

ElasticSearch第二天

学习目标：

1. 能够完成创建索引的操作
2. 能够完成删除索引的操作
3. 能够完成创建映射的操作
4. 能够完成文档的增删改查
5. 能够完成文档的分页操作
6. 能够完成文档的高亮查询操作
7. 能够搭建Spring Data ElasticSearch的环境
8. 能够完成Spring Data ElasticSearch的基本增删改查操作
9. 能够掌握基本条件查询的方法命名规则

第一章 ElasticSearch常用编程操作

1.1 索引相关操作

1.1.1 创建索引

```
@Test
//创建索引
public void test1() throws Exception{
    // 创建Client连接对象
    TransportClient client = new PreBuiltTransportClient(Settings.EMPTY)
        .addTransportAddress(new
    InetSocketAddress(InetAddress.getByName("127.0.0.1"), 9300));
    //创建名称为blog2的索引
    client.admin().indices().prepareCreate("blog2").get();
    //释放资源
    client.close();
}
```

The screenshot shows the Kibana 'Index Management' page. At the top, there are tabs for 'blog2' and 'blog1'. Below the tabs, there are buttons for '信息' (Info) and '动作' (Actions). Underneath, there are two rows of index shards, each labeled 0 through 4. The first row is labeled 'Unassigned' and the second row is labeled '7TD9pkg'. The 'blog2' index is highlighted with a red box, showing its size as 324B (324B) and 0 documents. The 'blog1' index shows a size of 8.74ki (8.74ki) and 1 document.

The screenshot shows the 'blog1' index settings in Kibana. The 'mappings' section is highlighted with a red box, showing an empty object: `"mappings": { }`. A red text annotation next to it says '当前映射没有信息' (Current mapping has no information). The 'index' section shows settings like 'creation_date', 'number_of_shards', 'number_of_replicas', 'uuid', and 'version'. The 'primary_terms' section shows a list of terms: '0', '1', '2', '3', '4'.

1.1.2 删除索引

```

@Test
//删除索引
public void test2() throws Exception{
    // 创建Client连接对象
    TransportClient client = new PreBuiltTransportClient(Settings.EMPTY)
        .addTransportAddress(new
    InetSocketAddress(InetAddress.getByName("127.0.0.1"), 9300));
    //删除名称为blog2的索引
    client.admin().indices().prepareDelete("blog2").get();
    //释放资源
    client.close();
}

```

The screenshot shows the Kibana interface for Elasticsearch. The top navigation bar includes the Elasticsearch logo, a search bar with 'http://localhost:9200/' and a '连接' (Connect) button, and a 'elasticsearch' dropdown. Below the navigation bar are tabs for '概览' (Overview), '索引' (Indices), '数据浏览' (Data Explorer), '基本查询' (Basic Search), and '复合查询' (Advanced Search). The '集群概览' (Cluster Overview) section is active, showing a '集群排序' (Cluster Sort) dropdown, 'Sort Indices', 'View Aliases', and an 'Index Filter' input.

The main content area displays the status of indices. Two indices are shown: 'blog1' and '.kibana'. For 'blog1', the size is 8.74ki (8.74ki) and there is 1 document. For '.kibana', the size is 8.70ki (8.70ki) and there are 2 documents. Each index has '信息' (Info) and '动作' (Actions) buttons.

Below the index list, there is a section for 'Unassigned' and '7TD9pkg' shards. The 'Unassigned' section shows a row of 6 boxes, with the first box containing '0' and the others empty. The '7TD9pkg' section shows a row of 6 boxes, with the first box containing '0' and the others empty. Each box has a '信息' (Info) and '动作' (Actions) button.

1.2 映射相关操作

1.2.1 创建映射

```

@Test
//创建映射
public void test3() throws Exception{
    // 创建Client连接对象
    TransportClient client = new PreBuiltTransportClient(Settings.EMPTY)
        .addTransportAddress(new
    InetSocketAddress(InetAddress.getByName("127.0.0.1"), 9300));
    //创建索引
    client.admin().indices().prepareCreate("blog2").get();
    // 添加映射
    /**

```

```

* 格式:
* "mappings" : {
    "article" : {
        "properties" : {
            "id" : { "type" : "string" },
            "content" : { "type" : "string" },
            "author" : { "type" : "string" }
        }
    }
}
*/
XContentBuilder builder = XContentFactory.jsonBuilder()
    .startObject()
    .startObject("article")
    .startObject("properties")
    .startObject("id")
    .field("type", "integer").field("store", "yes")
    .endObject()
    .startObject("title")
    .field("type", "string").field("store", "yes").field("analyzer", "ik_smart")
    .endObject()
    .startObject("content")
    .field("type", "string").field("store", "yes").field("analyzer", "ik_smart")
    .endObject()
    .endObject()
    .endObject()
    .endObject();
// 创建映射
PutMappingRequest mapping = Requests.putMappingRequest("blog2")
    .type("article").source(builder);
client.admin().indices().putMapping(mapping).get();
//释放资源
client.close();
}

```

elasticsearch-head x 127.0.0.1:9200/_analyze x 127.0.0.1:9200/_analyze x

localhost:9100

应用 微信 百度 传智邮箱 RBVS OA 单点登录系统CAS搭 Elasticsearch学习 elastic search

Elasticsearch

http://localhost:9200/ 连接 elasticsearch 集群健康

概览 索引 数据浏览 基本查询 [+] 复合查询 [+]

集群概览 集群排序 Sort Indices View Aliases Index Filter

blog2

size: 810B (810B)
docs: 0 (0)

信息 动作

0 1 2 3 4

0 1 2 3 4

blog1

size: 8.74ki (8.74ki)
docs: 1 (1)

