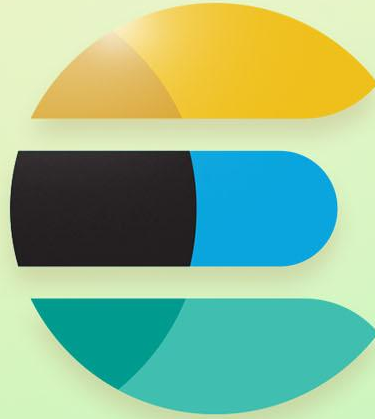


Index templates



Introduction to index templates

- A way to automatically apply settings and mappings on index creation
 - Works by matching index names against an *index pattern*
- Typically used for data sets that are stored in multiple indices
 - E.g. time series data

Structure of index templates

```
PUT /_index_template/my-index-template (1)
{
  "index_patterns": ["my-index-pattern*"], (2)
  "template": {
    "settings": { ... }, (3)
    "mappings": { ... } (4)
  }
}
```

- (1) The name of the index template
- (2) Pattern(s) determining when the index template is applied
- (3) Settings to apply to the new index
- (4) Field mappings to add to the new index

Access logs index template

```
PUT /_index_template/access-logs
{
  "index_patterns": ["access-logs-*"],
  "template": {
    "settings": {
      "number_of_shards": 2,
      "index.mapping.coerce": false
    },
    "mappings": {
      "properties": {
        "@timestamp": { "type": "date" },

        /* Requested URL */
        "url.original": { "type": "wildcard" },
        "url.path": { "type": "wildcard" },
        "url.scheme": { "type": "keyword" },
        "url.domain": { "type": "keyword" },

        /* Client geography */
        "client.geo.continent_name": { "type": "keyword" },
        "client.geo.country_name": { "type": "keyword" },
        "client.geo.region_name": { "type": "keyword" },
        "client.geo.city_name": { "type": "keyword" },

        /* User agent */
        "user_agent.original": { "type": "keyword" },
        "user_agent.name": { "type": "keyword" },
        "user_agent.version": { "type": "keyword" },
        "user_agent.device.name": { "type": "keyword" },
        "user_agent.os.name": { "type": "keyword" },
        "user_agent.os.version": { "type": "keyword" }
      }
    }
  }
}
```

Time based indices



Yearly indices

- `access-logs-2018`
- `access-logs-2019`
- `access-logs-2020`
- `access-logs-2021`
- `access-logs-2022`
- `access-logs-2023`
- ...



Monthly indices

- `access-logs-2023-01`
- `access-logs-2023-02`
- `access-logs-2023-03`
- `access-logs-2023-04`
- `access-logs-2023-05`
- `access-logs-2023-06`
- ...



Daily indices

- `access-logs-2023-01-01`
- `access-logs-2023-01-02`
- `access-logs-2023-01-03`
- `access-logs-2023-01-04`
- `access-logs-2023-01-05`
- `access-logs-2023-01-06`
- ...

Indexing documents into time based indices

```
from datetime import datetime, timezone
from elasticsearch import Elasticsearch

es = Elasticsearch('https://localhost:9200')

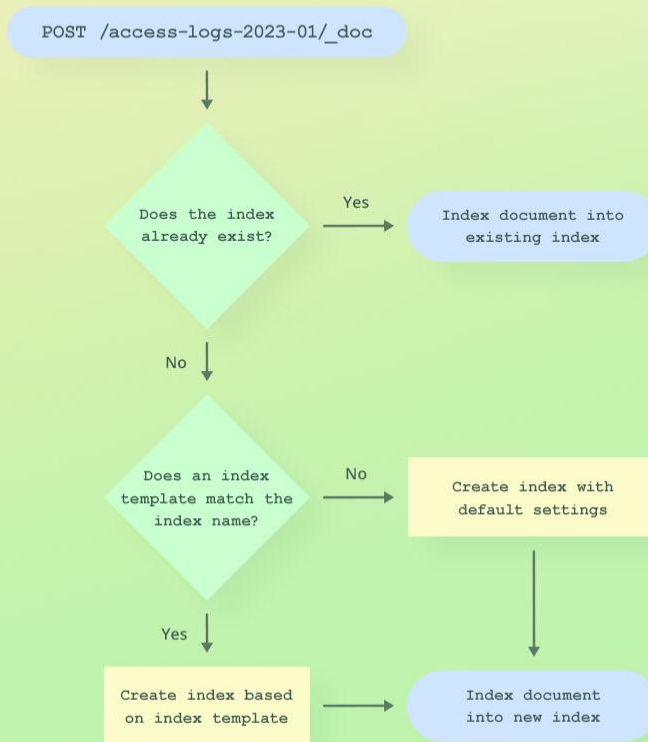
now = datetime.now(timezone.utc)
index_name = f"access-logs-{now.year}-{now.month:02d}"

doc = {
    '@timestamp': now.isoformat(timespec='seconds'),
    'url.original': 'https://example.com/products',
    'url.path': '/products',
    # ...
}

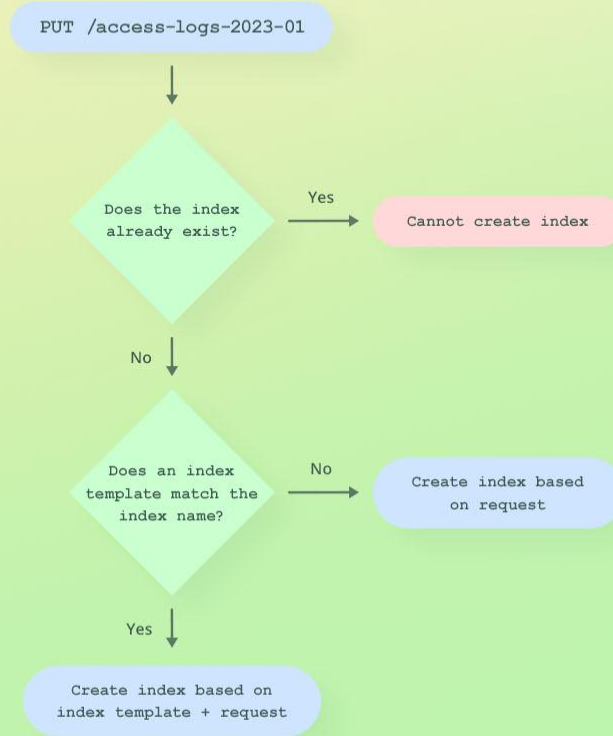
es.index(index=index_name, document=doc)
```



