Akeneo **Workshop**

Elasticsearch edition

12/02/2019

Objectives

- To gain a **basic** understanding of:
  - How ES works
  - How to use ES
  - How we use ES in the PIM

*(**Disclaimer**: I'm not an ES expert* 😊*)*

Summary

- The **Basics**
- **Part I:** Mapping & Indexing
- **Part II:** Searching
- **Part III:** Elasticsearch & PIM

The **Basics**

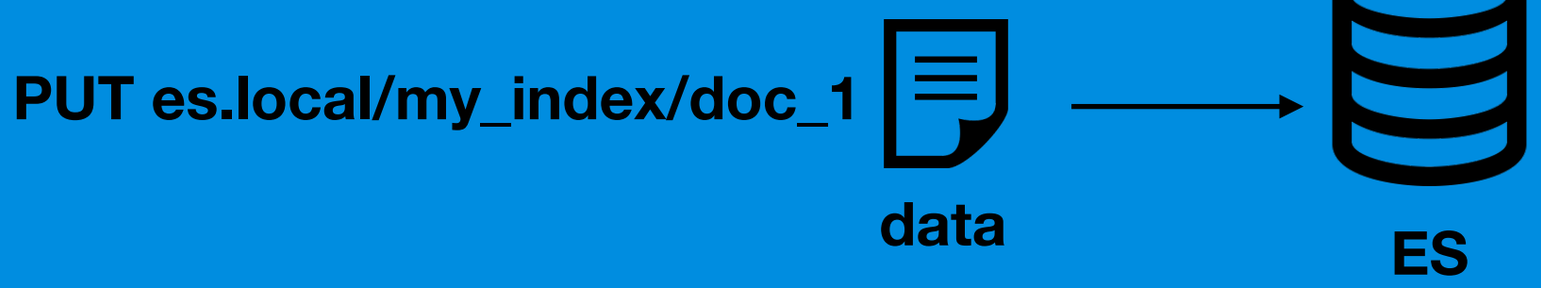
- **Search engine** based on Lucene
- Open source
- Asynchronous (Near real time)
- Runs on JVM

```
$> java -Xms512m -Xmx512m ...
```

