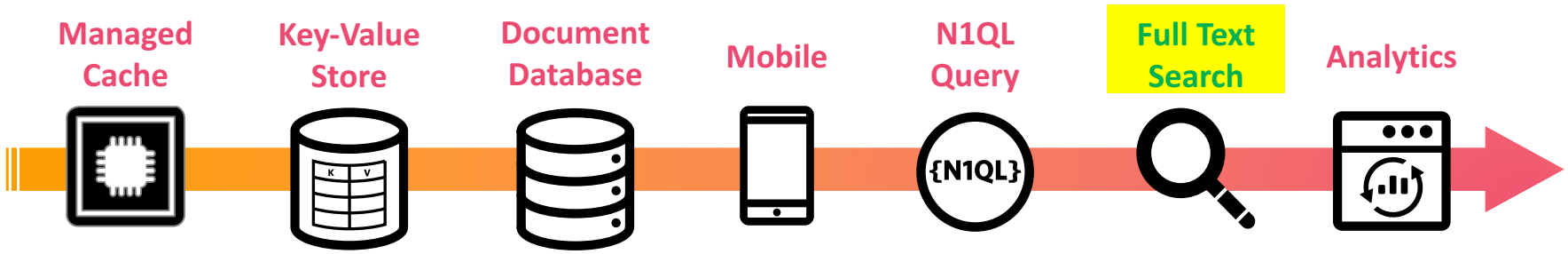
Architecture and Administration Basics

Workshop Day 1 - FTS

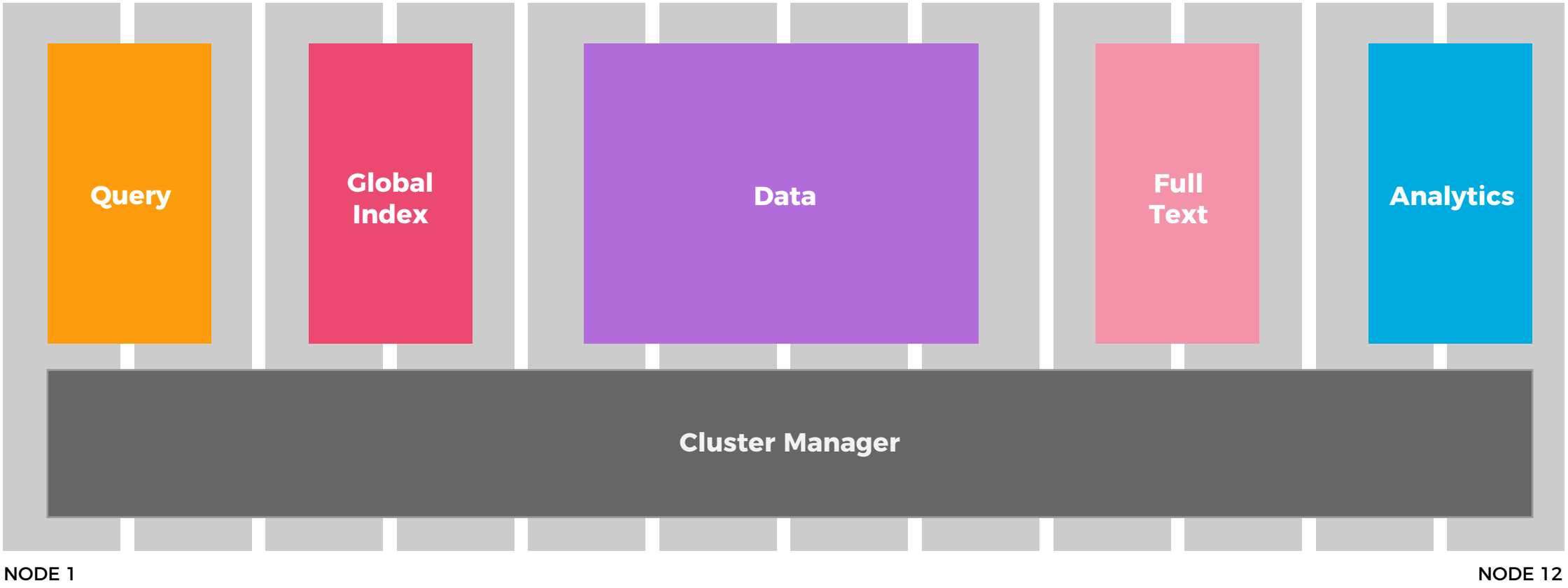
1 | Introduction

COUCHBASE

SCALABLE DATA PLATFORM



Multidimensional Scaling



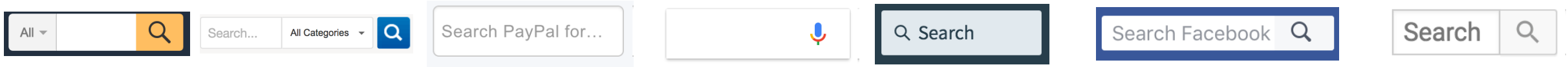
2 | Full Text Search Overview

Search is pervasive...

Born-digital businesses are relentlessly innovating to provide better experiences

amazon ebay PayPal Google LinkedIn facebook YouTube

"Search" is foundational to all born-digital businesses...



