Getting Down and Dirty with Elasticsearch

@clintongormley
Berlin Buzzwords 2013

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elasticsearch.

Elasticsearch

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Elasticsearch

real time,

search and

analytics engine

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Elasticsearch

real time,

search and

analytics engine

distributed

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scales

massively **Elasticsearch**

real time,

search and distributed

analytics engine

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elasticsearch.

scales

massively

Elasticsearch

high availability

real time,

search and

analytics engine

distributed

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RESTful
API

scales
massively

Elasticsearch

high
availability

real time,
search and
analytics engine

distributed

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RESTful
API

**JSON
over HTTP**

scales
massively

Elasticsearch

real time,
search and
analytics engine

high
availability

distributed

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RESTful
API

JSON
over HTTP

scales
massively

Elasticsearch

real time,
search and
analytics engine

high
availability

distributed

**schema
free**

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RESTful API

JSON over HTTP

scales massively

Elasticsearch

real time, search and analytics engine

high availability

distributed

schema free

multi tenancy

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open-source

RESTful API

JSON over HTTP

scales massively

Elasticsearch

real time, search and analytics engine

high availability

distributed

schema free

multi tenancy

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open-source

RESTful API

JSON over HTTP

scales massively

Elasticsearch

Lucene based

real time, search and analytics engine

high availability

distributed

schema free

multi tenancy

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Cool.

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Cool. Bonsai cool...

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This is **WHY** we use it...

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```
> ./bin/elasticsearch
> _
```

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But **HOW** do we use it?

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```
> curl -XGET localhost:9200/?pretty
```

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```
> curl -XGET localhost:9200/?pretty
```

verb

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elasticsearch.

```
> curl -XGET localhost:9200/?pretty
```

$\uparrow$

node

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```
> curl -XGET localhost:9200/?pretty
```

HTTP port

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```
> curl -XGET localhost:9200/?pretty
```

path

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```
> curl -XGET localhost:9200/?pretty
```

query string

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```
> curl -XGET localhost:9200/?pretty
```

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```
GET /
```

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GET /

```
{
  "name"     : "Exploding Man",
  "tagline" : "You Know, for Search",
  "ok"       : true,
  "status"  : 200,
  "version" : {
    "number"          : "0.90.1",
   "snapshot_build" : false
 }
}
```

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Where do we start?

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With **data**

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```
{
  "tweet": "I think #elasticsearch is AWESOME",
  "nick":  "@clintongormley",
  "name":  "Clinton Gormley",
  "date":  "2013-06-03",
  "rt"  :  5,
  "loc":   {
    "lat": 13.4,
    "lon": 52.5
  }
```

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How to **put** it into ES?

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```
PUT /index/type/id
```

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```
PUT /index/type/id
```

where?

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```
PUT /myapp/type/id
```

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```
PUT /myapp/type/id
```

what?

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```
PUT /myapp/tweet/id
```

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```
PUT /myapp/tweet/id
```

$$\uparrow$$

which?

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```
PUT /myapp/tweet/1
```

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```
PUT /myapp/tweet/1 -d '
{
  "tweet": "I think #elasticsearch is AWESOME",
  "nick":  "@clintongormley",
  "name":  "Clinton Gormley",
  "date":  "2013-06-03",
  "rt":    5,
  "loc":   {
    "lat": 13.4,
    "lon": 52.5
  }
}
'
```

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```
# 201 CREATED

{
  "_index":   "myapp",
  "_type":    "tweet",
  "_id":      "1",
  "_version":  1,
  "ok":        true
}
```

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Get

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```
GET /myapp/tweet/1
```

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```
 # 200 OK

{
  "_index":   "myapp",
  "_type":    "tweet",
  "_id":      "1",
  "_version":  1,
  "exists":    true,
  "_source":   { ...OUR TWEET... }
}
```

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Exists?

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```
HEAD /myapp/tweet/1
```

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```
HEAD /myapp/tweet/1  # 200 OK
```

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```
HEAD /myapp/tweet/1  # 200 OK

HEAD /myapp/tweet/2  # 404 Not Found
```

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Update

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```
PUT /myapp/tweet/1 -d '
{
   "tweet": "I know #elasticsearch is AWESOME",
   "nick":  "@clintongormley",
   "name":  "Clinton Gormley",
   "date":  "2013-06-03",
   "rt":    5,
   "loc":   {
     "lat": 13.4,
     "lon": 52.5
   }
}
'
```

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`→ atomic DELETE & PUT`

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```
  # 200 OK

{
   "_index":    "myapp",
   "_type":     "tweet",
   "_id":       "1",
   "_version":   2,
   "ok":         true
}
```

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Delete

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```
DELETE /myapp/tweet/1
```

