

Document- and field-level security with Search Guard

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Document- and field-level security gives you very fine-grained control over which documents and fields a certain user is allowed to see.

Document-level security (DLS) means filtering out complete documents of a search result based on the role of the user. Field-level security (FLS) means filtering out fields from documents based on the role of the user.

Scenario

Let's assume we have an index called *humanresources_*, which contains sensitive information about employees, including their actual salary. A document in this index might look like this:

```
{
  "_type" :      "employee",
  "first_name":  "John",
  "last_name":   "Doe",
  "age" :        45,
  "department":  "Management",
  "salary":      120000
}
```

We want to be able to restrict access to these documents, based on the role of the user. Let's assume we have the following roles:

- `headofhr`
- `hr_employee`
- `hr_trainee`

We want to configure the following permissions:

- The role `headofhr` is able to see all documents, and all field
- The role `hremmployee_` is able to see only documents of employees that do not have a management position
- the role `hrtrainee` can also see only non-management documents, but only the field `firstname`, `lastname` and `department_`.

In order to do so, we can use **document-level security** for **filtering out documents** based on a certain criterion, and **field-level-security** for defining the **visible fields**.

Both settings are applied per-role and per-index, and are configured in `sgroles.yml`. We start by setting up the three roles, and initially allow complete access to the index `humanresources`:

```
head_of_hr:
  indices:
    'human_resources':
      '*':
        - '*'
hr_employee:
  indices:
    'human_resources':
      '*':
        - '*'
hr_trainee:
  indices:
    'human_resources':
      '*':
        - '*'
```

Document-level security

Now we want to filter out all documents where the `department` field is `Management`, and we want to do so for the `hremmployee` and the `hrtrainee` role.

Document-level security works by simply specifying a regular Elasticsearch query, using the query DSL. Only documents that match this query are included in the search result. We use a Bool query with a `must_not` clause for this (more on Bool queries can be found in the [Elasticsearch docs](#)).

```
{
  "query": {
    "bool": {
      "must_not": { "match": { "department": "Management" } }
    }
  }
}
```

We now can use this exact query for configuring the document-level security setting of Search Guard:

```
hr_employee:
  indices:
    'human_resources':
      '*':
        - '*'
      _dls_: '{"query": { "bool": { "must_not": { "match": { "department": "Management" } } } }'}
```

Note that the **dls** parameter is on the same level as *humanresources*, so it applies for this index only. Whenever a user with role *hr_employee* tries to access documents, the specified dls-query is executed and the results filtered accordingly.

For Search Guard 5, please remove the leading “query” key from the DSL query:

```
_dls_: '{ "bool": { "must_not": { "match": { "department": "Management" } } }'}
```

DLS and FLS are applied on Lucene-level, not Elasticsearch-level. This means that the final documents handed from Lucene to Elasticsearch are already filtered according to the DLS and FLS settings for added security.

Field-level security

Field-level security is even simpler. You just need to specify which fields the document should contain, a.k.a. white-list these fields. FLS is configured on the same level as DLS. In our example, we want to limit the access of the *hr_trainee* role also to non-management documents, but only the fields *firstname*, *lastname* and *department_* should be visible. The settings look like this:

```
hr_trainee:
  indices:
    'human_resources':
      '*':
        - '*'
      _dls_: '{"query": { "bool": { "must_not": { "match": { "department": "Management" } } } }'
      _fls_:
        - 'first_name'
        - 'last_name'
        - 'department'
```

Advanced: Username substitution in DLS queries

Sometimes it is handy to use the authenticated users username in DLS queries. This is also possible with Search Guard, by using the variable `{user.name}`. You can use it in any part of the DLS query, and also multiple times if needed. What can you do with that?

Let's extend our scenario a little bit. Let's say our employee documents have an additional field *owner*, which contains the username of the employee:

```
{
  "_type" :      "employee",
  "owner":       "jdoe",
  "first_name":  "John",
  "last_name":   "Doe",
  "age" :        45,
  "department":  "Management",
  "salary":      120000
}
```

Every employee should be able to see his/her own document in the index. Given that the *owner* field contains the username that was used to authenticate against Search Guard, we can use this DLS query for the *employee* role:

```
employee:
  indices:
    'human_resources':
      '*':
        - '*'
      _dls_: '{"term" : {"owner" : "${user.name}"}}'
```

Summary

Document- and field-level security can be used to implement very fine-grained control over which documents and fields a particular role can see. By defining a regular query using the Elasticsearch query DLS, you can filter documents on a per-index and per-role basis. By defining FLS fields, you can white-list the fields a particular role can see. For DLS, you can also use the `${user.name}` variable in the query, which gets substituted with the authenticated user's username.

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