信息 动作

0 1 2 3 4

0 1 2 3 4

Unassigned

★ 7TD9pkg 信息 动作

blog2

Index Filter

```
{
  "state": "open",
  "settings": {
    "index": {
      "creation_date": "1522985770585",
      "number_of_shards": "5",
      "number_of_replicas": "1",
      "uuid": "NdAgIMd4Q-mZypLJCCEuWQ",
      "version": {
        "created": "5060899"
      },
      "provided_name": "blog2"
    }
  },
  "mappings": {
    "article": {
      "properties": {
        "id": {
          "store": true,
          "type": "integer"
        },
        "title": {
          "analyzer": "ik_smart",
          "store": true,
          "type": "text"
        },
        "content": {
          "analyzer": "ik_smart",
          "store": true,
          "type": "text"
        }
      }
    }
  },
  "aliases": [ ]
}
```

1.3 文档相关操作

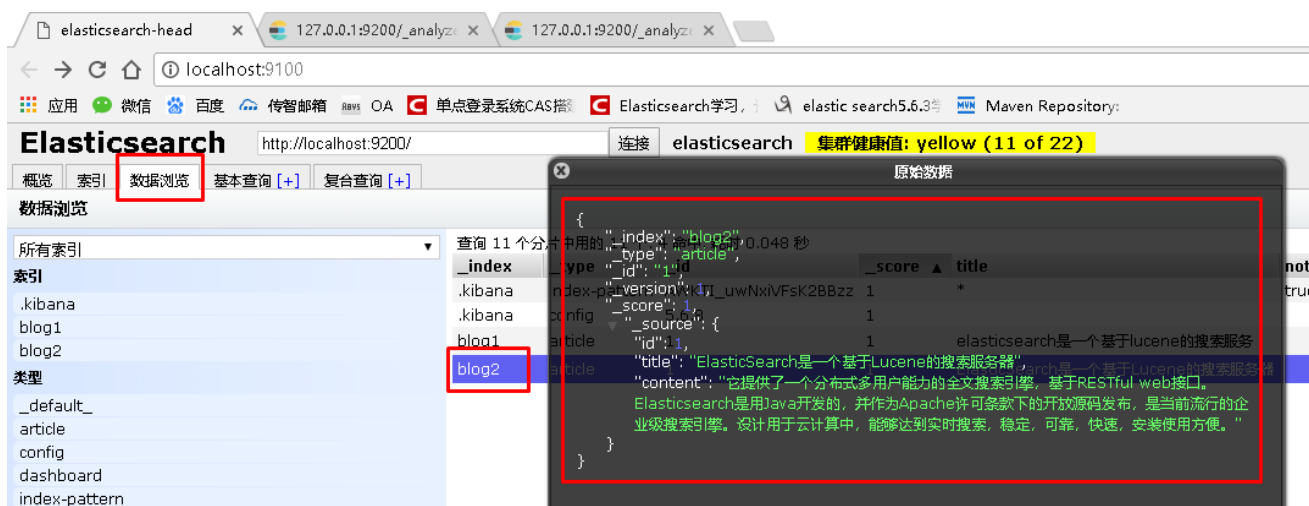
1.3.1 建立文档（通过XContentBuilder）

```
@Test
//创建文档(通过XContentBuilder)
public void test4() throws Exception{
    // 创建Client连接对象
    TransportClient client = new PreBuiltTransportClient(Settings.EMPTY)
        .addTransportAddress(new
    InetSocketAddress(InetAddress.getByName("127.0.0.1"), 9300));

    //创建文档信息
    XContentBuilder builder = XContentFactory.jsonBuilder()
        .startObject()
        .field("id", 1)
        .field("title", "ElasticSearch是一个基于Lucene的搜索服务器")
        .field("content",
            "它提供了一个分布式多用户能力的全文搜索引擎，基于RESTful web接口。Elasticsearch是用Java开发的，并作为Apache许可条款下的开放源码发布，是当前流行的企业级搜索引擎。设计用于云计算中，能够达到实时搜索，稳定，可靠，快速，安装使用方便。")
        .endObject();

    // 建立文档对象
    /**
     * 参数一blog1: 表示索引对象
     * 参数二article: 类型
     * 参数三1: 建立id
     */
    client.prepareIndex("blog2", "article", "1").setSource(builder).get();

    //释放资源
    client.close();
}
```



1.3.2 建立文档（使用Jackson转换实体）

1) 创建Article实体

```
public class Article {  
    private Integer id;  
    private String title;  
    private String content;  
    getter/setter...  
}
```

2) 添加jackson坐标

```
<dependency>  
    <groupId>com.fasterxml.jackson.core</groupId>  
    <artifactId>jackson-core</artifactId>  
    <version>2.8.1</version>  
</dependency>  
<dependency>  
    <groupId>com.fasterxml.jackson.core</groupId>  
    <artifactId>jackson-databind</artifactId>  
    <version>2.8.1</version>  
</dependency>  
<dependency>  
    <groupId>com.fasterxml.jackson.core</groupId>  
    <artifactId>jackson-annotations</artifactId>  
    <version>2.8.1</version>  
</dependency>
```