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```
# 200 OK

{
  "_index":   "myapp",
  "_type":    "tweet",
  "_id":      "1",
  "_version":  3,
  "ok":        true,
  "found":     true
}
```

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Optimistic concurrency control

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Optimistic concurrency control

without locking

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```
 PUT /myapp/tweet/1?version=3 -d '
{
   ...
}
'


# 200 OK
```

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```
 PUT /myapp/tweet/1?version=2 -d '
{
   ...
}
'


# 409 Conflict
```

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Update in place

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```
POST /myapp/tweet/1/_update -d '
{
 "script":                    "ctx._source.count+=1",
 "retry_on_conflict":   3
}
'
```

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```
POST /myapp/tweet/1/_update -d '
{
 "script":                  "ctx._source.count+=1",
 "retry_on_conflict":  3
}
'
```

GET → change → PUT

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Cheaper in bulk

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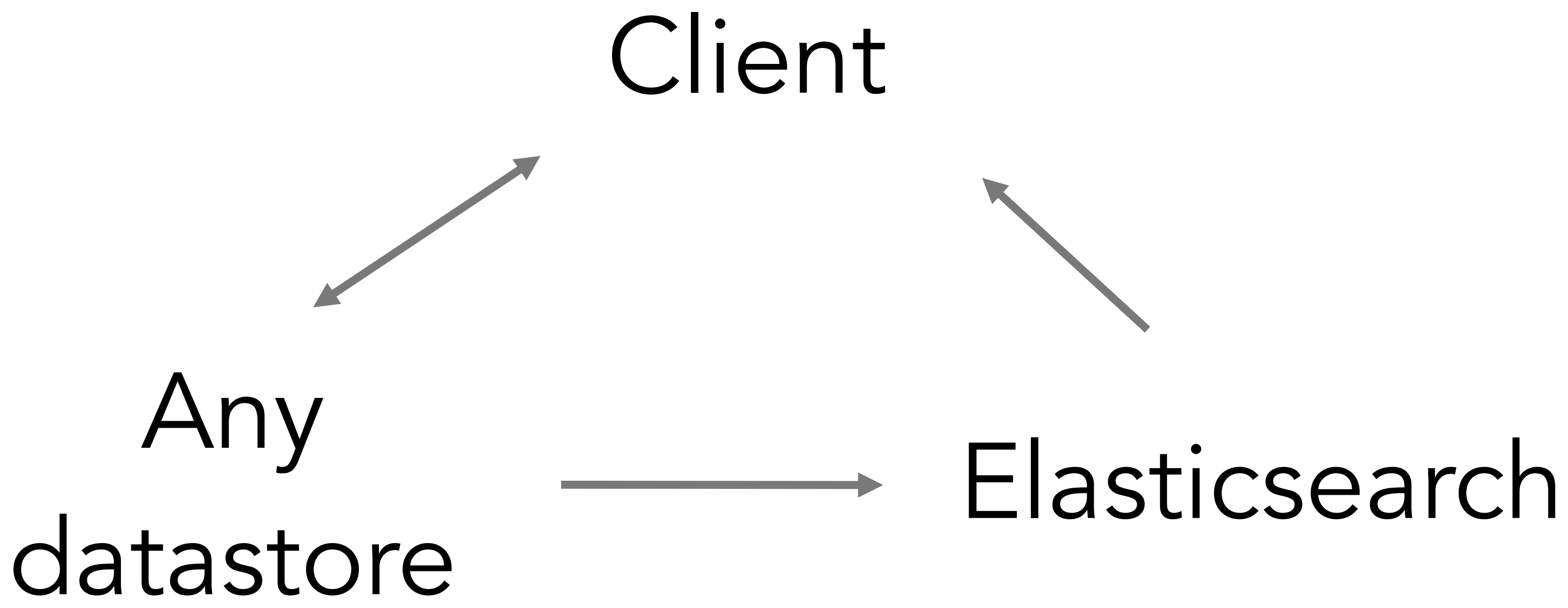
Mirror external DB



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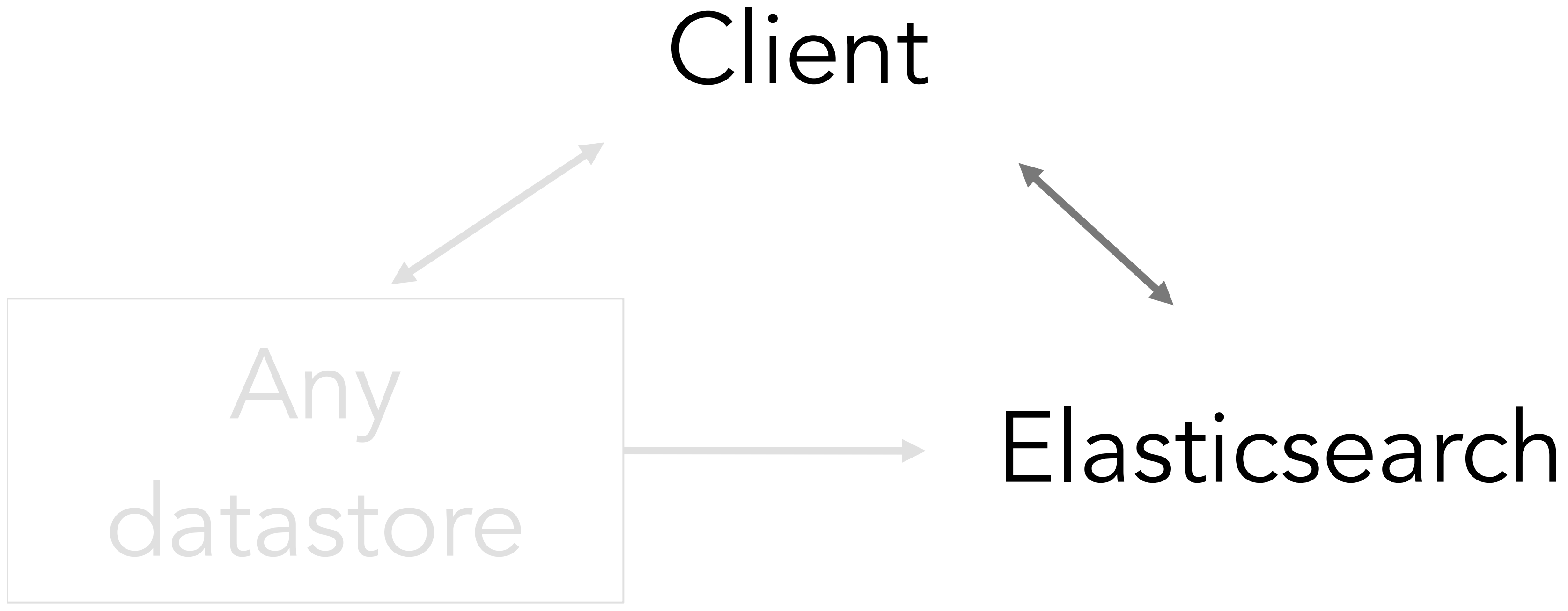
Standalone



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"Empty" Search

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```
GET /_search
```