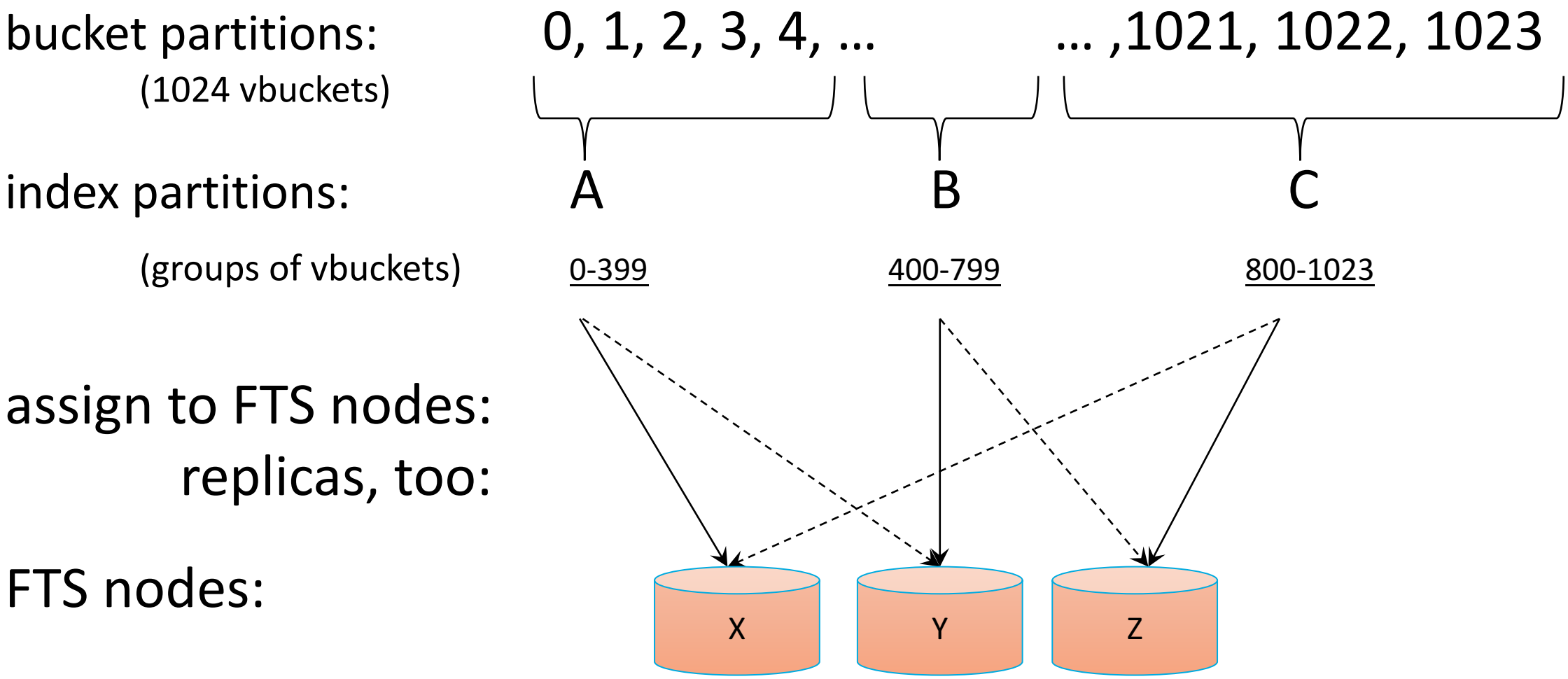
Bleve – Engine behind FTS

Bleve is acronym of “**B**oiling **l**iquid **e**xpanding **v**apor **e**xplosion”

Bleve – open source full text search