ResinDB

A search-centric document database

A document database

- The core mechanism of a database is that of a **key/value** store.
- The principal difference between a key/value store and a document store is that in a document store terms (key/value pairs) are grouped into documents.
- A document is a serialized business entity or graph that can be seen as a **dictionary of key/value**, or a nested dictionary of dictionaries of string/object, much like a JSON document, or even a **dictionary of byte stream/byte stream.**
- A key/value store can respond to value lookups by key (i.e. what value did I store with this key?). The query is composed of a key.
- Key/value stores and databases alike can **index the values** of a certain key to be able to respond to lookups by its value.
- Document databases instead keep an inverted index where **values are mapped to documents** to be able to respond to document lookups (i.e. what documents did I store that contain this content?)

An inverted index

A document:

{

"label": "universe", "description": "totality of planets, stars, galaxies, intergalactic space, or all matter or all energy"

}

The postings *:

label/**universe** (1)

description/**totality of planets, stars, galaxies, intergalactic space, or all matter or all energy** (1)

* posting = a term reference, (a count) + a reference to the original document

A full-text search inverted index

label/**universe** (1)

description/**totality** (1)

description/**of** (1)

description/**planets** (1)

description/**stars** (1

description/**galaxies** (1)

description/**intergalactic** (1)

description/**space** (1)

description/**or (2)**

description/**all (2)**

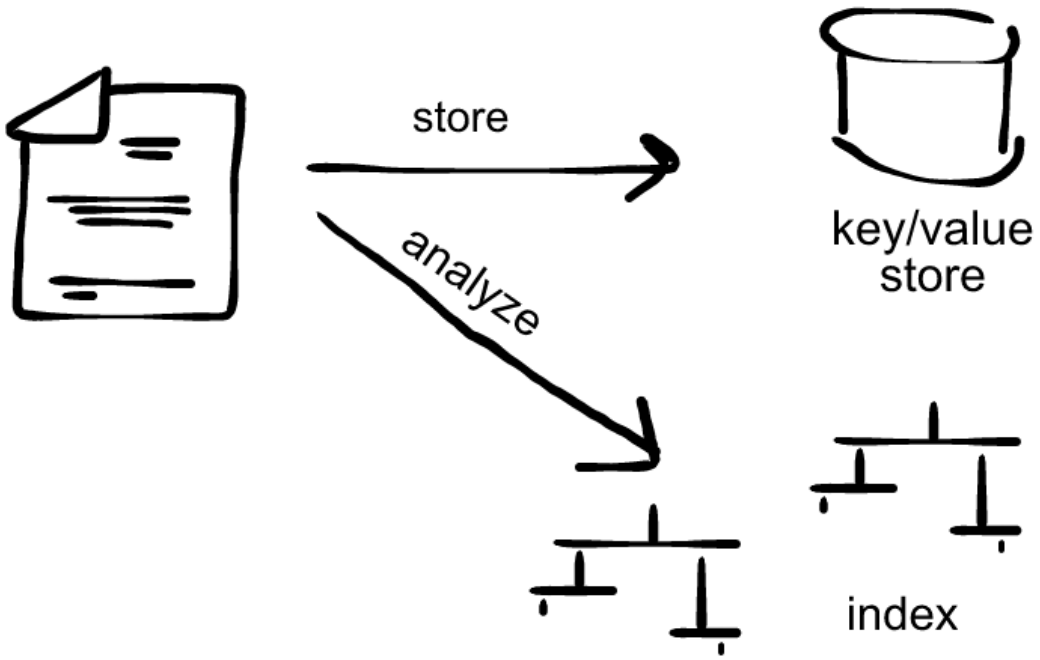
description/**matter** (1)

description/**energy** (1)