3) 代码实现

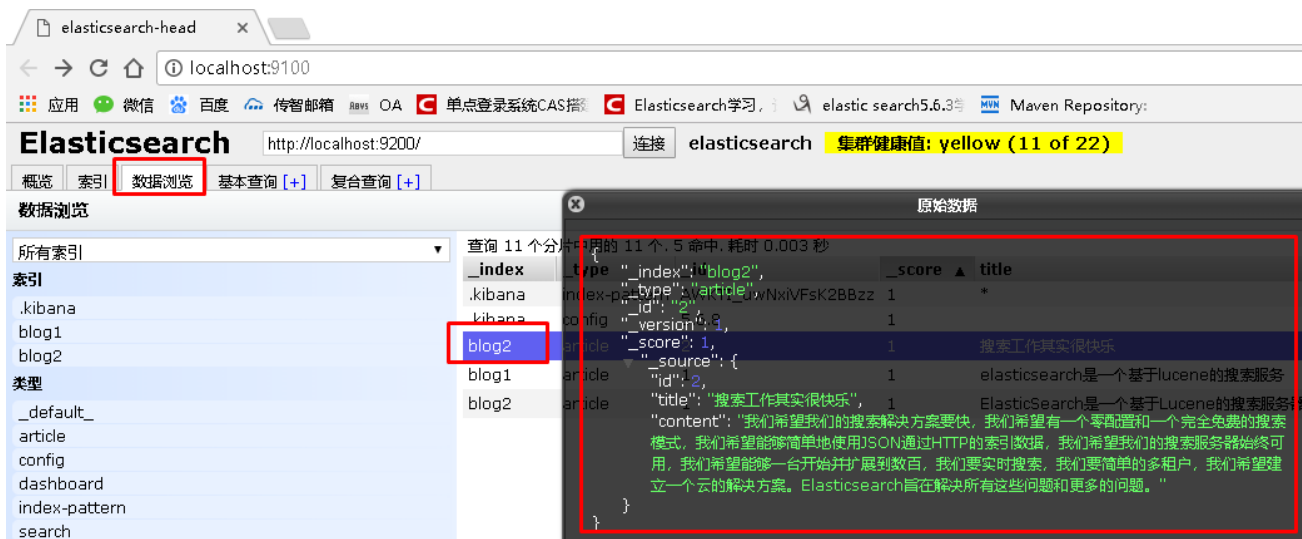
```
@Test  
//创建文档(通过实体转json)  
public void test5() throws Exception{  
    // 创建Client连接对象  
    TransportClient client = new PreBuiltTransportClient(Settings.EMPTY)  
        .addTransportAddress(new  
InetSocketAddress(InetAddress.getByAddress("127.0.0.1"), 9300));  
  
    // 描述json 数据  
    // {id:xxx, title:xxx, content:xxx}  
    Article article = new Article();  
    article.setId(2);  
    article.setTitle("搜索工作其实很快乐");  
    article.setContent("我们希望我们的搜索解决方案要快, 我们希望有一个零配置和一个完全免费的搜索模式, 我们希望能够简单地使用JSON通过HTTP的索引数据, 我们希望我们的搜索服务器始终可用, 我们希望能够一台开始并扩展到数百, 我们要实时搜索, 我们要简单的多租户, 我们希望建立一个云的解决方案。Elasticsearch旨在解决所有这些问题和更多的问题。");  
  
    ObjectMapper objectMapper = new ObjectMapper();  
  
    // 建立文档  
    client.prepareIndex("blog2", "article", article.getId().toString())
```

```

        .setSource(objectMapper.writeValueAsString(article)).get();

//释放资源
client.close();
}

```



1.3.3 修改文档

1.3.3.1 使用prepareUpdate、prepareIndex修改文档

```

@Test
//修改文档
public void test6() throws Exception{
    // 创建Client连接对象
    TransportClient client = new PreBuiltTransportClient(Settings.EMPTY)
        .addTransportAddress(new
    InetSocketAddress(InetAddress.getByAddress(new byte[] { 127, 0, 0, 1 }), 9300));

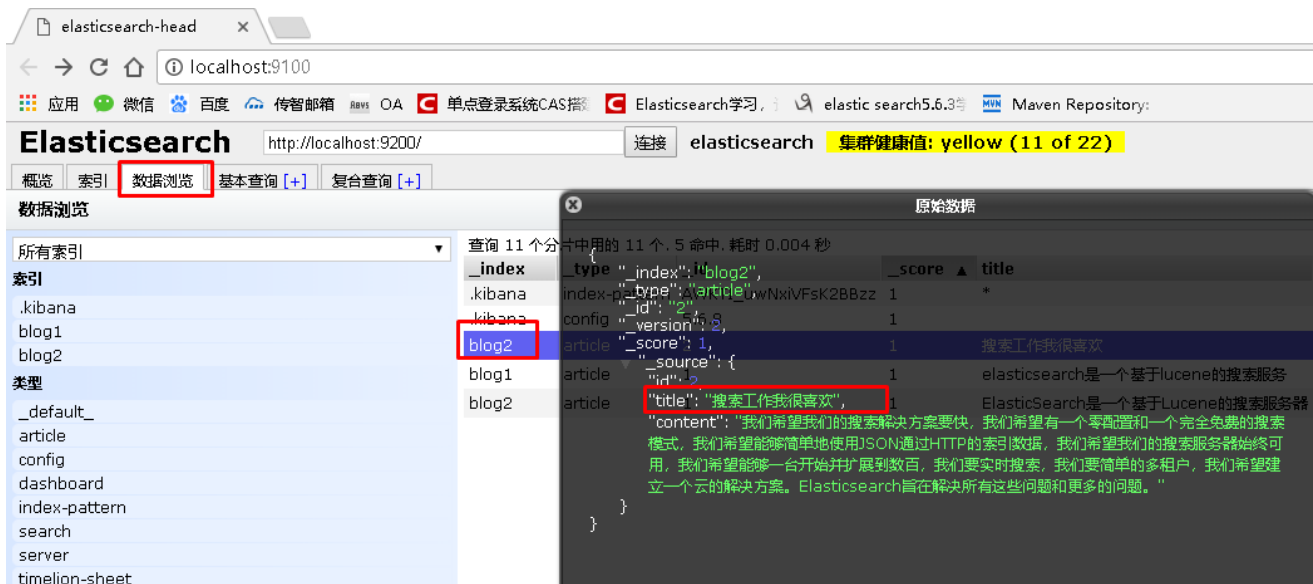
    Article article = new Article();
    article.setId(2);
    article.setTitle("搜索工作我很喜欢");
    article.setContent("我们希望我们的搜索解决方案要快，我们希望有一个零配置和一个完全免费的搜索模式，我们希望能够简单地使用JSON通过HTTP的索引数据，我们希望我们的搜索服务器始终可用，我们希望能够一台开始并扩展到数百，我们要实时搜索，我们要简单的多租户，我们希望建立一个云的解决方案。Elasticsearch旨在解决所有这些问题和更多的问题。");

    ObjectMapper objectMapper = new ObjectMapper();

    client.prepareUpdate("blog2", "article", article.getId().toString())
        .setDoc(objectMapper.writeValueAsString(article)).get();

//释放资源
client.close();
}