and indexing library written in Go – http://blevesearch.com

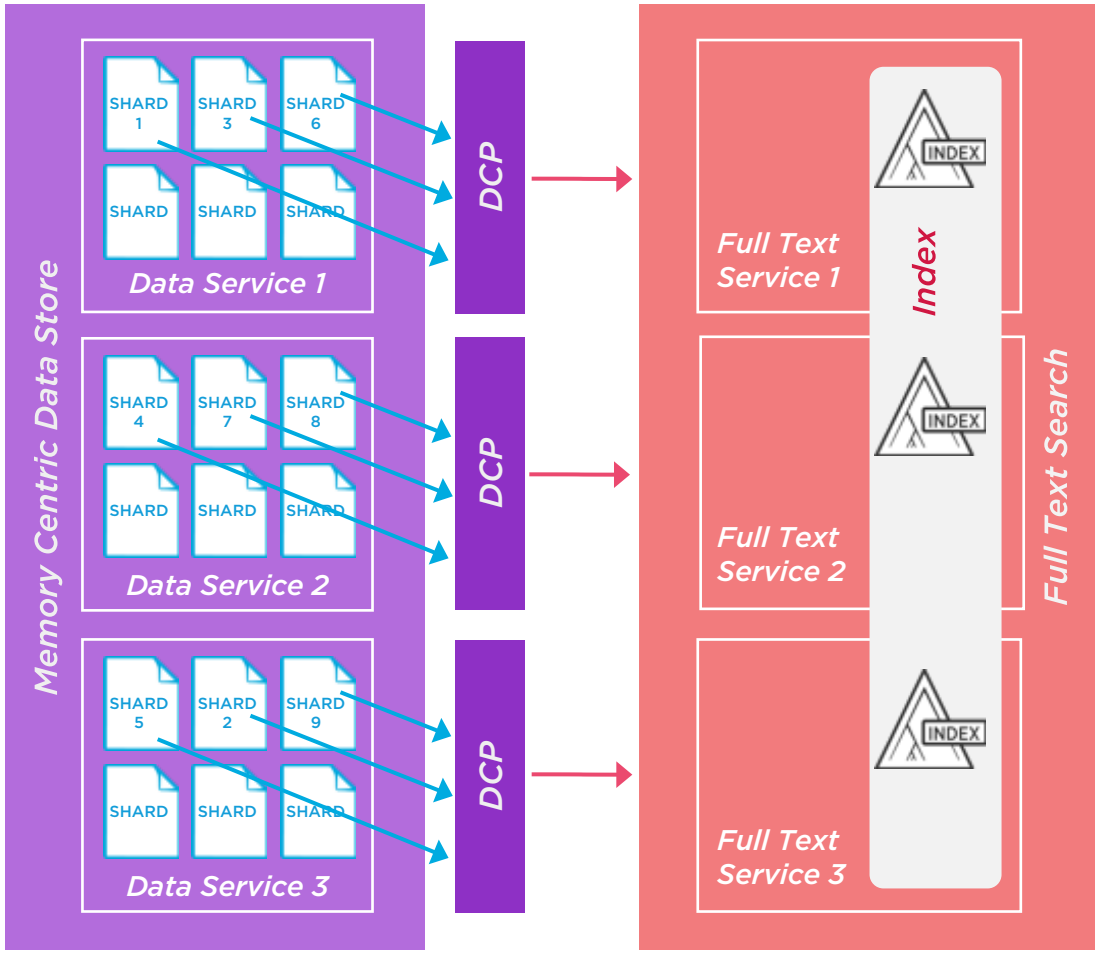
Simple, Powerful search engine with text analysis, faceting, scoring capabilities.