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```
 GET /_search
{
  "took" :          2,









}
```

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```
  GET /_search
{
  "took" :         2,
  "timed_out" :    false,









}
```

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```
  GET /_search
{
  "took" :          2,
  "timed_out" :     false,
  "_shards" : {
    "total" :       10,
    "successful" : 10,
    "failed" :      0
  },



}
```

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GET /_search

```
{
  "took" :          2,
  "timed_out" :     false,
  "_shards" : {
    "total" :       10,
    "successful" :  10,
    "failed" :      0
  },
  "hits" : {
    "total" :       14,
    "max_score" :   1.0,
    "hits" :        [ { ... }]
  }
}
```

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GET /_search

```
"hits" : [
  {
     "_index" :  "de",
     "_type" :   "tweet",
     "_id" :     "4",
     "_source" : { ... },
     "_score" :  1.0,
  },
  ...
]
```

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Multi-index
Multi-type

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```
GET /index/_search
```

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```
GET /index/_search

GET /index1,index2/_search
```

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```
GET /index/_search

GET /index1,index2/_search

GET /ind*/_search
```

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```
GET /index/_search

GET /index1,index2/_search

GET /ind*/_search

GET /index/type/_search
```

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```
GET /index/_search

GET /index1,index2/_search

GET /ind*/_search

GET /index/type/_search

GET /index/type1,type2/_search
```

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```
GET /index/_search

GET /index1,index2/_search

GET /ind*/_search

GET /index/type/_search

GET /index/type1,type2/_search

GET /index/type*/_search
```

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```
GET /index/_search

GET /index1,index2/_search

GET /ind*/_search

GET /index/type/_search

GET /index/type1,type2/_search

GET /index/type*/_search

GET /_all/type*/_search
```

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Pagination

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Pagination

`size` = num of results

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Pagination

`size` = num of results

`from` = results to skip

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```
GET /_search?size=5&from=0

GET /_search?size=5&from=5

GET /_search?size=5&from=10
```

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Search *Lite*

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Search *Lite*

```
GET /_search?q=name:john
```

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```
+tweet:foo +name:john +date:>2013-05-01
```

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```
+tweet:foo +name:john +date:>2013-05-01
```

→ percent encoding →

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```
+tweet:foo +name:john +date:>2013-05-01
```

→ percent encoding →

```
?q=%2Btweet%3Afoo+%2Bname%3Ajohn+
%2Bdate%3A%3E2013-05-01
```

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```
GET /_search?q=mary
```

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```
GET /_search?q=mary
```

→ user named "Mary"

→ tweets by "Mary"

→ tweet mentioning "@mary"

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```
GET /_search?q=_all:mary
```

→ user named "Mary"

→ tweets by "Mary"

→ tweet mentioning "@mary"

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_all field

string values from
all other fields

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```
GET /_search?q=2013
→ 12 results
```

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```
GET /_search?q=2013
→ 12 results

GET /_search?q=2013-06-03
→ 12 results!!
```

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```
GET /_search?q=2013
→ 12 results

GET /_search?q=2013-06-03
→ 12 results!!

GET /_search?q=date:2013-06-03
→ 1 result
```

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```
GET /_search?q=2013
→ 12 results

GET /_search?q=2013-06-03
→ 12 results!!