Usage

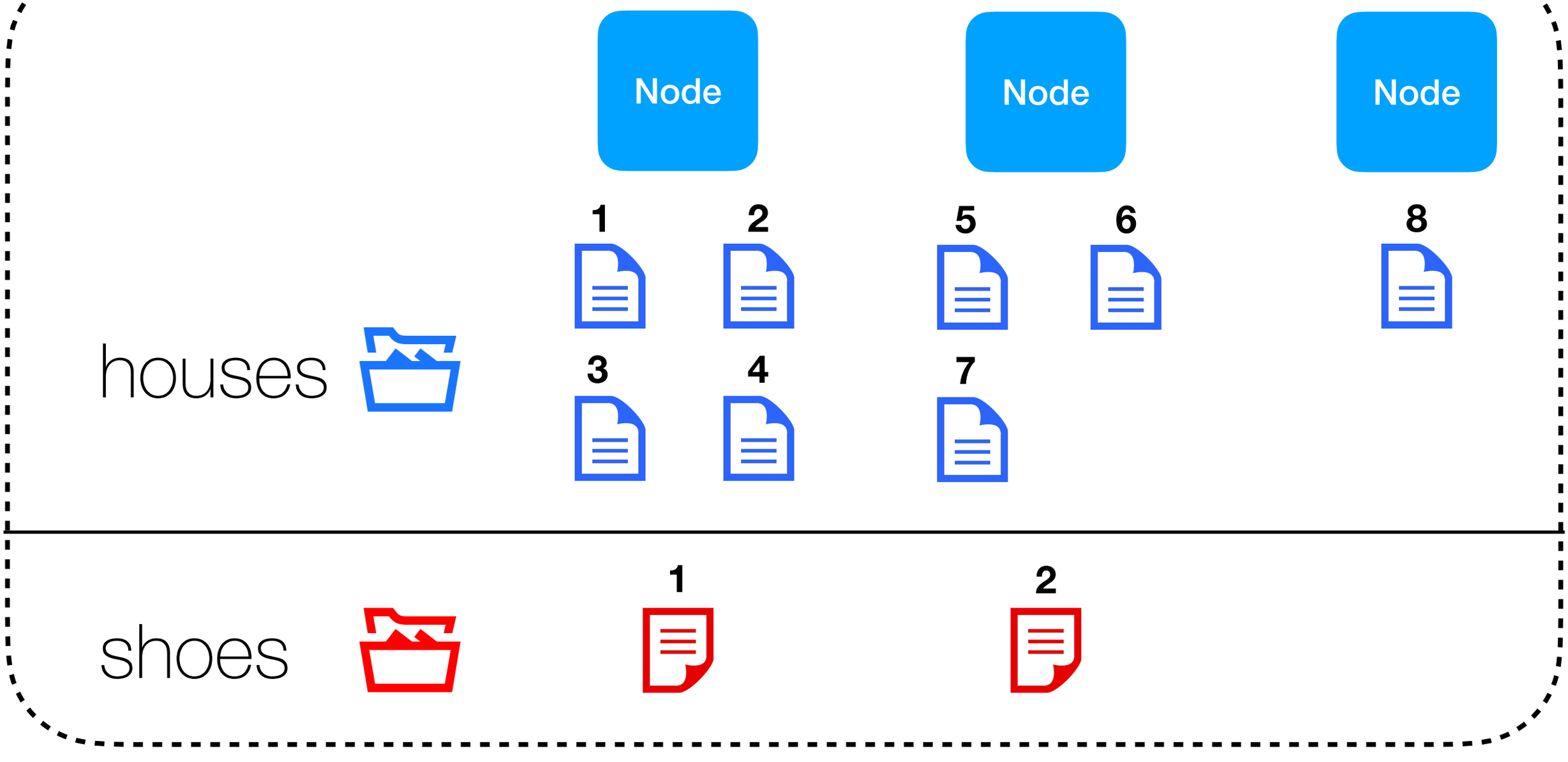
CREATE INDEX WITH Settings

INDEX Documents



Query

Infrastructure



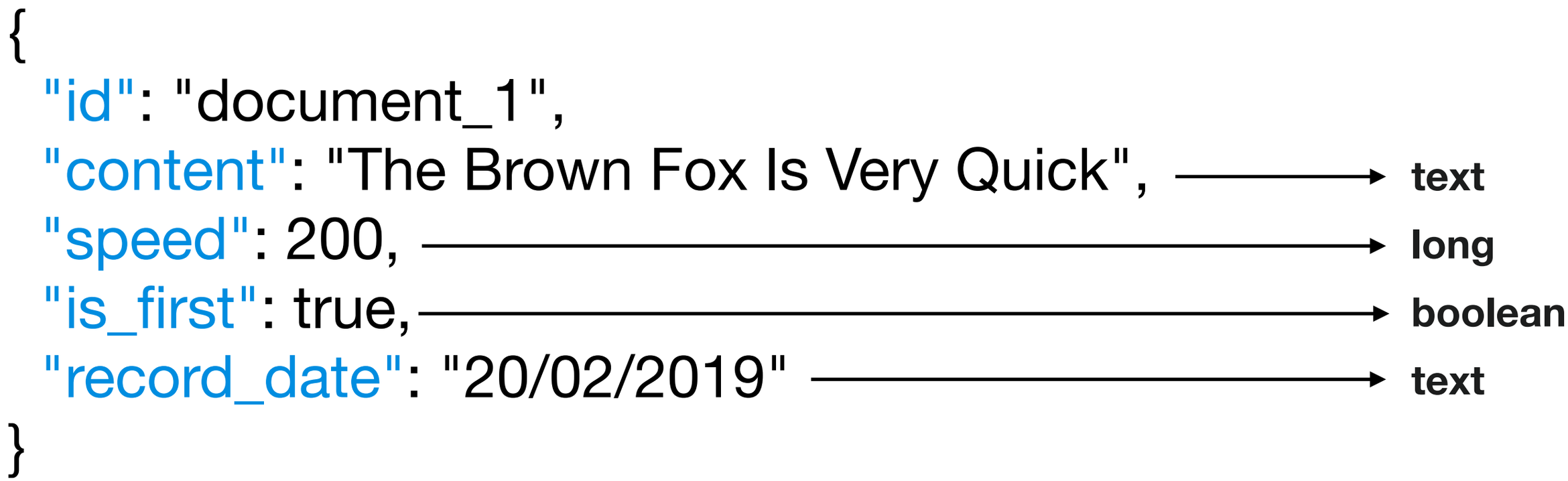
Part I: **Mapping** & **Indexing**

- What is a **Mapping** ?
- Normalizers & **Analysers**
- The **inverted dictionary**
- Exercices

What is a mapping ?

- It's a simple json file
- It's a way of telling ES about:
  - How should it interpret the data ?
  - What should it do with it ?

Mapping by default



Custom mapping (you choose)

- Map properties

```
mappings:
    my_type:
        properties:
            content:
                type: 'keyword'
            speed:
                type: 'number'
        is_first:
            type: 'boolean'
        record_date:
            type: 'date'
```

```
{
  "id": "document_1",
  "content": "The Brown Fox Is Very Quick",
  "speed": "200",
  "is_first": "true",
  "record_date": "20/02/2019"
}
```

Keyword

Integer

Boolean

Date

Custom mapping (you choose)

- Map dynamic properties

```
{
  "id": "document_1",
   ...
  "race-of-the-rock": 10.50,
  "race-of-the-pine-tree": 9.50,
  "race-of-the-garden": 11.50
}
```

```
mappings:
  my_type:
    dynamic_templates:
      -
        map_races_records:
          path_match: 'race-*'
          mapping:
            type: 'float'
```

Custom mapping (you choose)

- Map dynamic properties

```
{
  "id": "document_1",
  "races": {
      "race-of-the-rock": 10.50,
      "race-of-the-pine-tree": 9.50,
      "race-of-the-garden": 11.50
  },
}
```

```
mappings:
  my_type:
    dynamic_templates:
      -
        map_races_records:
          path_match: 'races.*'
          mapping:
            type: 'float'
```

Available types

- Available types:
  - **"Keyword"** (aggregation and sorting)