```

1.3.3.2 直接使用update修改文档

```
@Test
//修改文档
public void test7() throws Exception{
    // 创建Client连接对象
    TransportClient client = new PreBuiltTransportClient(Settings.EMPTY)
        .addTransportAddress(new
    InetSocketAddress(InetAddress.getByName("127.0.0.1"), 9300));

    Article article = new Article();
    article.setId(2);
    article.setTitle("搜索工作我特别喜欢");
    article.setContent("我们希望我们的搜索解决方案要快，我们希望有一个零配置和一个完全免费的搜索模式，我们希望能够简单地使用JSON通过HTTP的索引数据，我们希望我们的搜索服务器始终可用，我们希望能够一台开始并扩展到数百，我们要实时搜索，我们要简单的多租户，我们希望建立一个云的解决方案。Elasticsearch旨在解决所有这些问题和更多的问题。");

    ObjectMapper objectMapper = new ObjectMapper();

    client.update(new UpdateRequest("blog2", "article", article.getId().toString())
        .doc(objectMapper.writeValueAsString(article))).get();

    //释放资源
    client.close();
}
```

elasticsearch-head x

localhost:9100

应用 微信 百度 传智邮箱 BBS OA 单点登录系统CAS搭 Elasticsearch学习 elastic search5.6.3 Maven Repository

Elasticsearch http://localhost:9200/ 连接 elasticsearch 集群健康值: yellow (11 of 22)

概览 索引 数据浏览 基本查询 [+]

数据浏览

所有索引

索引

- .kibana
- blog1
- blog2

类型

- _default_
- article
- config
- dashboard
- index-pattern
- search
- server

查询 11 个分片中用的 11 个, 5 命中, 耗时 0.002 秒

_index	_type	_id	_score	title
.kibana	index-pattern	AWKTI_uwNxiVFsk2BBzz	1	*
.kibana	config	5.6.8	1	
blog1	article	1	1	搜索工作我特别特别喜欢
blog2	article	1	1	ElasticSearch是一个基于Lucene的搜索服务

原始数据

```
{
  "_index": "blog2",
  "_type": "article",
  "_id": "2",
  "_score": 1,
  "_source": {
    "title": "搜索工作我特别特别喜欢",
    "content": "我们希望我们的搜索解决方案要快, 我们希望有一个零配置和一个完全免费的搜索模式, 我们希望能够简单地使用JSON通过HTTP的索引数据, 我们希望我们的搜索服务器始终可用, 我们希望能够一台开始并扩展到数百, 我们要实时搜索, 我们要简单的多租户, 我们希望建立一个云解决方案. Elasticsearch旨在解决所有这些问题和更多的问题。"
  }
}
```

1.3.4 删除文档

1.3.4.1 通过prepareDelete 删除文档

```
@Test
//修改文档
public void test8() throws Exception{
    // 创建Client连接对象
    TransportClient client = new PreBuiltTransportClient(Settings.EMPTY)
        .addTransportAddress(new
    InetSocketAddress(InetAddress.getByName("127.0.0.1"), 9300));

    //删除blog2下的类型是article中的id为2的数据
    client.prepareDelete("blog2", "article", "2").get();

    //释放资源
    client.close();
}
```

elasticsearch-head x

localhost:9100

应用 微信 百度 传智邮箱 BBS OA 单点登录系统CAS搭 Elasticsearch学习 elastic search5.6.3 Maven Repository

Elasticsearch http://localhost:9200/ 连接 elasticsearch 集群健康值: yellow (11 of 22)

概览 索引 数据浏览 基本查询 [+]

数据浏览

所有索引

索引

- .kibana
- blog1
- blog2

类型

- _default_
- article

查询 11 个分片中用的 11 个, 4 命中, 耗时 0.002 秒

_index	_type	_id	_score	title
.kibana	index-pattern	AWKTI_uwNxiVFsk2BBzz	1	*
.kibana	config	5.6.8	1	
blog1	article	1	1	elasticsearch是一个
blog2	article	1	1	ElasticSearch是一个


没有索引为blog2 类型为 article id为2的数据

1.3.4.2 直接使用delete 删除文档

```
@Test
//修改文档
public void test9() throws Exception{
    // 创建Client连接对象
    TransportClient client = new PreBuiltTransportClient(Settings.EMPTY)
        .addTransportAddress(new
    InetSocketAddress(InetAddress.getByName("127.0.0.1"), 9300));

    //删除blog2下的类型是article中的id为1的数据
    client.delete(new DeleteRequest("blog2", "article", "1")).get();

    //释放资源
    client.close();
}
```



查询 11 个分片中用的 11 个, 3 命中, 耗时 0.002 秒

_index	_type	_id	_score	title
.kibana	index-pattern	AWKTI_uwNxiVFsk2BBzz	1	*
.kibana	config	5.6.8	1	
blog1	article	1	1	elasticsearch是一个

没有索引为blog2 类型为article id为1的数据

1.4 查询文档分页操作

1.4.1 批量插入数据

```
@Test
//批量插入100条数据
public void test10() throws Exception{
    // 创建Client连接对象
    TransportClient client = new PreBuiltTransportClient(Settings.EMPTY)
        .addTransportAddress(new
    InetSocketAddress(InetAddress.getByName("127.0.0.1"), 9300));

    ObjectMapper objectMapper = new ObjectMapper();

    for (int i = 1; i <= 100; i++) {
        // 描述json 数据
        Article article = new Article();

        article.setId(i);
    }
}
```

```

        article.setTitle(i + "搜索工作其实很快乐");
        article.setContent(i
            + "我们希望我们的搜索解决方案要快，我们希望有一个零配置和一个完全免费的
            搜索模式，我们希望能够简单地使用JSON通过HTTP的索引数据，我们希望我们的搜索服务器始终可用，我们希望能够
            一台开始并扩展到数百，我们要实时搜索，我们要简单的多租户，我们希望建立一个云的解决方案。Elasticsearch
            旨在解决所有这些问题和更多的问题。");
    }

    // 建立文档
    client.prepareIndex("blog2", "article", article.getId().toString())
        .setSource(objectMapper.writeValueAsString(article)).get();
}

// 释放资源
client.close();
}

```

The screenshot shows the Kibana Elasticsearch interface. The top navigation bar includes the Elasticsearch logo and a status indicator showing '集群健康值: yellow (11 of 22)'. The left sidebar shows the '数据浏览' (Data View) section with a list of indices including 'blog2'. The main content area displays a search results table for the 'blog2' index. The table has columns for '_index', '_type', '_id', '_score', 'title', and 'notExposed'. It shows 11 results, all of type 'article' with IDs 14 through 44, each with a score of 1 and the title '14搜索工作其实很快乐'.