GET /_search?q=date:2013-06-03
→ 1 result

GET /_search?q=date:2013
→ 0 results!!
```

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datatype differences?

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check "mapping"

(field definitions)

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```
GET /myapp/tweet/_mapping
```

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```
GET /myapp/tweet/_mapping
{
  "tweet" : {
    "properties" : {
      "tweet" :   { "type" : "string" },
      "name" :    { "type" : "string" },
      "nick" :    { "type" : "string" },
      "date" :    { "type" : "date"   },
      "rt" :      { "type" : "long"   },
      "loc" : {
        "type": "object",
        "properties" : {
          "lat" : { "type" : "double" },
          "lon" : { "type" : "double" }
        }
      }
}}}
```

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date = type:**date**

_all = type:**string**

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Exact value vs **Full text**

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Exact value vs Full text

```
10
4.5
2013-01-01
true
Foo
foo
```

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Exact value vs Full text

`10`	`The quick`
`4.5`	`brown fox`
`2013-01-01`	`jumped`
`true`	`over the`
`Foo`	`lazy dog`
`foo`	

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Inverted index

```
“The quick brown fox jumped over the lazy dog”

“Quick brown foxes leap over lazy dogs in summer”
```

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Inverted index

→ separate words / terms

```
"The quick brown fox jumped over the lazy dog"

"Quick brown foxes leap over lazy dogs in summer"
```

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Inverted index

→ separate words / terms

```
The,quick,brown,fox,jumped,over,the,lazy,dog

Quick,brown,foxes,leap,over,lazy,dogs,in,summer
```

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Inverted index

→ separate words / terms
→ sort unique terms

```
The,quick,brown,fox,jumped,over,the,lazy,dog

Quick,brown,foxes,leap,over,lazy,dogs,in,summer
```

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Inverted index

→ separate words / terms

→ sort unique terms

```
The,brown,dog,fox,jumped,lazy,over,quick,the

Quick,brown,dogs,foxes,in,lazy,leap,over,summer
```

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Inverted index

- → separate words / terms
- → sort unique terms
- → list docs containing terms

```
The,brown,dog,fox,jumped,lazy,over,quick,the

Quick,brown,dogs,foxes,in,lazy,leap,over,summer
```

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Term	Doc 1	Doc 2
Quick	🟩	
The		🟩
brown	🟩	🟩
dog	🟩	
dogs		🟩
fox	🟩	
foxes		🟩
in		🟩
jumped	🟩	
lazy	🟩	🟩
leap		🟩
over	🟩	🟩
quick		🟩
summer		🟩
the	🟩	

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Term	Doc 1	Doc 2
Quick	🟩	
The		🟩
brown	🟩	🟩
dog	🟩	
jumped	🟩	
lazy	🟩	🟩
leap		🟩
over	🟩	🟩
quick		🟩
summer		🟩
the	🟩	

```
q=quick brown
```

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Term	Doc 1	Doc 2
Quick		
The		
brown	🟩	🟩
dog		
dogs		
fox	🟩	
foxes		
in		
jumped		
lazy		
leap		
over		
quick		
summer		
the		

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Term	Doc 1	Doc 2
Quick	🟩	
The		🟩
brown	🟩	🟩
dog	🟩	
jumped	🟩	
lazy	🟩	🟩
leap		🟩
over	🟩	🟩
quick		🟩
summer		🟩
the	🟩	