Indexing a document



Creating an index manually



Updating index templates

```
PUT /_index_template/access-logs
{
  "index_patterns": ["access-logs-*"],
  "template": {
    "mappings": {
      "properties": {
        "@timestamp": { "type": "date" },

        /* Requested URL */
        "url.original": { "type": "wildcard" },
        "url.path": { "type": "wildcard" },
        "url.scheme": { "type": "keyword" },
        "url.domain": { "type": "keyword" },

        /* Client geography */
        "client.geo.continent_name": { "type": "keyword" },
        "client.geo.country_name": { "type": "keyword" },
        "client.geo.region_name": { "type": "keyword" },
        "client.geo.city_name": { "type": "keyword" },

        /* User agent */
        "user_agent.original": { "type": "keyword" },
        "user_agent.name": { "type": "keyword" },
        "user_agent.version": { "type": "keyword" },
        "user_agent.device.name": { "type": "keyword" },
        "user_agent.os.name": { "type": "keyword" },
        "user_agent.os.version": { "type": "keyword" }
      }
    }
  }
}
```

Retrieving an index template

```
GET /_index_template/access-logs
```

Deleting an index template

```
DELETE /_index_template/access-logs
```

Reserved index patterns

- `logs-*-*`
- `metrics-*-*`
- `synthetics-*-*`
- `profiling-*`

Overlapping index patterns

```
PUT /_index_template/monthly-logs
{
  "index_patterns": ["monthly-*"],
  "template": {
    "mappings": {
      "properties": {
        "@timestamp": { "type": "date" },
        "month_name": { "type": "keyword" }
      }
    }
  }
}
```



```
PUT /_index_template/monthly-access-logs
{
  "index_patterns": ["monthly-*-logs"],
  "template": {
    "mappings": {
      "properties": {
        "url.original": { "type": "wildcard" },
        "url.path": { "type": "wildcard" },
        "url.scheme": { "type": "keyword" },
        "url.domain": { "type": "keyword" }
      }
    }
  }
}
```



Specifying priorities

```
PUT /_index_template/monthly-logs
{
  "index_patterns": ["monthly-*"],
  "priority": 0,
  "template": {
    "mappings": {
      "properties": {
        "@timestamp": { "type": "date" },
        "month_name": { "type": "keyword" }
      }
    }
  }
}
```



```
PUT /_index_template/monthly-access-logs
{
  "index_patterns": ["monthly-*-logs"],
  "priority": 1,
  "template": {
    "mappings": {
      "properties": {
        "url.original": { "type": "wildcard" },
        "url.path": { "type": "wildcard" },
        "url.scheme": { "type": "keyword" },
        "url.domain": { "type": "keyword" }
      }
    }
  }
}
```



Specifying priorities

```
PUT /_index_template/monthly-logs
{
  "index_patterns": ["monthly-*"],
  "priority": 0,
  "template": {
    "mappings": {
      "properties": {
        "@timestamp": { "type": "date" },
        "month_name": { "type": "keyword" }
      }
    }
  }
}
```

```
PUT /_index_template/monthly-access-logs
{
  "index_patterns": ["monthly-*-logs"],
  "priority": 1,
  "template": {
    "mappings": {
      "properties": {
        "url.original": { "type": "wildcard" },
        "url.path": { "type": "wildcard" },
        "url.scheme": { "type": "keyword" },
        "url.domain": { "type": "keyword" }
      }
    }
  }
}
```

0 < 1

monthly-202301-access-logs

```
{
  "mappings": {
    "properties": {
      "url.original": { "type": "wildcard" },
      "url.path": { "type": "wildcard" },
      "url.scheme": { "type": "keyword" },
      "url.domain": { "type": "keyword" }
    }
  }
}
```

Priorities

- Index patterns cannot overlap by default
- Only a single index template can be applied to a new index
- Specify a `priority` parameter to handle overlapping index patterns
 - Defaults to zero
 - The index template with the highest priority “wins”

Lecture summary

- Index templates automatically apply settings and mappings to new indices
- Only a single index template can be applied to a new index
- Useful for data sets that store data in multiple indices, e.g. time series data
- Enables us to simply index documents into indices that don't already exist
- Indices can still be created manually
 - API request and index template are merged (the request takes precedence)
- Use priorities to allow overlapping index patterns
 - The index template with the highest priority is used