_index	_type	_id	_score	title	notExposed
.kibana	index-pattern	AWKTI_uwNxiVfsK2BBzz	1	*	true
.kibana	config	5.6.8	1		
blog2	article	14	1	14搜索工作其实很快乐	
blog2	article	19	1	19搜索工作其实很快乐	
blog2	article	22	1	22搜索工作其实很快乐	
blog2	article	24	1	24搜索工作其实很快乐	
blog2	article	25	1	25搜索工作其实很快乐	
blog2	article	26	1	26搜索工作其实很快乐	
blog2	article	29	1	29搜索工作其实很快乐	
blog2	article	40	1	40搜索工作其实很快乐	
blog2	article	41	1	41搜索工作其实很快乐	
blog2	article	44	1	44搜索工作其实很快乐	

1.4.3 分页查询和排序

```

@Test
// 分页查询
public void test11() throws Exception {
    // 创建Client连接对象
    TransportClient client = new PreBuiltTransportClient(Settings.EMPTY)
        .addTransportAddress(new
    InetSocketAddress(InetAddress.getByAddress("127.0.0.1"), 9300));

    // 搜索数据
    SearchRequestBuilder searchRequestBuilder =
    client.prepareSearch("blog2").setTypes("article")
        .setQuery(QueryBuilders.matchAllQuery()); // 默认每页10条记录

    // 查询第2页数据，每页20条
}

```

```

//setFrom(): 从第几条开始检索，默认是0。
//setSize():每页最多显示的记录数。
searchRequestBuilder.setFrom(20).setSize(20);
// 排序
searchRequestBuilder.addSort("id", SortOrder.DESC);
SearchResponse searchResponse = searchRequestBuilder.get();

SearchHits hits = searchResponse.getHits(); // 获取命中次数，查询结果有多少对象
System.out.println("查询结果有: " + hits.getTotalHits() + "条");
Iterator<SearchHit> iterator = hits.iterator();
while (iterator.hasNext()) {
    SearchHit searchHit = iterator.next(); // 每个查询对象
    System.out.println(searchHit.getSourceAsString()); // 获取字符串格式打印
    System.out.println("id:" + searchHit.getSource().get("id"));
    System.out.println("title:" + searchHit.getSource().get("title"));
    System.out.println("content:" + searchHit.getSource().get("content"));
    System.out.println("-----");
}

//释放资源
client.close();
}

```

```

查询结果有: 100条
{"id":80,"title":"80搜索工作其实很快乐","content":"80我们希望我们的搜索解决方案要快，我们希望有一个零配置和一个完全免费
id:80
title:80搜索工作其实很快乐
content:80我们希望我们的搜索解决方案要快，我们希望有一个零配置和一个完全免费的搜索模式，我们希望能够简单地使用JSON通过HTT
-----
{"id":79,"title":"79搜索工作其实很快乐","content":"79我们希望我们的搜索解决方案要快，我们希望有一个零配置和一个完全免费
id:79
title:79搜索工作其实很快乐
content:79我们希望我们的搜索解决方案要快，我们希望有一个零配置和一个完全免费的搜索模式，我们希望能够简单地使用JSON通过HTT
-----
{"id":78,"title":"78搜索工作其实很快乐","content":"78我们希望我们的搜索解决方案要快，我们希望有一个零配置和一个完全免费
id:78
title:78搜索工作其实很快乐
content:78我们希望我们的搜索解决方案要快，我们希望有一个零配置和一个完全免费的搜索模式，我们希望能够简单地使用JSON通过HTT

```

1.5 查询结果高亮操作

1.5.1 什么是高亮显示

在进行关键字搜索时，搜索出的内容中的关键字会显示不同的颜色，称之为高亮

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1.5.2 高亮显示的html分析

通过开发者工具查看高亮数据的html代码实现:



ElasticSearch可以对查询出的内容中关键字部分进行标签和样式的设置，但是你需要告诉ElasticSearch使用什么标签对高亮关键字进行包裹

1.5.3 高亮显示代码实现

```
@Test
//高亮查询
public void test12() throws Exception{
    // 创建Client连接对象
    TransportClient client = new PreBuiltTransportClient(Settings.EMPTY)
        .addTransportAddress(new
    InetSocketAddress(InetAddress.getByName("127.0.0.1"), 9300));

    // 搜索数据
    SearchRequestBuilder searchRequestBuilder = client
        .prepareSearch("blog2").setTypes("article")
        .setQuery(QueryBuilders.termQuery("title", "搜索"));

    //设置高亮数据
    HighlightBuilder hiBuilder=new HighlightBuilder();
    hiBuilder.preTags("<font style='color:red'>");
    hiBuilder.postTags("</font>");
    hiBuilder.field("title");
    searchRequestBuilder.highlighter(hiBuilder);

    //获得查询结果数据
    SearchResponse searchResponse = searchRequestBuilder.get();
```

```

//获取查询结果集
SearchHits searchHits = searchResponse.getHits();
System.out.println("共搜到:"+searchHits.getTotalHits()+"条结果!");
//遍历结果
for(SearchHit hit:searchHits){
    System.out.println("String方式打印文档搜索内容:");
    System.out.println(hit.getSourceAsString());
    System.out.println("Map方式打印高亮内容");
    System.out.println(hit.getHighlightFields());

    System.out.println("遍历高亮集合, 打印高亮片段:");
    Text[] text = hit.getHighlightFields().get("title").getFragments();
    for (Text str : text) {
        System.out.println(str);
    }
}

//释放资源
client.close();
}