```
q=+Quick +foxes
```

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Term	Doc 1	Doc 2
Quick	🟩	
The		
brown		
dog		
dogs		
fox		
foxes		🟩
in		
jumped		
lazy		
leap		
over		
quick		
summer		
the		

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Term	Doc 1	Doc 2
Quick	🟩	
The		
brown		
dog		

No matches!

jumped		
lazy		
leap		
over		
quick		
summer		
the		

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Improving recall

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Term	Doc 1	Doc 2
Quick	🟩	
The		🟩
brown		
dog		
dogs		
fox		
foxes		
in		
jumped		
lazy		
leap		
over		
quick		🟩
summer		
the	🟩	

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Term	Doc 1	Doc 2
brown		
dog		
dogs		
fox		
foxes		
in		
jumped		
lazy		
leap		
over		
quick	🟩	🟩
summer		
the	🟩	🟩

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elasticsearch.

Term	Doc 1	Doc 2
brown		
dog	🟩	
dogs		🟩
fox	🟩	
foxes		🟩
in		
jumped		
lazy		
leap		
over		
quick		
summer		
the		

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Term	Doc 1	Doc 2
brown		
dog	🟩	🟩
fox	🟩	🟩
in		
jumped		
lazy		
leap		
over		
quick		
summer		
the		

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Term	Doc 1	Doc 2
brown		
dog		
fox		
in		
jumped	🟩	
lazy		🟩
leap		
over		
quick		
summer		
the		

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Term	Doc 1	Doc 2
brown		
dog		
fox		
in		
jump	🟩	🟩
leap		
over		
quick		
summer		
the		

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normalize terms

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Term	Doc 1	Doc 2
brown	🟩	🟩
dog	🟩	🟩
fox	🟩	🟩
in		🟩
jump	🟩	🟩
leap	🟩	🟩
over	🟩	🟩
quick	🟩	🟩
summer		🟩
the	🟩	🟩

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Term	Doc 1	Doc 2
brown	🟩	🟩
dog	🟩	🟩
fox	🟩	🟩
leap	🟩	🟩
over	🟩	🟩
quick	🟩	🟩
summer		🟩
the	🟩	🟩

```
q=+Quick +foxes
```

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Term	Doc 1	Doc 2
brown		
dog		
fox		
in		
jump		
leap		
over		
quick		
summer		
the		

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normalize terms

in query too!

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Term	Doc 1	Doc 2
brown	🟩	🟩
dog	🟩	🟩
fox	🟩	🟩
leap	🟩	🟩
over	🟩	🟩
quick	🟩	🟩
summer		🟩
the	🟩	🟩

```
q=+Quick +foxes
```

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Term	Doc 1	Doc 2
brown	🟩	🟩
dog	🟩	🟩
fox	🟩	🟩
leap	🟩	🟩
over	🟩	🟩
quick	🟩	🟩
summer		🟩
the	🟩	🟩

`q=+quick +foxes`

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Term	Doc 1	Doc 2
brown	🟩	🟩
dog	🟩	🟩
fox	🟩	🟩
leap	🟩	🟩
over	🟩	🟩
quick	🟩	🟩
summer		🟩
the	🟩	🟩

```
q=+quick +fox
```

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Term	Doc 1	Doc 2
brown		
dog		
fox	🟩	🟩
in		
jump		
leap		
over		
quick	🟩	🟩
summer		
the		

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"Analysis"

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"Analysis"

tokenization + normalization

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"Analysers"

tokenizer + token filters

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standard analyzer

```
"The Quick Brown Fox jumped
over the Lazy Dog!"
```

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standard analyzer

→ standard tokenizer

```
"The Quick Brown Fox jumped
over the Lazy Dog!"
```

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standard analyzer

→ standard tokenizer

```
The,Quick,Brown,Fox,jumped,
over,the,Lazy,Dog
```

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standard analyzer

→ standard tokenizer

→ lowercase filter

```
The,Quick,Brown,Fox,jumped,
over,the,Lazy,Dog
```

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standard analyzer

→ standard tokenizer

→ lowercase filter

```
the,quick,brown,fox,jumped,
over,the,lazy,dog
```

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standard analyzer

→ standard tokenizer
→ lowercase filter
→ stopwords filter

```
the,quick,brown,fox,jumped,
over,the,lazy,dog
```

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standard analyzer

- → standard tokenizer
- → lowercase filter
- → stopwords filter

```
,quick,brown,fox,jumped,
  over,    ,lazy,dog
```

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english analyzer

→ standard tokenizer
→ lowercase filter

```
the,quick,brown,fox,jumped,
over,the,lazy,dog
```

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english analyzer

- → standard tokenizer
- → lowercase filter
- → english stemmer

```
the,quick,brown,fox,jumped,
over,the,lazy,dog
```

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english analyzer

→ standard tokenizer
→ lowercase filter
→ english stemmer

```
the,quick,brown,fox,jumped,
over,the,lazy,dog
```

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english analyzer

→ standard tokenizer
→ lowercase filter
→ english stemmer

```
the,quick,brown,fox,jump,
over,the,lazy,dog
```

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english analyzer

- → standard tokenizer
- → lowercase filter
- → english stemmer
- → english stopwords

```
the,quick,brown,fox,jump,
over,the,lazy,dog
```

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english analyzer

→ standard tokenizer
→ lowercase filter
→ english stemmer
→ english stopwords

```
,quick,brown,fox,jump,
 over,    ,lazy,dog
```

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date = type:**date**

_all = type:**string**

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date = exact value

_all = full text

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date = 2013-06-03

_all = 2013,06,03

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```
GET /_search?q=2013
→ 12 results
```