  - **"text"** (for full text search)
  - Date, Long, Double, Boolean, Ip, etc.

(https://www.elastic.co/guide/en/elasticsearch/reference/current/mapping-types.html)

Analysers

- Happens at **index time**
- 1. **Tokenizing** a block of text into terms

Tokenize: standard

"The White Rabbit Is Also Very Quick" → ["The", "White", "Rabbit", "Is", "Also", "Very", "Quick"]

- 2. **Normalizing** terms to improve **searchability**

["The", "White", "Rabbit", "Is", "Also", "Very", "Quick"]

↓ **Normalize: lowercase**

["the", "white", "rabbit", "is", "also", "very", "quick"]

Declaring an Analyser

- In the settings we declare an analyser
  - **Character filter**: strip html
  - **Tokenizer**: Split the sentence into terms using a strategy (language)
  - **Token filter**: lowercase ,remove terms like: "a", "and", "or"

```
settings:
    analysis:

        analyzer:
            my_analyzer:
                filter: ['lowercase']
                char_filter: ['html_strip', 'newline_pattern']
                type: 'custom'
                tokenizer: 'standard'

        char_filter:
            newline_pattern:
                pattern: '\\n'
                type: 'pattern_replace'
                replacement: ''

    filter:
        text_area_truncate:
            type: 'truncate'
            length: 100

    normalizer:
        my_normalizer:
            filter: ['lowercase']
```

Use them in mapping

```
mappings:
    pim_catalog_product:
        properties:

            my_property:
                type: 'keyword'
                normalizer: 'my_normalizer'

        my_other_property:
            type: 'text'
            analyzer: 'my_analyzer'
```

But, Why bother with normalizers and analyzers ?