```

```

{"id":36,"title":"36搜索工作其实很快乐","content":"36我们希望我们的搜索解决方案要快,我们希望有一个零配置和一个完全免
Map方式打印高亮内容
{title=[title], fragments[[36<font style='color:red'>搜索</font>工作其实很快乐]]}
遍历高亮集合, 打印高亮片段:
36<font style='color:red'>搜索</font>工作其实很快乐
String方式打印文档搜索内容:
{"id":38,"title":"38搜索工作其实很快乐","content":"38我们希望我们的搜索解决方案要快,我们希望有一个零配置和一个完全免
Map方式打印高亮内容
{title=[title], fragments[[38<font style='color:red'>搜索</font>工作其实很快乐]]}
遍历高亮集合, 打印高亮片段:
38<font style='color:red'>搜索</font>工作其实很快乐
String方式打印文档搜索内容:
{"id":43,"title":"43搜索工作其实很快乐","content":"43我们希望我们的搜索解决方案要快,我们希望有一个零配置和一个完全免
Map方式打印高亮内容
{title=[title], fragments[[43<font style='color:red'>搜索</font>工作其实很快乐]]}
遍历高亮集合, 打印高亮片段:
43<font style='color:red'>搜索</font>工作其实很快乐

```

第二章 Spring Data Elasticsearch 使用

2.1 Spring Data Elasticsearch简介

2.1.1 什么是Spring Data

Spring Data是一个用于简化数据库访问, 并支持云服务的开源框架。其主要目标是使得对数据的访问变得方便快捷, 并支持map-reduce框架和云计算数据服务。Spring Data可以极大的简化JPA的写法, 可以在几乎不用写实现的情况下, 实现对数据的访问和操作。除了CRUD外, 还包括如分页、排序等一些常用的功能。

Spring Data的官网: <http://projects.spring.io/spring-data/>

Spring Data常用的功能模块如下:

Main modules

- **Spring Data Commons** - Core Spring concepts underpinning every Spring Data project.
- **Spring Data Gemfire** - Provides easy configuration and access to GemFire from Spring applications.
- **Spring Data JPA** - Makes it easy to implement JPA-based repositories.
- **Spring Data JDBC** - JDBC-based repositories.
- **Spring Data KeyValue** - **Map**-based repositories and SPIs to easily build a Spring Data module for key-value stores.
- **Spring Data LDAP** - Provides Spring Data repository support for **Spring LDAP**.
- **Spring Data MongoDB** - Spring based, object-document support and repositories for MongoDB.
- **Spring Data REST** - Exports Spring Data repositories as hypermedia-driven RESTful resources.
- **Spring Data Redis** - Provides easy configuration and access to Redis from Spring applications.
- **Spring Data for Apache Cassandra** - Spring Data module for Apache Cassandra.
- **Spring Data for Apache Solr** - Spring Data module for Apache Solr.

Community modules

- **Spring Data Aerospike** - Spring Data module for Aerospike.
- **Spring Data ArangoDB** - Spring Data module for ArangoDB.
- **Spring Data Couchbase** - Spring Data module for Couchbase.
- **Spring Data Azure DocumentDB** - Spring Data module for Microsoft Azure DocumentDB.
- **Spring Data DynamoDB** - Spring Data module for DynamoDB.
- **Spring Data Elasticsearch** - Spring Data module for Elasticsearch.
- **Spring Data Hazelcast** - Provides Spring Data repository support for Hazelcast.
- **Spring Data Jest** - Spring Data for Elasticsearch based on the Jest REST client.
- **Spring Data Neo4j** - Spring based, object-graph support and repositories for Neo4j.
- **Spring Data Spanner** - Google Spanner support via Spring Cloud GCP.
- **Spring Data Vault** - Vault repositories built on top of Spring Data KeyValue.

2.1.2 什么是Spring Data ElasticSearch

Spring Data ElasticSearch 基于 spring data API 简化 elasticSearch操作，将原始操作elasticSearch的客户端API 进行封装。Spring Data为Elasticsearch项目提供集成搜索引擎。Spring Data Elasticsearch POJO的关键功能区域为中心的模型与Elasticsearch交互文档和轻松地编写一个存储库数据访问层。

官方网站: <http://projects.spring.io/spring-data-elasticsearch/>

2.2 Spring Data ElasticSearch入门

1) 导入Spring Data ElasticSearch坐标

```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://maven.apache.org/POM/4.0.0
http://maven.apache.org/xsd/maven-4.0.0.xsd">
    <modelVersion>4.0.0</modelVersion>

    <groupId>com.itheima</groupId>
    <artifactId>itheima_elasticsearch_demo3</artifactId>
    <version>1.0-SNAPSHOT</version>

    <dependencies>
        <dependency>
            <groupId>org.elasticsearch</groupId>
            <artifactId>elasticsearch</artifactId>
            <version>5.6.8</version>
        </dependency>
        <dependency>
            <groupId>org.elasticsearch.client</groupId>
            <artifactId>transport</artifactId>
            <version>5.6.8</version>
        </dependency>
        <dependency>
            <groupId>org.apache.logging.log4j</groupId>
            <artifactId>log4j-to-slf4j</artifactId>
            <version>2.9.1</version>
        </dependency>
        <dependency>
            <groupId>org.slf4j</groupId>
            <artifactId>slf4j-api</artifactId>
            <version>1.7.24</version>
        </dependency>
        <dependency>
            <groupId>org.slf4j</groupId>
            <artifactId>slf4j-simple</artifactId>
            <version>1.7.21</version>
        </dependency>
        <dependency>
            <groupId>log4j</groupId>
            <artifactId>log4j</artifactId>
            <version>1.2.12</version>
        </dependency>
        <dependency>
            <groupId>junit</groupId>
            <artifactId>junit</artifactId>
            <version>4.12</version>
        </dependency>
    </dependencies>
```

```

<dependency>
  <groupId>com.fasterxml.jackson.core</groupId>
  <artifactId>jackson-core</artifactId>
  <version>2.8.1</version>
</dependency>
<dependency>
  <groupId>com.fasterxml.jackson.core</groupId>
  <artifactId>jackson-databind</artifactId>
  <version>2.8.1</version>
</dependency>
<dependency>
  <groupId>com.fasterxml.jackson.core</groupId>
  <artifactId>jackson-annotations</artifactId>
  <version>2.8.1</version>
</dependency>

<dependency>
  <groupId>org.springframework.data</groupId>
  <artifactId>spring-data-elasticsearch</artifactId>
  <version>3.0.5.RELEASE</version>
</dependency>

<dependency>
  <groupId>org.springframework</groupId>
  <artifactId>spring-test</artifactId>
  <version>5.0.4.RELEASE</version>
</dependency>

</dependencies>

</project>