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```
GET /_search?q=2013
→ 12 results

GET /_search?q=2013-06-03
→ 12 results
```

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```
GET /_search?q=2013
→ 12 results

GET /_search?q=2013 OR 06 OR 03
→ 12 results
```

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```
GET /_search?q=2013
→ 12 results

GET /_search?q=2013-06-03
→ 12 results

GET /_search?q=date:2013-06-03
→ 1 result
```

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```
GET /_search?q=2013
→ 12 results

GET /_search?q=2013-06-03
→ 12 results

GET /_search?q=date:2013-06-03
→ 1 result

GET /_search?q=date:2013
→ 0 results
```

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Field mapping

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Core field types

`Strings:`	`string`
`Datetimes:`	`date`
`Whole numbers:`	`byte, short, integer, long`
`Floats:`	`float, double`
`Booleans:`	`boolean`
`Objects:`	`object`

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Core field types

`Strings:`	`string`
`Datetimes:`	`date`
`Whole numbers:`	`byte, short, integer, long`
`Floats:`	`float, double`
`Booleans:`	`boolean`
`Objects:`	`object`

`Also: multi_field, ip, geo_point, geo_shape,`

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Dynamic detection

`"foo bar"`	**`string`**
`"2013-01-01"`	**`date`**
`10`	`byte, short, integer,` **`long`**
`10.0`	`float,` **`double`**
`true`	**`boolean`**
`{ foo: "bar" }`	**`object`**

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Dynamic detection

"foo bar"	**string**
"2013-01-01"	**date**
10	byte, short, integer, **long**
10.0	float, **double**
true	**boolean**
{ foo: "bar" }	**object**
["foo","bar"]	No special mapping. Any field can have multi-vals

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Most important: `type`

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```
{
  "tweet" : {
    "properties" : {
      "tweet" :    { "type" : "string"     },
      "name" :     { "type" : "string"     },
      "nick" :     { "type" : "string"     },
      "date" :     { "type" : "date"       },
      "rt" :       { "type" : "long"       },
      "loc" : {
        "type": "object",
        "properties" : {
          "lat" : { "type" : "double"     },
          "lon" : { "type" : "double"     }
        }
      }

}}}
```

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```
{
  "tweet" : {
    "properties" : {
      "tweet" :    { "type" : "string"    },
      "name" :     { "type" : "string"    },
      "nick" :     { "type" : "string"    },
      "date" :     { "type" : "date"      },
      "rt" :       { "type" : "long"      },
      "loc" :      { "type" : "geo_point" }
}}}
```

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Full text vs **Exact string**

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Full text: (default)

```
{ "type": "string", "index": "analyzed" }
```

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Full text: (default)

```
{ "type": "string", "index": "analyzed" }
```

Exact string:

```
{ "type": "string", "index": "not_analyzed" }
```

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Full text: (default)

```
{ "type": "string", "index": "analyzed" }
```

Exact string:

```
{ "type": "string", "index": "not_analyzed" }
```

Not searchable:

```
{ "type": "string", "index": "no" }
```

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```
{
  "tweet" : {
    "properties" : {
      "tweet" :    { "type" : "string"    },
      "name" :     { "type" : "string"    },
      "nick" :     { "type" : "string"    },
      "date" :     { "type" : "date"      },
      "rt" :       { "type" : "long"      },
      "loc" :      { "type" : "geo_point" }
}}}
```

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```
{
  "tweet" : {
    "properties" : {
      "tweet" :    { "type" : "string"    },
      "name" :     { "type" : "string"    },
      "nick" :     {
          "type"   : "string",
          "index"  : "not_analyzed"
      },
      "date" :     { "type" : "date"      },
      "rt" :       { "type" : "long"      },
      "loc" :      { "type" : "geo_point" }
}}}
```

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Analyzer

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```
{
  "tweet" : {
    "properties" : {
      "tweet" :    { "type" : "string"    },
      "name" :     { "type" : "string"    },
      "nick" :     {
          "type"   : "string",
          "index" : "not_analyzed"
      },
      "date" :     { "type" : "date"      },
      "rt" :       { "type" : "long"      },
      "loc" :      { "type" : "geo_point" }
}}}
```

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```
{
  "tweet" : {
    "properties" : {
      "tweet" :    {
          "type" :      "string",
          "analyzer" : "english"
      },
      "name" :     { "type" : "string"     },
      "nick" :     {
          "type"   : "string",
          "index" : "not_analyzed"
      },
      "date" :     { "type" : "date"       },
      "rt" :       { "type" : "long"       },
      "loc" :      { "type" : "geo_point" }
}}}
```

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Updating mappings

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Can: add new fields

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Can: add new fields

```
PUT /myapp/tweet/_mapping -d '
{
    "tweet": {
        "properties": {
            ...
        }
    }
}
'
```

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Cannot: change fields

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Cannot: change fields

```
DELETE /myapp
```