To improve ***Searchability***

The Inverted index

```
{
  "id": "document_1"
  "content": "The brown fox is very quick"
}
```

Index

Token	document_1
The	x
brown	x
fox	x
is	x
very	x
quick	x
white	
rabbit	

The Inverted index


```
{
  "id": "document_2"
  "content": "The white rabbit is very quick"
}
```


Index

Token	document_1	document_2
The	x	x
brown	x	
fox	x	
is	x	x
very	x	x
quick	x	x
white		x
rabbit		x

The Inverted index

Token	document_1	document_2
The	x	x
brown	x	
fox	x	
is	x	x
very	x	x
quick	x	x
white		x
rabbit		x

Find documents having terms:
"very" and "quick"

Token	document_1	document_2
very	x	x
quick	x	x

The Inverted index

Token	document_1	document_2
The	x	x
brown	x	
fox	x	
is	x	x
very	x	x
quick	x	x
white		x
rabbit		x

Find documents having terms:
"quick" and "rabbit"

Token	document_1	document_2
rabbit		x
quick	x	x

The Inverted index

Token	document_1	document_2
The	x	x
brown	x	
fox	x	
is	x	x
very	x	x
quick	x	x
white		x
rabbit		x

Find documents having terms:
"the" and "rabbit"

Token	document_1	document_2
the		
rabbit		x

The Inverted index

ES can do that for us at index time thanks to **Analysis**

Token	document_1	document_2
the	x	x
brown	x	
fox	x	
is	x	x
very	x	x
quick	x	x
white		x
rabbit		x

Find documents having terms: "the" and "rabbit"

Token	document_1	document_2
the	x	x
rabbit		x

Keyword VS Text types

By default: No tokenization

"White Rabbit" ⟶ "White Rabbit"

Use **normalizers** to transform the token

*At the time we used the normalizers,
it was still a pretty new concept in ES

By default: Standard tokenization

"White Rabbit" ⟶ "White"
"Rabbit"

Use **analysers** to transform the tokens

Exercises on Mapping

$> *git clone git@github.com/samirboulil/workshop-es --branch=workshop*

$> *cd workshop-es*

$> *docker-compose up -d*

Import the postman collection:
*"**assignments/**es-workshop - Index & Mapping.postman_collection"*

Ok,

so which **type** should I use ?

which **transformation** should we perform ?

you need to rely on your

search use-cases

to actually

write your **mapping**

Part II: **Searching**

- Generic request model
- Term level queries
- Compound queries
- Exercises

Searching - Generic model

```
{
    "_source": ["id", "title"], // Properties you want
    "sort": [{"title": {"order": "ASC"}], // sort order
    "query": {
        "constant_score": {
            "filter": {
                "bool": {
                "filter": [
                    // AND clauses
                ],
                "must_not": [
                    // NOT clauses
                ],
                "should": [
                    // OR clauses
                ],
            }
        }
    }
}
```

Searching - Quiz 1

Elasticsearch

```
{
  "_source": ["title", "release_year"],
  "sort": [
    {"release_year": {"order": "DESC"}
  ],
  "query": {
    "constant_score": {
      "filter": {
        "bool": {
          "filter": [
            {
              "term": {
                "title": "ARMAGEDDON"
              }
            }
          ],
        }
      }
    }
  }
}
```

SQL ?

```
SELECT title, release_year
FROM movies
WHERE title LIKE "%ARMAGEDDON%"
ORDER BY release_year DESC
```

Searching - Quiz 2

Elasticsearch

```
{
  "_source": ["title"],
 "query": {
    "constant_score": {
      "filter": {
        "bool": {
          "filter": [
            {
              "term": {
                "title": "ARMAGEDDON"
              }
            },
            {
              "term": {
                "language": "French"
              }
            },
          ],
        }
      }
    }
  }
}
```

SQL ?

```
SELECT title
FROM movies
WHERE
  title LIKE "%ARMAGEDDON%"
  AND
  language = "French"
```