```

2) 创建applicationContext.xml配置文件，引入elasticsearch命名空间

```

<?xml version="1.0" encoding="UTF-8"?>
<beans xmlns="http://www.springframework.org/schema/beans"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:context="http://www.springframework.org/schema/context"
  xmlns:elasticsearch="http://www.springframework.org/schema/data/elasticsearch"
  xsi:schemaLocation="
    http://www.springframework.org/schema/beans
    http://www.springframework.org/schema/beans/spring-beans.xsd
    http://www.springframework.org/schema/context
    http://www.springframework.org/schema/context/spring-context.xsd
    http://www.springframework.org/schema/data/elasticsearch
    http://www.springframework.org/schema/data/elasticsearch/spring-elasticsearch-
1.0.xsd
  ">

```

```
</beans>
```

3) 编写实体Article

```
package com.itheima.domain;

public class Article {

    private Integer id;
    private String title;
    private String content;
    public Integer getId() {
        return id;
    }
    public void setId(Integer id) {
        this.id = id;
    }
    public String getTitle() {
        return title;
    }
    public void setTitle(String title) {
        this.title = title;
    }
    public String getContent() {
        return content;
    }
    public void setContent(String content) {
        this.content = content;
    }
    @Override
    public String toString() {
        return "Article [id=" + id + ", title=" + title + ", content=" + content + "];"
    }
}
```

4) 编写Dao

```
package com.itheima.dao;

import com.itheima.domain.Article;
import org.springframework.data.elasticsearch.repository.ElasticsearchRepository;

public interface ArticleRepository extends ElasticsearchRepository<Article, Integer> {

}
```

5) 编写Service

```

package com.itheima.service;

import com.itheima.domain.Article;

public interface ArticleService {

    public void save(Article article);

}

```

```

package com.itheima.service.impl;

import com.itheima.dao.ArticleRepository;
import com.itheima.domain.Article;
import com.itheima.service.ArticleService;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.stereotype.Service;

@Service
public class ArticleServiceImpl implements ArticleService {

    @Autowired
    private ArticleRepository articleRepository;

    public void save(Article article) {
        articleRepository.save(article);
    }

}

```

6) 配置applicationContext.xml

```

<?xml version="1.0" encoding="UTF-8"?>
<beans xmlns="http://www.springframework.org/schema/beans"
       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
       xmlns:context="http://www.springframework.org/schema/context"
       xmlns:elasticsearch="http://www.springframework.org/schema/data/elasticsearch"
       xsi:schemaLocation="
           http://www.springframework.org/schema/beans
           http://www.springframework.org/schema/beans/spring-beans.xsd
           http://www.springframework.org/schema/context
           http://www.springframework.org/schema/context/spring-context.xsd
           http://www.springframework.org/schema/data/elasticsearch
           http://www.springframework.org/schema/data/elasticsearch/spring-elasticsearch-
1.0.xsd
       ">

    <!-- 扫描Dao包，自动创建实例 -->
    <elasticsearch:repositories base-package="com.itheima.dao"/>

```

```

<!-- 扫描Service包, 创建Service的实体 -->
<context:component-scan base-package="com.itheima.service"/>

<!-- 配置elasticSearch的连接 -->
<elasticsearch:transport-client id="client" cluster-nodes="localhost:9300" />

<!-- spring data elasticSearchDao 必须继承 ElasticsearchTemplate -->
<bean id="elasticsearchTemplate"
class="org.springframework.data.elasticsearch.core.ElasticsearchTemplate">
    <constructor-arg name="client" ref="client"></constructor-arg>
</bean>

</beans>

```

7) 配置实体

基于spring data elasticsearch注解配置索引、映射和实体的关系

```

package com.itheima.domain;

import org.springframework.data.annotation.Id;
import org.springframework.data.elasticsearch.annotations.Document;
import org.springframework.data.elasticsearch.annotations.Field;
import org.springframework.data.elasticsearch.annotations.FieldType;

/**@Document 文档对象 (索引信息、文档类型 )
 * @Document(indexName="blog3",type="article")
 */
public class Article {

    /**@Id 文档主键 唯一标识
     * @Id
     */
    /**@Field 每个文档的字段配置 (类型、是否分词、是否存储、分词器 )
     * @Field(store=true, index = false,type = FieldType.Integer)
     */
    private Integer id;
    @Field(index=true,analyzer="ik_smart",store=true,searchAnalyzer="ik_smart",type =
FieldType.text)
    private String title;
    @Field(index=true,analyzer="ik_smart",store=true,searchAnalyzer="ik_smart",type =
FieldType.text)
    private String content;
    public Integer getId() {
        return id;
    }
    public void setId(Integer id) {
        this.id = id;
    }
    public String getTitle() {
        return title;
    }
    public void setTitle(String title) {
        this.title = title;
    }
    public String getContent() {

```

```

        return content;
    }
    public void setContent(String content) {
        this.content = content;
    }
    @Override
    public String toString() {
        return "Article [id=" + id + ", title=" + title + ", content=" + content + "]";
    }
}

```

其中，注解解释如下：

```

@Document(indexName="blob3",type="article"):
    indexName: 索引的名称（必填项）
    type: 索引的类型
@Id: 主键的唯一标识
@Field(index=true,analyzer="ik_smart",store=true,searchAnalyzer="ik_smart",type =
FieldType.text)
    index: 是否设置分词
    analyzer: 存储时使用的分词器
    searchAnalyze: 搜索时使用的分词器
    store: 是否存储
    type: 数据类型