FTS design / index partitioning

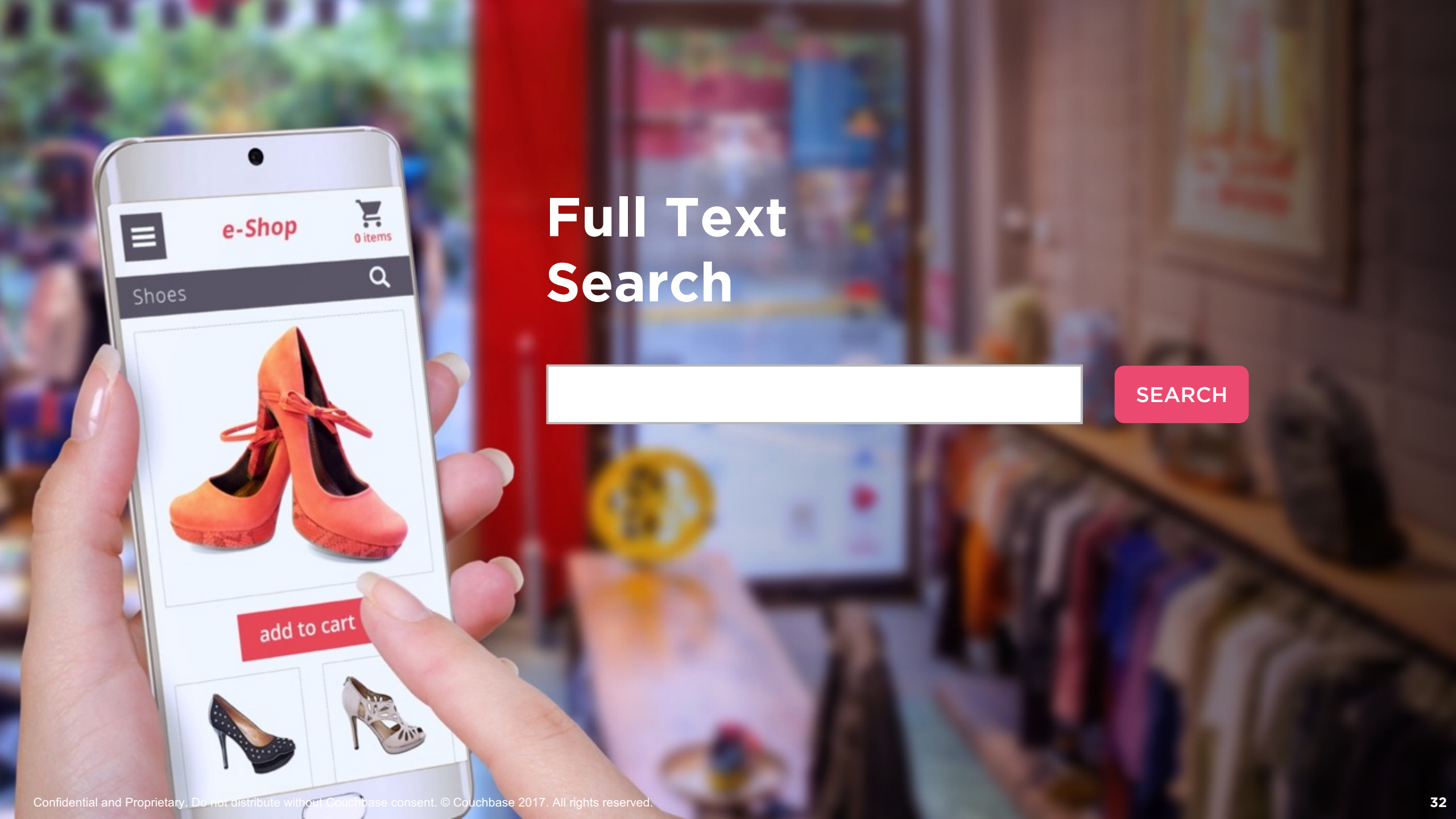


Multidimensional Scaling

- Each FTS node a DCP stream subscriber
- Indexing distributed across FTS nodes
- Any FTS service can receive queries
  - “scatters” to other nodes
  - “gathers” response
- Application sees single logical Index



Full Text Search



Full Text Search

Basic document search use case

- Query String

search couchbase docs...

SEARCH

Full Text Search

Basic document search use case

- Query String

- Term matching
- Scoring
- Context snippet

best hotel location

SEARCH

Search results

Scoring	Document ID	Description Matches
1.88	hotel_1234	best location