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Cannot: change fields

```
PUT /myapp -d '
{
    "mappings": {
        "tweet": {
            "properties": {
                ...
            }
        }
    }
}
'
```

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Full body search

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```
GET /_search -d '
{
    "query": {
        "match_all": {}
    },
    "from":  0,
    "size":  10
}
'
```

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```
GET /_search -d '
{
    "query": {
        "match_all": {}
    },
    "from":  0,
    "size":  10
}
'
```

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Query DSL

rich flexible query language

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```
{
    "match": { "tweet": "search" }
}
```

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```
GET /_search -d '{
{
    "query": {
        "match": { "tweet": "search" }
    }
}
```

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Filters vs Queries

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Filters vs Queries

`exact matching` `full text search`

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Filters vs Queries

Filters	Queries
`exact matching`	`full text search`
`binary yes/no`	`relevance scoring`

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Filters vs Queries

Filters	Queries
`exact matching`	`full text search`
`binary yes/no`	`relevance scoring`
`fast`	`heavier`

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Filters vs Queries

Filters	Queries
exact matching	full text search
binary yes/no	relevance scoring
fast	heavier
cacheable	not cacheable

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Combine filter & query

```
Query:   { "match": { "tweet": "search" }}

Filter:  { "term":  { "nick":  "@mary" }}
```

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Combine filter & query

```
{
   "filtered": {
      "query": {
         "match": { "tweet": "search" }
      },
      "filter": {
         "term":  { "nick":  "@mary" }
      }
   }
}
```

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Combine filter & query

```
GET /_search -d '
{
  "query": {
     "filtered": {
        "query": {
           "match": { "tweet": "search" }
        },
        "filter": {
           "term":  { "nick":  "@mary" }
        }
     }
  }
}
'
```

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Just a filter

```
GET /_search -d '
{
  "query": {
     "filtered": {
        "query": {
           "match_all": {}
        },
        "filter": {
           "term":  { "nick":   "@mary" }
        }
     }
  }
}
'
```

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Just a filter

```
GET /_search -d '
{
  "query": {
     "filtered": {
        "filter": {
           "term":  { "nick":  "@mary" }
        }
     }
  }
}
'
```

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User's tweets by date

```
GET /_search -d '
{
  "query": {
     "filtered": {
        "filter": {
           "term":  { "nick":  "@mary" }
        }
     }
  },
  "sort": { "date": "desc" }
}
'
```

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Tweets for last month

```
GET /_search -d '
{
  "query": {
     "filtered": {
        "filter": {
           "range":  {
             "date": {
               "gte": "2013-05-01",
               "lt":  "2013-06-01"
             }
           }
        }
}}}
'
```

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Top tweeters

```
GET /_all/tweet/_search -d '
{
  "facets": {
      "top_tweeters": {
          "terms": {
              "field": "nick"
          }
      }
   }
}
'
```

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Top tweeters for query

```
GET /_all/tweet/_search -d '
{
  "facets": {
      "top_tweeters": {
          "terms": {
              "field": "nick"
          }
      }
   },
   "query": {
       "match": { "tweet": "elasticsearch" }
   }
}
'
```

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Tweets by month

```
GET /_all/tweet/_search -d '
{
  "facets": {
      "tweets_by_month": {
          "date_histogram": {
              "field":    "date",
              "interval": "month"
          }
      }
   }
}
'
```

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Autocomplete

```
{ "match": { "name": "joh" }}
```

↓

```
John Smith

Johnny Depp

Lyndon Johnson
```

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Autocomplete

```
{ "match": { "name": "joh" }}

↓

John Smith

Johnny Depp

Lyndon Johnson
```

But "joh" doesn't exist in the index

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Autocomplete

N-grams == window-on-a-word:

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Autocomplete

N-grams == window-on-a-word:

```
Length 1: j,o,h,n,s,m,i,t,h
```

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Autocomplete

N-grams == window-on-a-word:

```
Length 1: j,o,h,n,s,m,i,t,h
Length 2: jo,oh,hn,sm,mi,it,th
```

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Autocomplete

N-grams == window-on-a-word:

```
Length 1: j,o,h,n,s,m,i,t,h
Length 2: jo,oh,hn,sm,mi,it,th
Length 3: joh,ohn,smi,mit,ith
Length 4: john,smit,mith
```

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Autocomplete

N-grams == window-on-a-word:

```
Length 1: j,o,h,n,s,m,i,t,h
Length 2: jo,oh,hn,sm,mi,it,th
Length 3: joh,ohn,smi,mit,ith
Length 4: john,smit,mith
```

Good for partial word matching

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Autocomplete

Edge N-grams == anchored N-grams:

