NoSQL Index

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Index types

- Various indexes exist per NoSQL database type
- Portion of a document(s) stored separately, in a special data structure
    - Ordered by value (of given data type)
- Index can be added on any field or sub-field

Create index

- `db.collection.createIndex({ prop: 1|-1 })`
  - Where 1 | -1 indicates the order

Single vs Compound Index

- Index on multiple fields = compound index
  - Order matters!
  - { userid: 1, score: -1 }
  - Drives sort operation as well

Other index types

- Multikey index
- Geospatial Index
- Text Indexes
- Hashed Indexes

Word Indexing

Doc 1

a red car

Doc 2

the blue car

Doc 3

the red train

Doc 4

the grey bus

red car 🔍

term	doc
a	1
bus	4
blue	2
car	1, 2
grey	4
red	1, 3
train	3
the	2, 3, 4

"AND", "OR", "NOT" queries can easily be resolved by applying intersection, union and difference on the index respectively
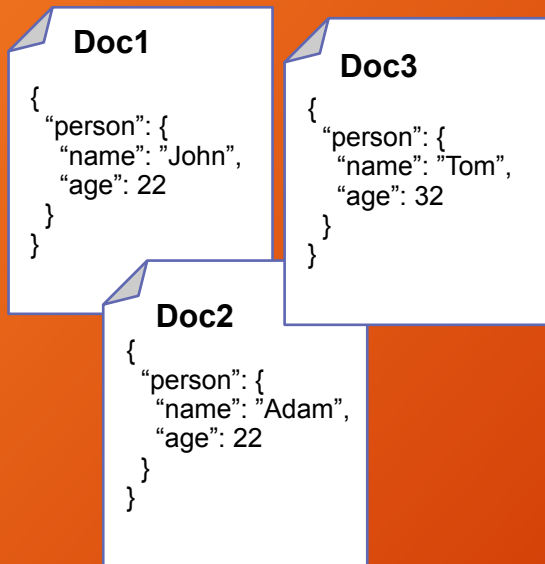
Doc 1, 2
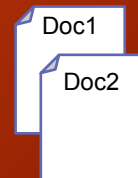x
Doc 1, 3

Doc 1

a red car

2019

Value Index

- A value index stores XML element and JSON property values
- results in fast resolution of value queries

```
cts.search(
  cts.jsonPropertyValueQuery('age', 22)
);
```

Doc1
```
{
  "person": {
    "name": "John",
    "age": 22
  }
}
```

Doc3
```
{
  "person": {
    "name": "Tom",
    "age": 32
  }
}
```

Doc2
```
{
  "person": {
    "name": "Adam",
    "age": 22
  }
}
```

value	document
age: 22 (type Number)	1, 2
name: John (type String)	1
name: Tom (type String)	3
… (additional entries) …	

Doc1
Doc2

2019

Range Index

```
cts.search(
  cts.rangeQuery(cts.jsonPropertyReference('age'), '<', 23)
);
```

Doc1

```
{
  "person": {
    "name": "John",
    "age": 22
  }
}
```

Doc3

```
{
  "person": {
    "name": "Tom",
    "age": 32
  }
}
```

Doc2

```
{
  "person": {
    "name": "Adam",
    "age": 22
  }
}
```

value (age: Integer)	document
22	1, 2
32	1

Doc1

Doc2

document	value (age: Integer)
1	22
2	22
3	3

- Range queries and data-type-aware equality (and inequality) queries
- Fast value extraction (facets)

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Geospatial Search

- Allows to return documents based on the
- Supported geospatial region types include:
  - Circle (radius, center point)
  - Polygon (3...n)
  - Complex Polygon (polygon with holes)
  - Box (rectangular region)
  - Linestring (connected sequence of geodesic arcs)