1.82	hotel_2345	loved hotel location
1.37	hotel_3456	location is awesome
1.25	hotel_4557	hard to locate

Index
Analyze
Search

1. **Index fields of a document**
   "...located in the heart of the new City Quay development. The hotel has views of ..."

2. **Analyze terms for index**
   located ... heart .. new City Quay development. .. hotel has views

3. **Query the index**
   description: *location*

best hotel location

SEARCH

Return scored documents list

Scoring	Document ID	Description Matches
1.88	hotel_1234	best location
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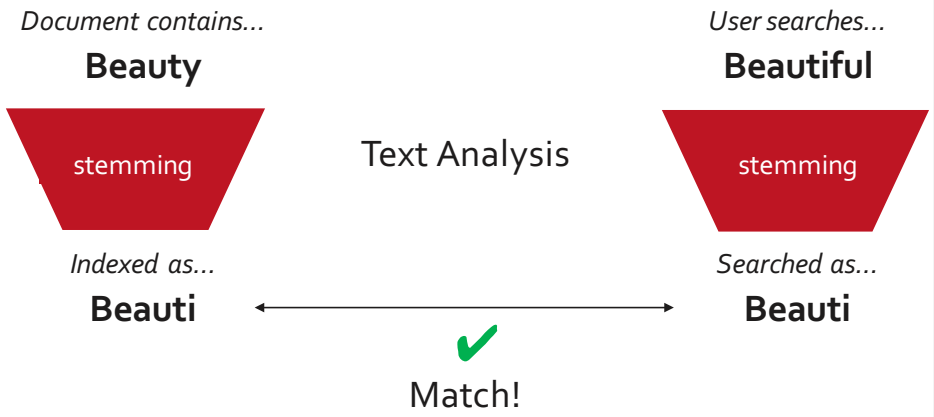
3 | Full Text Search Concepts & Configuration