Searching - Quiz 3

Elasticsearch

```
{
  "_source": ["title"],
 "query": {
    "constant_score": {
      "filter": {
        "bool": {
          "filter": [
             {
              "term": {
                "language": "French"
              }
            },
          ],
          "must_not": [
             {
              "term": {
                "release_year": 2006
              }
            },
          ],
        }
      }
    }
  }
}
```

SQL ?

```
SELECT title
FROM movies
WHERE
  language = "French"
  AND
  release_year <> 2006
```

Searching - Quiz 4

Elasticsearch

```
{
  "_source": ["title"],
 "query": {
    "constant_score": {
      "filter": {
        "bool": {
          "should": [
            {
              "term": {
                "release_year": "2006"
              }
            },
            {
              "term": {
                "release_year": "2007"
              }
            },
          ],
        }
      }
    }
  }
}
```

SQL ?

```
SELECT title
FROM movies
WHERE
 release_year = "2006"
 OR
 release_year = "2007"
```

Searching - term level queries

- The operators you can use depend on the data type (defined in the mapping):
  - strings: "term" / "terms" / "query_string"
  - dates / numbers: "range"
  - check a field exists: "exists"

https://www.elastic.co/guide/en/elasticsearch/reference/6.6/query-dsl.html

Searching - Quiz 5

Elasticsearch ?

SQL

```sql
SELECT title
FROM movies
WHERE
 release_year = "2006"
 OR
 release_year = "2007"
```

Any way to simplify this in SQL?

Searching - Quiz 5

Elasticsearch

```
{
  "_source": ["title"],
 "query": {
    "constant_score": {
      "filter": {
        "bool": {
          "filter": [
            {
              "terms": {
                "release_year": [
                  "2006",
                  "2007"
                ]
              }
            },
          ],
        }
      }
    }
  }
}
```

SQL

```
SELECT title
FROM movies
WHERE
 release_year IN ("2006", "2007")
```

Yes! (It's an implicit "OR")

Searching - Quiz 6

Elasticsearch

```
{
  "_source": ["title"],
 "query": {
    "constant_score": {
      "filter": {
        "bool": {
          "filter": [
            {
              "query_string": {
                 "default_field": "title",
                 "query": "*armag*"
               }
             }
           },
        ],
      }
    }
  }
}
```

SQL ?

```
SELECT title
FROM movies
WHERE
 title LIKE "%armag%"
```

Searching - Quiz 7

Exists Matches

```
{ "director": "jane" }
{ "director": "" }
{ "director": "-" }
{ "director": [jane] }
{ "director": [jane", null] }
```

Exists Does not Match

```
{ "user": null }
{ "user": [] }
{ "user": [null] }
{ "foo":  "bar" }
```

Searching - Compound queries

- It's all about the **Bool**

https://www.elastic.co/guide/en/elasticsearch/reference/6.6/compound-queries.html

Searching - Quiz 8

Elasticsearch

```
{
  "query": {
    "constant_score": {
      "filter": {
        "bool": {
          "filter": [
            {
              "bool": {
                "should": [
                  {CLAUSE A},
                  {CLAUSE B}
                ]
              }
            },
            {
              "bool": {
                "should": [
                  {CLAUSE C},
                  {CLAUSE D}
                ]
              }
            },
      ]
    }
  ...
```

Logical expression ?

```
(A || B) && (C || D)
```

Exercises on Searching

git clone git@github.com/samirboulil/es-workshop --branch=workshop

Part III: **ES** and the **PIM**

- Define a new index in the PIM
- Product query builder and ES
- How do we test ?
- Case study: full-text search reference entities

ES & **PIM** : New index

- Via configuration:

```yaml
parameters:
    record_index_configuration:
        - 'path/to/record_index_configuration.yml'
```