Conceptual model

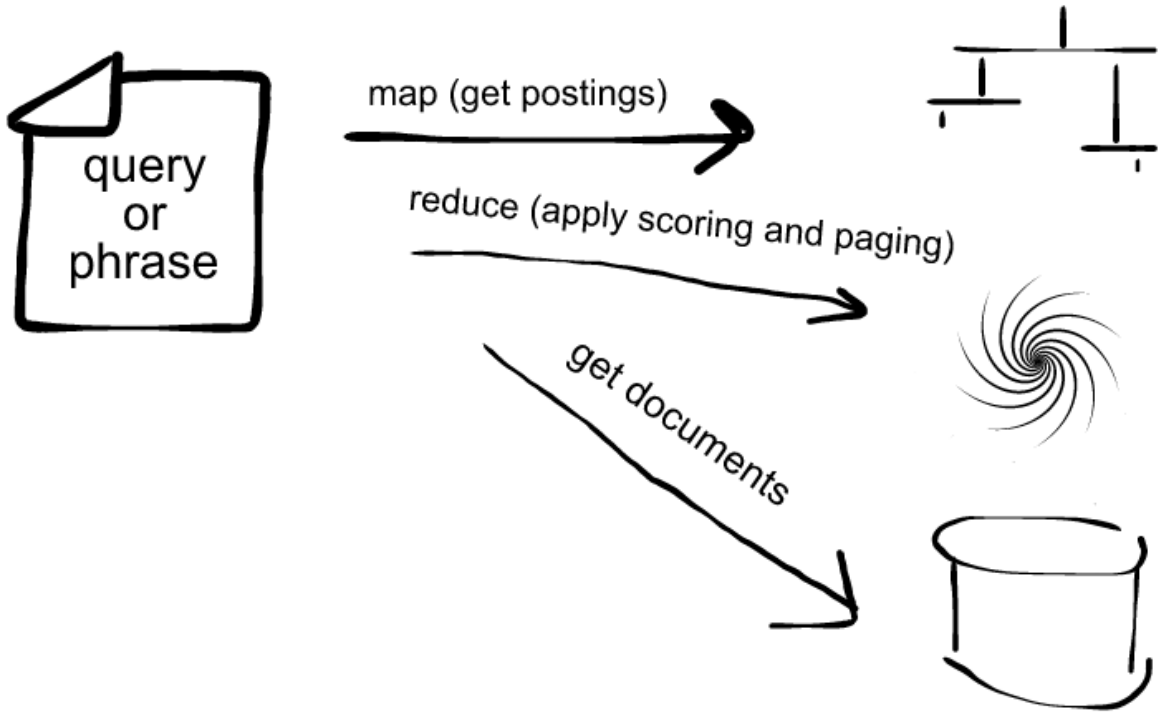
Write

Column-based indexing,
row-based compression

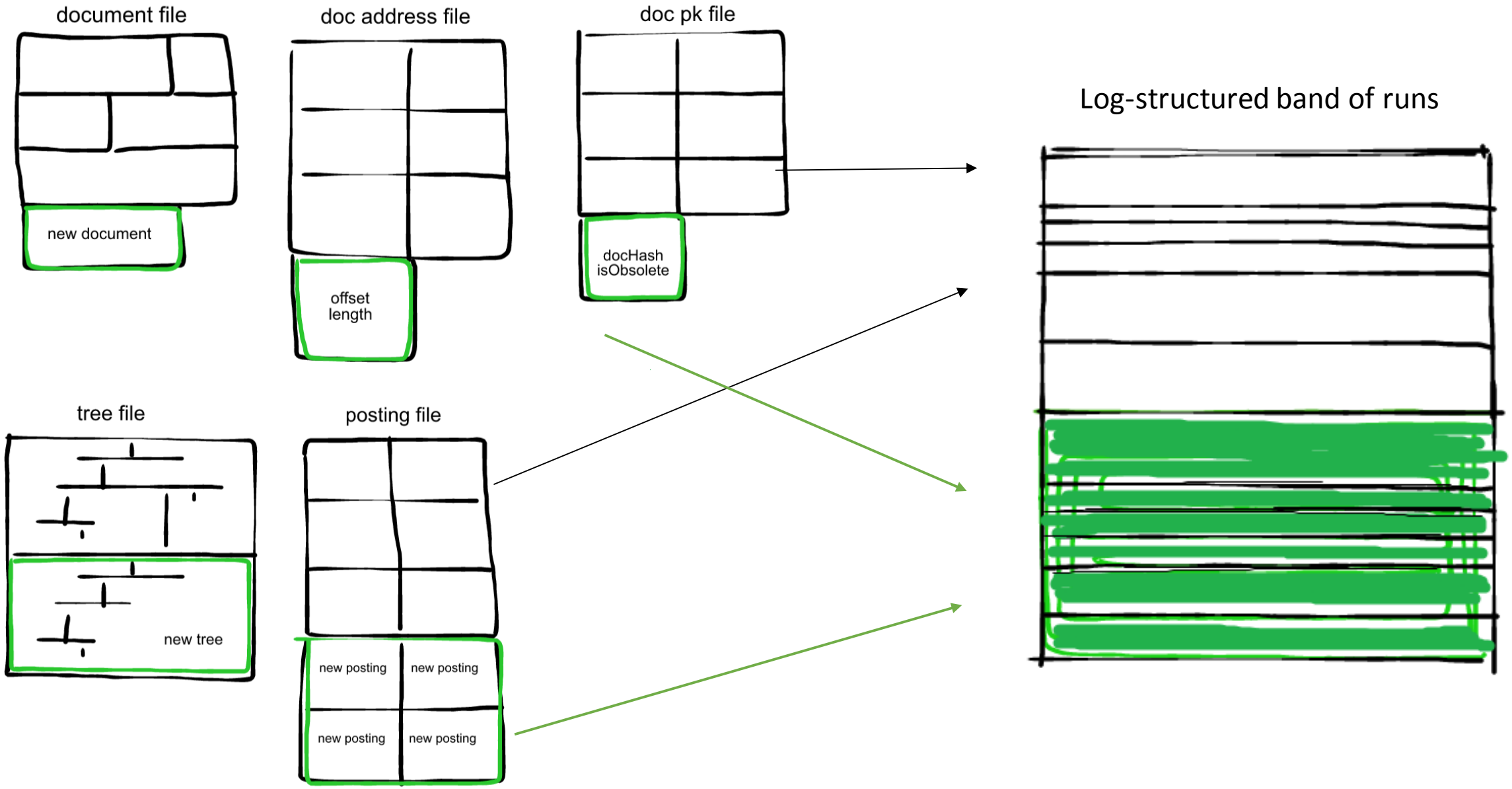


Read

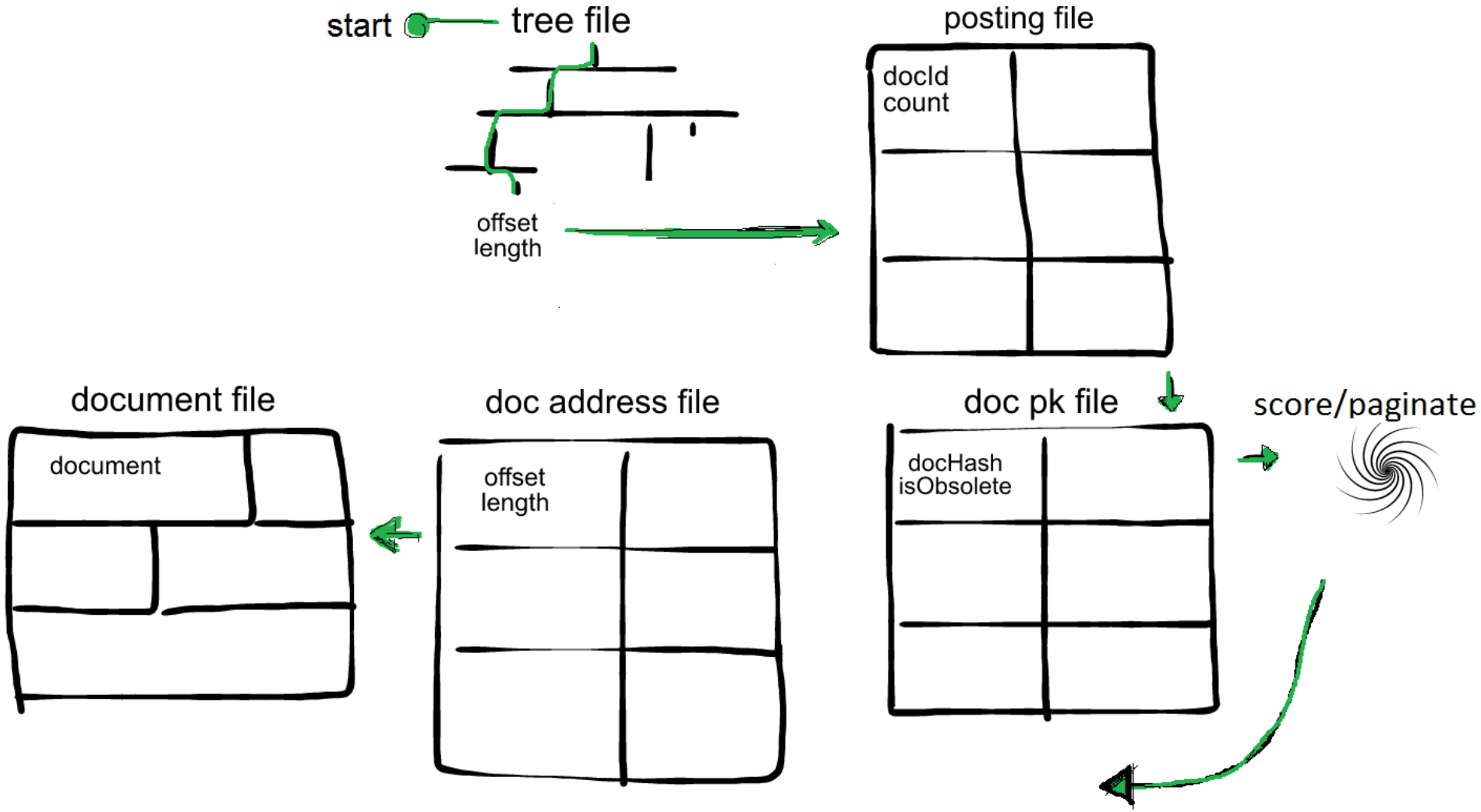
Term-based reading



Write model


document file
new document
doc address file
offset
length
doc pk file
docHash
isObsolete
tree file
new tree
posting file
new posting
new posting
new posting
new posting
Log-structured band of runs

Read model


start
tree file
offset
length
posting file
docId
count
document file
document
doc address file
offset
length
doc pk file
docHash
isObsolete