Underlying concepts

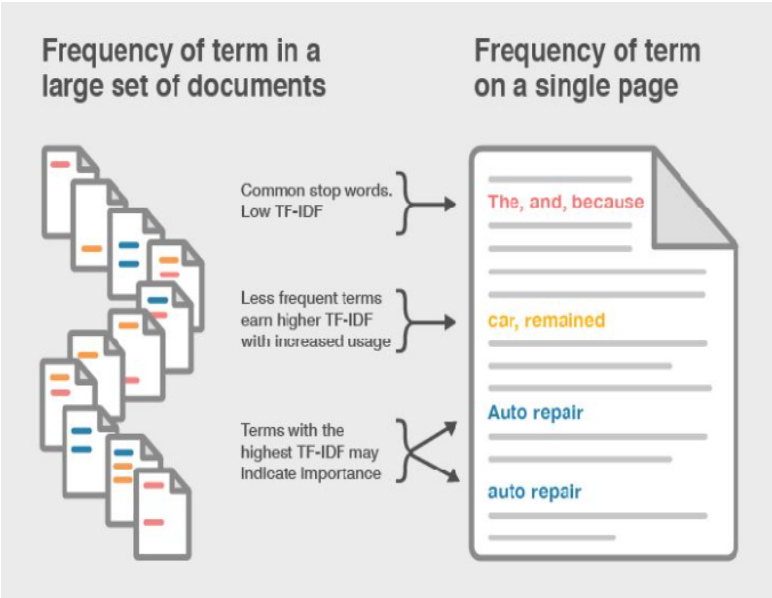
Inverted indexes

Terms	Where found
my:	Doc 1, Doc 2, Doc 3
dog:	Doc 1, Doc 2, Doc 81
has:	Doc 1, Doc 2, Doc 3
fleas:	Doc 1, Doc 81
…	

Language awareness



Scoring



1 – 2 – 3 step approach to FTS

Index

- Identify document type
- Exclude fields / sub-sections
- Configure index behavior per field

Analyze

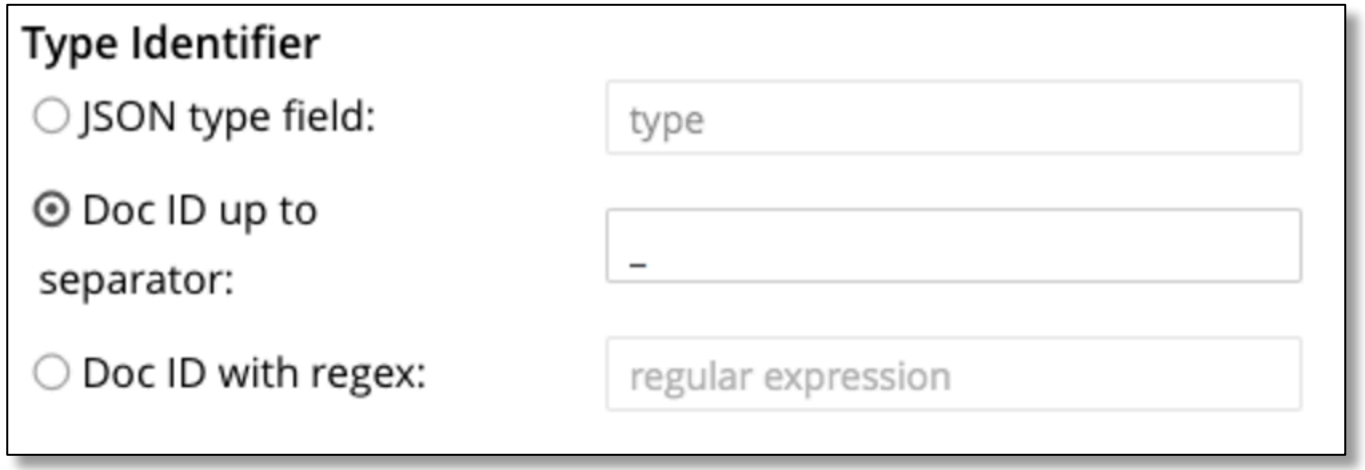
- Remove undesirable characters in input using **character filters**
- Split Input String to token streams using **Tokenizers**
- Process token streams by chaining **Token filters**

Query

- Query using SDK, REST API or web console
- Optionally query using Field Scoping(:), Boosting(^)
- Sort query results by any indexed field or score