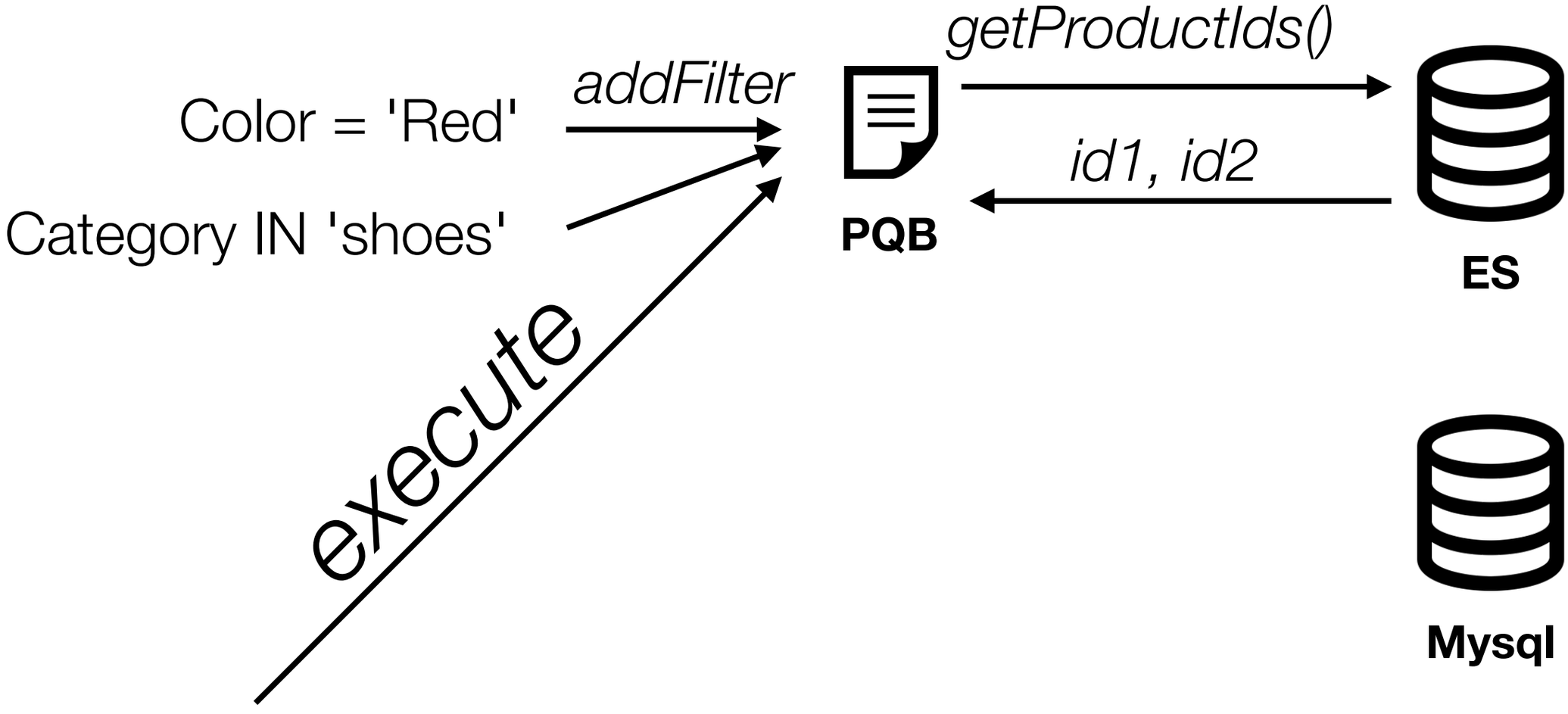
```yaml
akeneo_elasticsearch:
    hosts: "%index_hosts%"
    indexes:
        -
            service_name: "akeneo_referenceentity.client.record"
            index_name: "%record_index_name%"
            configuration_files: "%record_index_configuration%"
```

