and Cassandra, have a limiting one size fits all approach to scaling that forces you to pool all database services on the same set of resources. Every time a node is added, all services are spread indiscriminately to that node. This approach leads to resource contention, slower performance, and overprovisioning of expensive hardware. Couchbase Server 4.0 with Multi-Dimensional Scaling removes all these limitations, resulting in greater performance, at greater scale, all at a lower cost.

### Why is Multi-Dimensional Scaling Necessary?

While a distributed architecture enables great scale, scaling out isn't great for all types of services.

Simply put, what's good for the Data isn't always good for the Query — and what is good for the Index isn't good for the Data — and so on. For example, if you scale out your database to support a large amount of data, your query performance could suffer dramatically, as that process will also be scaled across every active node. And a large number of indexes, taking up a large amount of memory, can negatively impact data read/write performance. The bottom line is that scaling out, with every database service pooled across each distributed node, can result in a big drop in efficiency and performance.

### Each Type of Database Service Will Benefit From Isolation and Multi-Dimensional Scaling

- Queries require a high amount of CPU resources. When isolated to a smaller number of dedicated servers, queries perform faster, and do not interfere with data read/write processes.
- Indexes are memory bound processes requiring a high amount of throughput. They perform faster when run on a dedicated cluster, and do not interfere with other database functions.
- Data is the whole reason for a distributed database. The more nodes you have, the more data you can store. When data is isolated from query and index processes, performance improves, as read/write performance is not impacted.

### AVAILABILITY

**Couchbase Multi-Dimensional Scalability** will be available as part of Couchbase Server 4.0, currently scheduled for release in 2H15

SERVICE:	QUERY	INDEX	DATA
Core Requirement	CPU	Memory	Storage
Isolation Benefits	<ul style="list-style-type: none"> <li>Faster performance when isolated to a smaller set of nodes</li> <li>No degradation of data read/write performance</li> <li>No contention for resources</li> </ul>	<ul style="list-style-type: none"> <li>Supports unlimited indexes, resulting in faster queries</li> <li>Faster performance when isolated to a smaller set of nodes</li> <li>No disk I/O contention</li> <li>No impact on data writes</li> </ul>	<ul style="list-style-type: none"> <li>No contention with Index or Query, resulting in faster read/writes</li> <li>Benefits from a greater number of nodes</li> <li>Lower-priced, generic hardware can be used</li> </ul>
Hardware Profile	<ul style="list-style-type: none"> <li>Big CPU</li> <li>Smaller Storage/Memory</li> <li>No SSD</li> </ul>	<ul style="list-style-type: none"> <li>Fast SSD</li> </ul>	<ul style="list-style-type: none"> <li>Basic CPU</li> <li>Basic Disk</li> <li>Basic Storage</li> </ul>

### So How Does It Work?

Multi-Dimensional Scaling allows you to isolate standard database services — Querying, Indexing, and Data Access — so you can scale and optimize each one based on its own individual workload.

- Your queries and indexing workloads will perform better as they will no longer be spread across every node in the cluster.
- Your entire application will perform better as workloads will no longer contend for resources.
- Your hardware costs will also decrease as you can apply powerful servers to query and indexing, and use lower cost servers for data storage

### The Benefits are Impactful and Immediate.

- Improved Application Performance - Better Customer Experience
- Improved Application Stability - Consistent Customer Experience
- Improved Resource Utilization - Lower Hardware Costs
- Improved Operational Efficiency - Reduced Administrative Overhead

### About Couchbase

Couchbase provides the world's most complete, most scalable and best performing NoSQL database. Couchbase Server is designed from a simple yet bold vision: build the first and best, general-purpose NoSQL database. That goal has resulted in an industry leading solution that includes a shared nothing architecture, a single node-type, a built in caching layer, true auto-sharding and the world's first NoSQL mobile offering. Couchbase Mobile, announced in 2013 is a complete NoSQL mobile solution comprised of Couchbase Server, Couchbase Sync Gateway and Couchbase Lite – a lightweight NoSQL database designed for the device. Couchbase counts many of the worlds biggest brands as its customers, including Amadeus, Bally's, Beats Music, Cisco, Comcast, Concur, Disney, Orbitz, Rakuten / Viber, Sky, Tencent, Walmart and Verizon, as well as hundreds of other household names worldwide. Couchbase is headquartered in Silicon Valley, and is funded by Accel Partners, Adams Street Partners, Ignition Partners, Mayfield Fund, and North Bridge Venture Partners.



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