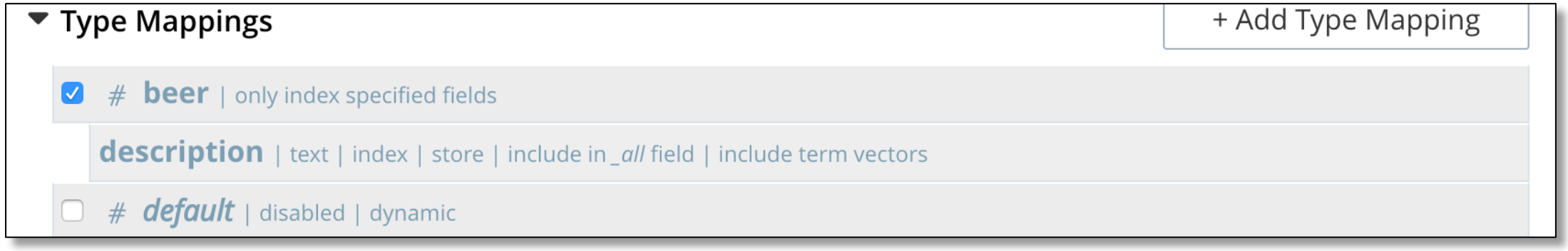
Full Text Search – Index Identifier

- Default Index Mapping refers to the index mapping that Couchbase Server uses for JSON documents that don't match a more specific document mapping based on document type
  - Used to ensure FTS is working
  - Not very selective, very large index
  - Slow or result in high load if used in production
- Type Mapping – user-supplied "type" field determines where to find the type of each document
  - **JSON type field:** Specify the field in the JSON document whose value determines the type of the document. Defaults to "type".
  - **Doc ID up to separator**: The type identifier is the prefix of the document key, up to but not including the given character.
  - **Doc ID with regex**: Advanced users can specify a regular expression to match the type identifier.



Full Text Search – Index Mapping

- Type mappings vs default mapping
  - Disable default mapping if you are only going to index specific types/fields
  - Disabling a type mapping can be used to ignore documents of a certain type
- For any type mapping, you can insert a child field to index the values in your JSON document with more control about what is indexed
  - "field" in index mapping refers to a name-value pair in JSON whose value is a simple type: string, number, true, false, or null
  - Child mapping allows you to index specific JSON sub-elements



Full Text Search – Index Mapping

- For a given “field” (name of name-value pair in the JSON document)
  - **type**: Defaults to text, but other possible values are object, number, datetime, and disabled.
  - **searchable as**: If a user limits their search to a specific field they would use this value instead of the actual name of the field in the JSON
  - **analyzer**: The analyzer to use for this specific field

Full Text Search – Index Mapping

- **index**: If unchecked, fields that match this will not be indexed.
- **store**: By default only document IDs are written to a FTS Index; however, this allows the document contents to be written to the index.
  - Enables highlighting and result snippets but generally results in larger indexes that are slower to build.
  - Encourage use of multi-gets so users don't need to store the additional information in the index.
- **Include in _all**: The text in this field will be searchable in query strings without prefixing the field name.
  If unchecked, the query must include this prefix (i.e. "description:modern").
- Not storing term vectors results in smaller indexes and faster index build times.

Web & REST Interface

Indexing

Name
FTSIndex1

Bucket
travel-sample

Type Identifier

- (•) JSON type field: type
- ( ) Doc ID up to separator: delimiter
- ( ) Doc ID with regex: regular expression

▼ Type Mappings + Add Type Mapping

- [ ] # airline | disabled | dynamic
- [x] # hotel | dynamic
  - [x] {} reviews | dynamic
    - content | text | index | store | include in _all field | include term vectors
- [ ] # default | disabled | dynamic