- ES Client generated at kernel compile time

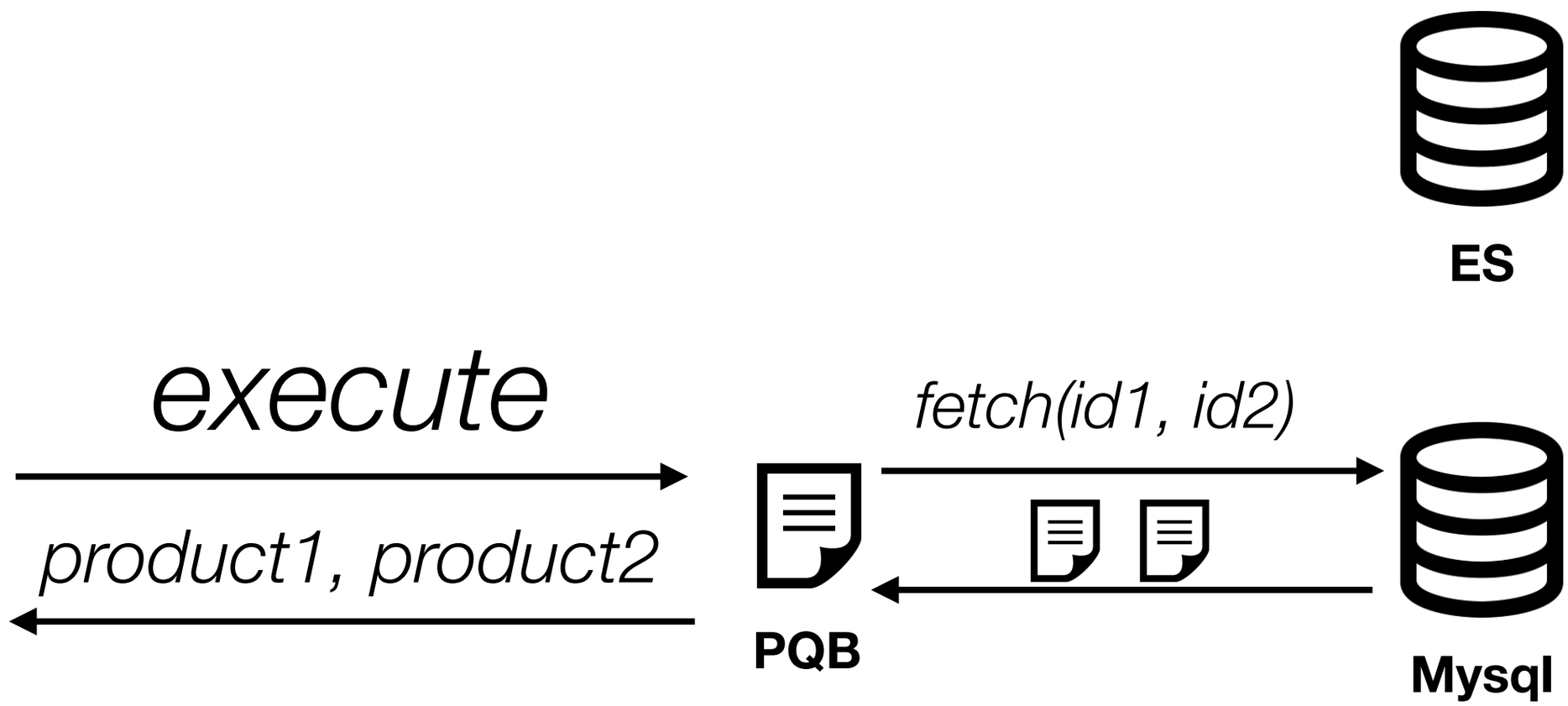
ES & **PIM** : New index

- We have a ESClient wrapper which can do much more things easily
- Akeneo\Tool\Bundle\ElasticsearchBundle\Client
  - Client::**index** && Client::**bulkIndexes**
  - Client::**delete** && Client::**bulkDelete**
  - Client::**refreshIndex**
  - Client::**resetIndex**

ES & **PIM** : PQB overview



ES & **PIM** : PQB overview



ES & **PIM** : Compiling the ES search ?

- Thanks to the SearchQueryBuilder
  - Sqb::addFilter
  - Sqb::addMustNot
  - Sqb::addShould
  - Sqb::addSort
- Sqb::getQuery => Generates a complete ES Request
  - very useful for Debugging 

ES & **PIM** : How many indexes ?

- 3 for products (p, p&pm, pm)
- 1 published products
- 1 reference entities
- maybe more ?

ES & **PIM** : Why so many PQBs ?