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Autocomplete

Edge N-grams == anchored N-grams:

```
j
jo
joh
john
s
sm
smi
smit
smith
```

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Autocomplete

Edge N-grams == anchored N-grams:

```
j
jo
joh
john
s
sm
smi
smit
smith
```

⇒ **Perfect for autocomplete**

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Edge N-Gram token filter

```
{
  "filter": {
    "autocomplete": {
      "type":      "edge_ngram",
      "min_gram": 1,
      "max_gram": 20
    }
  }
}
```

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Name field analyzers

```
{
  "analyzer": {
    "name": {
      "type":       "standard",
      "stopwords": []
    },






  }
}
```

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Name field analyzers

```
{
  "analyzer": {
    "name": {
      "type":       "standard",
      "stopwords": []
    },
    "name_autocomplete": {
      "type":       "custom",
      "tokenizer": "standard",
      "filter":    ["lowercase","autocomplete"]
    }
  }
}
```

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Name field mapping

```
{
  "name": {
    "type": "string"
  }
}
```

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Name field mapping

```
{
  "name": {
    "type": "string"
  }
}
```

multi_field == one field, multi-purposes

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Name field mapping

```
{
  "name": {
    "type":    "multi_field",
    "fields": {
      "name": {



      },
      "autocomplete": {




      }
}}
```

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Name field mapping

```
{
  "name": {
    "type":   "multi_field",
    "fields": {
      "name": {



      },
      "autocomplete": {




      }
}}
```

Main field:

"**name**" or "**name.name**"

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Name field mapping

```
{
  "name": {
    "type":    "multi_field",
    "fields": {
      "name": {
        "type":              "string",
        "analyzer":          "name"
      },
      "autocomplete": {




      }
}}
```

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Name field mapping

```
{
  "name": {
    "type":    "multi_field",
    "fields": {
      "name": {
        "type":             "string",
        "analyzer":         "name"
      },
      "autocomplete": {



      }
}}
```

Sub field:

"name.autocomplete"

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Name field mapping

```
{
  "name": {
    "type":    "multi_field",
    "fields": {
      "name": {
        "type":             "string",
        "analyzer":         "name"
      },
      "autocomplete": {
        "type":             "string",
        "index_analyzer":   "name_autocomplete",
        "search_analyzer":  "name"
      }
}}
```

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Recreate the index

```
DELETE /myapp
```

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Recreate the index

```
PUT /myapp -d '
{
  "settings": {
    "analysis": {
      "analyzer":  {...},
      "filter":    {...}
    }
  },






}
```

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Recreate the index

```
PUT /myapp -d '
{
  "settings": {
    "analysis": {
      "analyzer":  {...},
      "filter":    {...}
    }
  },
  "mappings": {
    "tweet": {
      "properties": {...}
    }
  }
}
```

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Autocomplete query

```
{
  "match": {
    "name.autocomplete": "john smi"
  }
}
```

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Autocomplete query

```
{
  "match": {
    "name.autocomplete": "john smi"
  }
}
```

Better: favor whole word matches

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Autocomplete query

```
{
  "bool": {
    "must":      [{...},{...}],
    "must_not": [{...},{...}],
    "should":   [{...},{...}]
  }
}
```

Combines multiple query clauses

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Autocomplete query

```
{
  "bool": {
    "must":     [{...},{...}],
    "must_not": [{...},{...}],
    "should":   [{...},{...}]
  }
}
```

MUST match

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Autocomplete query

```
{
  "bool": {
    "must":     [{...},{...}],
    "must_not": [{...},{...}],
    "should":   [{...},{...}]
  }
}
```

MUST NOT match

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Autocomplete query

```
{
  "bool": {
    "must":     [{...},{...}],
    "must_not": [{...},{...}],
    "should":   [{...},{...}]
  }
}
```

"More relevant" if these match

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Autocomplete query

```
{
  "bool": {
    "must": {
      "match": {
        "name.autocomplete": "john smi"
      }
    },
    "should": {
      "match": {
        "name": "john smi"
      }
    }
```

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Boost popular tweets

```
{
  "custom_score_query": {
    "query":  { "match": { "tweet": "search" }},
    "script": "_score * (1+log(doc['rt'].value))"
  }
}
```

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Filter local tweets

```
{
  "filtered": {
    "query":  { "match": { "tweet": "search" }},
    "filter": {
      "geo_distance": {
        "distance": "100km",
        "loc": {
          "lat": 13.4,
          "lon": 52.5
        }
      }
    }
```

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Boost local tweets

```
{
  "custom_filters_score_query": {
    "query":   { "match": { "tweet": "search" }},
    "filters": [









    ]
}}
```

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Boost local tweets

```
{
  "custom_filters_score_query": {
    "query":   { "match": { "tweet": "search" }},
    "filters": [
      {
        "boost": 2,
        "filter": {
          "geo_distance": {
            "distance": "100km",
            "loc": { "lat": 13.4, "lon": 52.5 }
      }}}
    ]
}}
```

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