score/paginate

Vector space model

Query: "What is a cat?"

Create query document: [what,is,a,cat]

Scan index: what

Scan index: is

Scan index: a

Scan index: cat

Found documents:

[(i), (have), a, cat],
[what, (if), (i), (am), a, cat]

Normalize to fit into 4-dimensional space:

[null, null, a, cat],
[what, null, a, cat]

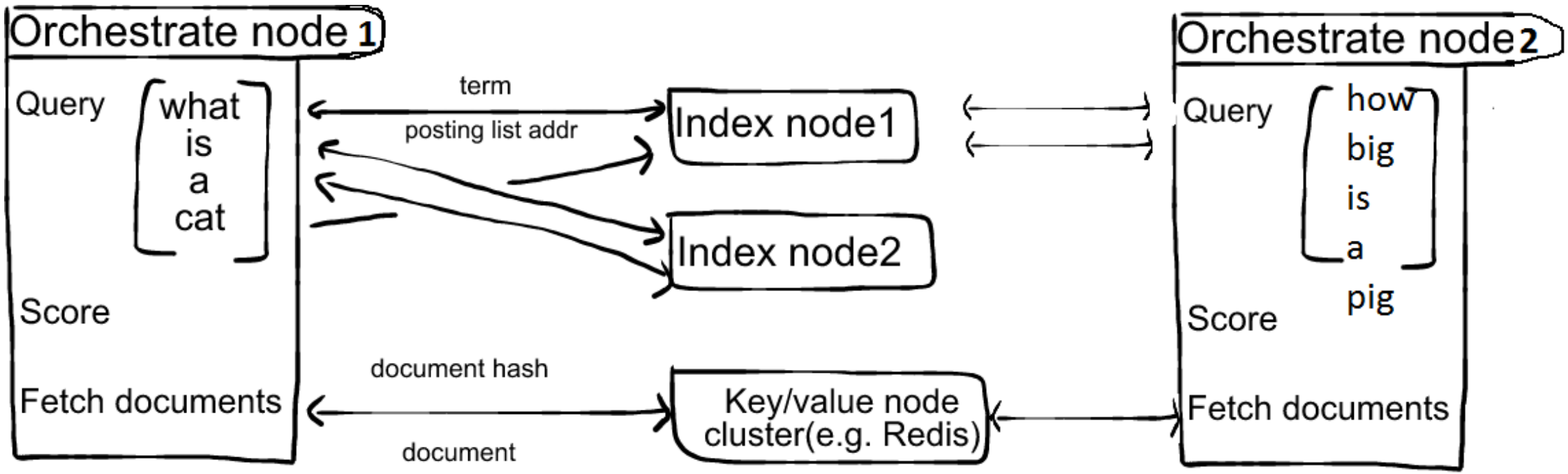
Score the documents:

[0, 0, 0.1, 3],
[0.2, 0, 0.1, 4]

Sort by the documents' (Euclidean) distance from query document, paginate, and as a final step, **fetch documents from the filesystem.**

Distributed model

Resin over gRPC



Left-child-right-sibling character trie

Resin's default index data structure is a binary character trie. It is **represented in memory** and during indexing by the LcrsTrie **and on disk** and at the time of query by the LcrsNode.

The LcrsNode offer the same binary search capabilities as a in-memory binary search tree but without having to load anything into memory.

A on-disk tree traversal is a sequential forward-only but possibly fragmented file scan.

.Net Core/C#

How can a indie developer keep pace, feature- and performance-wise with DocumentDb, RocksDB and Bigtable?