- Because **search use-cases on the UI** is not the same as the rest (exports / mass edits, etc.)
- Because it depends on the way you want to iterate
  - Search after: Given an ID, give me the next IDs
  - FromSize: from 155, give me next 40

ES & **PIM** : Testing

- Dedicated integration tests for the mapping
  - Setup the index with some raw data
  - Query on it (just like the exercises)
  - Make sure your mapping works for your search use-cases

(see AkeneoTest\Pim\Enrichment\Integration\Elasticsearch\IndexConfiguration\PimCatalogTextIntegration)

ES & **PIM** : Testing

- Integration tests for each filter of the PQB
  - Makes sure your filter generates correctly the clauses for the request

*Disclaimer: this is what we **is** done, I maybe would do it differently now*

See AkeneoTest\Pim\Enrichment\Integration\PQB\Filter\Text\TextFilterIntegration

Any questions ?

ES & **PIM** : Case study

- the case of "Reference entity full text search-*like*"
- ***Workflow is counter-intuitive***

ES & **PIM** : Case study

- Workflow:
  - **1.** Gather the requirements
  - **2.** Determine how you would want to the request to look like
    - ✴ ***Find the simplest query you could imagine***
  - ***3.*** *Find the Mapping that let's you execute this query successfully*

ES & **PIM** : Case study

- **1.** Requirements
  - *"On the record grid, I would like to enter some words that may correspond to the label, code or any text value the record may have given a reference entity, a channel and a locale"*

ES & **PIM** : Case study

- **2.** The simplest query ? *(Using fiddling)*

```
{
  "query": {
    "constant_score": {
      "filter": {
        "bool": {
          "filter": [
            {
              "term": { "reference_entity_code": "MY_REF" },
            },
            {
              "query_string": {
                "default_field": "full_text.ecommerce.fr_FR"
                "query": "*a* AND *few* AND *words*"
              }
            },
          ]
        }
      ...
```

ES & **PIM** : Case study

- **3.** Mapping

```
settings:
    analysis:
        normalizer:
            text_normalizer:
                filter: ['lowercase']
mappings:
    pimee_reference_entity_record:
        properties:
            reference_entity_code:
                type: 'keyword'
        dynamic_templates:
            -
                record_full_text_search:
                    path_match: 'record_full_text_search.*.*'
                    mapping:
                        type: 'keyword'
                        normalizer: 'text_normalizer'
```

ES & **PIM** : Case study

- **3.** Normalization

```
$kartell = [
    'reference_entity_code'    => 'brand',
    'identifier'               => 'brand_kartell',
    'record_full_text_search' => [
        'ecommerce' => [
            'en_US' => 'kartell' . ' ' . 'Kartell – The Culture of Plastics''… In
just over 50 years, this famous Italian company has revolutionised plastic, elevating it
and propelling it into the refined world of luxury. Today, Kartell has more than a hundred
showrooms all over the world and a good number of its creations have become cult pieces on
display in the most prestigious museums. The famous Kartell Louis Ghost armchair has the
most sales for armchairs in the world, with 1.5 million sales! Challenging the material,
constantly researching new tactile, visual and aesthetic effects – Kartell faces every
challenge! With more than 60 years of experience in dealing with plastic, the brand has a
unique know-how and an unquenchable thirst for innovation. Kartellharnesses technological
progress: notably, we owe them for the first totally transparent plastic chair, injection
moulds, laser welding and more!' . ' ' . 'Philippe Starck',
            ],
        ],
    ];
```

ES & **PIM** : Case study

- Please, use this workflow:
  - **1.** Usecases
  - **2.** Query
  - ***3.*** Mapping + normalization

ES & **PIM** : Going even further

- Documentation:
  https://www.elastic.co/guide/en/elasticsearch/reference/current/index.html

- Explanation of the Smart search:
  Search_of_products_and_product_models.md (in CE)

- Visualizing Lucene's segment merge:
  http://blog.mikemccandless.com/2011/02/visualizing-lucenes-segment-merges.html

Last Questions ?

(Don't worry, I'm not going anywhere anyway...)

Feedback 

Thank

you