▶ Analyzers

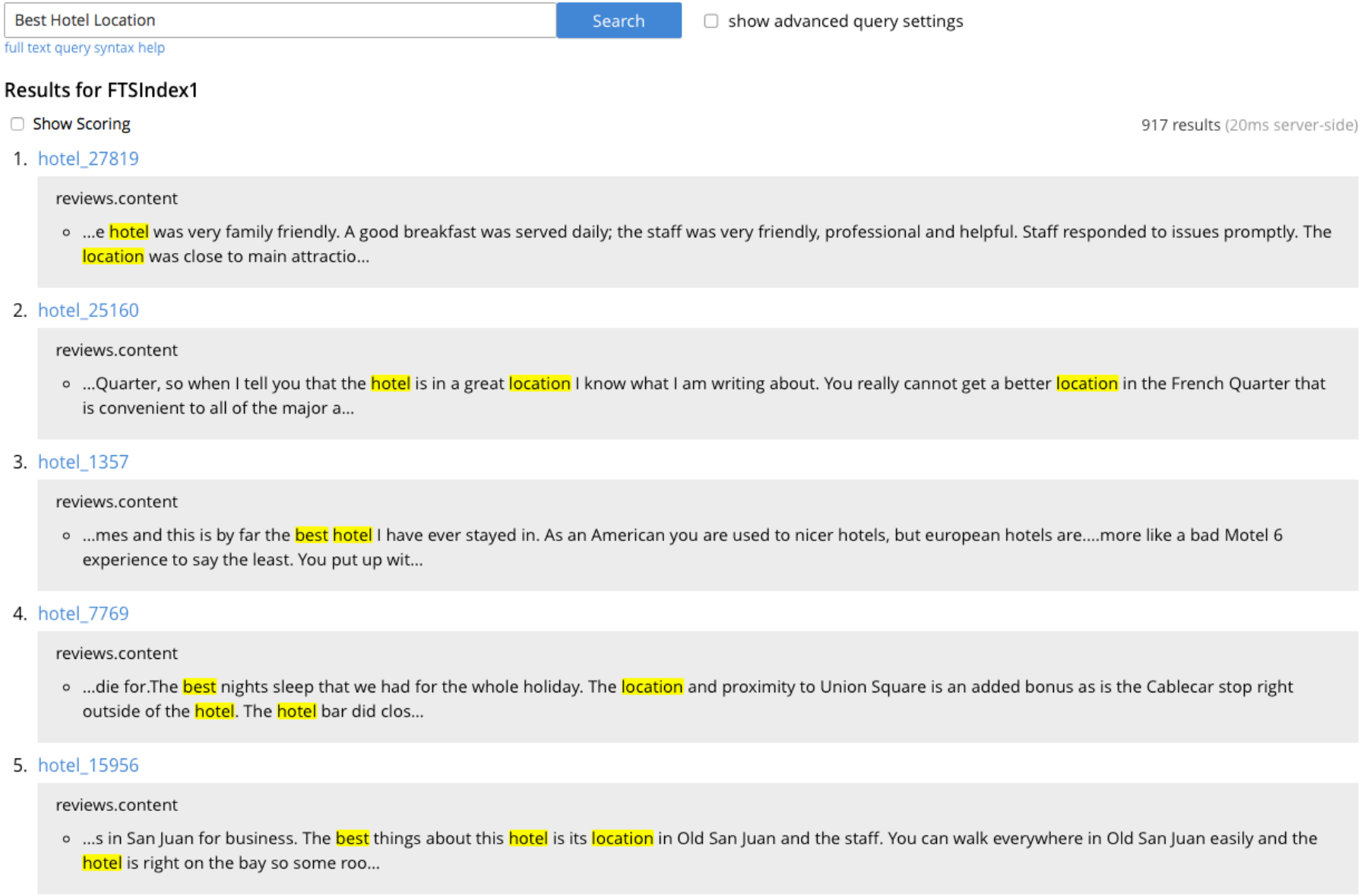
▶ Custom Filters

▶ Advanced

Index Replicas ⓘ
0

Web & REST Interface

Searching



Full Text Search – SDK

Python

```
termquery = fulltext.TermQuery('office')

results = bucket.search('travel-search', termquery, limit=25)
for result in results:
  ...
```

Java

```
TermQuery termquery = SearchQuery.term("office");

SearchQueryResult results = bucket.query(
        new SearchQuery("travel-search", termquery)
);

for (SearchQueryRow row : results) { ... }
```

Resources

1. 5.0 Beta – Full Text Search Intro Webinar video - "FTS 5.0 Launch Overview"
2. Presentation archive: https://connect.couchbase.com/us/connect-new-york-2017
3. Query Syntax: "FTS Query Types" – including JSON samples
4. Blog posts: https://blog.couchbase.com/search_gcse/?q=fts
5. Documentation: http://bit.ly/2tHduXo & http://www.blevesearch.com/
6. Forums - https://forums.couchbase.com/c/couchbase-full-text-search

Thank you

Couchbase