```

8) 创建测试类SpringDataESTest

```

package com.itheima.test;

import com.itheima.domain.Article;
import com.itheima.service.ArticleService;
import org.elasticsearch.client.transport.TransportClient;
import org.junit.Test;
import org.junit.runner.RunWith;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.data.elasticsearch.core.ElasticsearchTemplate;
import org.springframework.test.context.ContextConfiguration;
import org.springframework.test.context.junit4.SpringJUnit4ClassRunner;

@RunWith(SpringJUnit4ClassRunner.class)
@ContextConfiguration(locations="classpath:applicationContext.xml")
public class SpringDataESTest {

    @Autowired
    private ArticleService articleService;

    @Autowired
    private TransportClient client;

    @Autowired
    private ElasticsearchTemplate elasticsearchTemplate;
}

```

```

    /**创建索引和映射*/
    @Test
    public void createIndex(){
        elasticsearchTemplate.createIndex(Article.class);
        elasticsearchTemplate.putMapping(Article.class);
    }

    /**测试保存文档*/
    @Test
    public void saveArticle(){
        Article article = new Article();
        article.setId(100);
        article.setTitle("测试SpringData ElasticSearch");
        article.setContent("Spring Data ElasticSearch 基于 spring data API 简化
elasticSearch操作, 将原始操作elasticSearch的客户端API 进行封装 \n" +
            "    Spring Data为Elasticsearch Elasticsearch项目提供集成搜索引擎");
        articleService.save(article);
    }
}

```

2.3 Spring Data ElasticSearch的常用操作

2.3.1 增删改查方法测试

```

package com.itheima.service;

import com.itheima.domain.Article;
import org.springframework.data.domain.Page;
import org.springframework.data.domain.Pageable;

public interface ArticleService {

    //保存
    public void save(Article article);
    //删除
    public void delete(Article article);
    //查询全部
    public Iterable<Article> findAll();
    //分页查询
    public Page<Article> findAll(Pageable pageable);
}

```

```

package com.itheima.service.impl;

import com.itheima.dao.ArticleRepository;
import com.itheima.domain.Article;

```



```

import com.itheima.service.ArticleService;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.data.domain.Page;
import org.springframework.data.domain.Pageable;
import org.springframework.stereotype.Service;

```

```

@Service

```

```

public class ArticleServiceImpl implements ArticleService {

    @Autowired
    private ArticleRepository articleRepository;

    public void save(Article article) {
        articleRepository.save(article);
    }

    public void delete(Article article) {
        articleRepository.delete(article);
    }

    public Iterable<Article> findAll() {
        Iterable<Article> iter = articleRepository.findAll();
        return iter;
    }

    public Page<Article> findAll(Pageable pageable) {
        return articleRepository.findAll(pageable);
    }
}

```

```

package com.itheima.test;

```

```

import com.itheima.domain.Article;
import com.itheima.service.ArticleService;
import org.elasticsearch.client.transport.TransportClient;
import org.junit.Test;
import org.junit.runner.RunWith;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.data.domain.Page;
import org.springframework.data.domain.PageRequest;
import org.springframework.data.domain.Pageable;
import org.springframework.data.elasticsearch.core.ElasticsearchTemplate;
import org.springframework.test.context.ContextConfiguration;
import org.springframework.test.context.junit4.SpringJUnit4ClassRunner;

```

```

@RunWith(SpringJUnit4ClassRunner.class)

```

```

@ContextConfiguration(locations="classpath:applicationContext.xml")

```

```

public class SpringDataESTest {

```

```

    @Autowired

```

```

    private ArticleService articleService;

```

```

@Autowired
private TransportClient client;

@Autowired
private ElasticsearchTemplate elasticsearchTemplate;

/**创建索引和映射*/
@Test
public void createIndex(){
    elasticsearchTemplate.createIndex(Article.class);
    elasticsearchTemplate.putMapping(Article.class);
}

/**测试保存文档*/
@Test
public void saveArticle(){
    Article article = new Article();
    article.setId(100);
    article.setTitle("测试SpringData ElasticSearch");
    article.setContent("Spring Data ElasticSearch 基于 spring data API 简化
elasticSearch操作, 将原始操作elasticSearch的客户端API 进行封装 \n" +
        "    Spring Data为Elasticsearch Elasticsearch项目提供集成搜索引擎");
    articleService.save(article);
}

/**测试保存*/
@Test
public void save(){
    Article article = new Article();
    article.setId(1001);
    article.setTitle("elasticSearch 3.0版本发布");
    article.setContent("ElasticSearch是一个基于Lucene的搜索服务器。它提供了一个分布式多用户
能力的全文搜索引擎, 基于RESTful web接口");
    articleService.save(article);
}

/**测试更新*/
@Test
public void update(){
    Article article = new Article();
    article.setId(1001);
    article.setTitle("elasticSearch 3.0版本发布...更新");
    article.setContent("ElasticSearch是一个基于Lucene的搜索服务器。它提供了一个分布式多用户
能力的全文搜索引擎, 基于RESTful web接口");
    articleService.save(article);
}

/**测试删除*/
@Test
public void delete(){
    Article article = new Article();

    article.setId(1001);

```

```

        articleService.delete(article);
    }

    /**批量插入*/
    @Test
    public void save100(){
        for(int i=1;i<=100;i++){
            Article article = new Article();
            article.setId(i);
            article.setTitle(i+"elasticSearch 3.0版本发布..., 更新");
            article.setContent(i+"ElasticSearch是一个基于Lucene的搜索服务器。它提供了一个分布
式多用户能力的全文搜索引擎，基于RESTful web接口");
            articleService.save(article);
        }
    }

    /**排序查询*/
    @Test
    public void findAllSort(){
        Iterable<Article> list = articleService.findAll();
        for(Article article:list){
            System.out.println(article);
        }
    }

    /**分页查询*/
    @Test
    public void findAllPage(){
        Pageable pageable = new PageRequest(0, 10);
        Page<Article> page = articleService.findAll(pageable);
        for(Article article:page.getContent()){
            System.out.println(article);
        }
    }
}

```

2.3.2 常用查询命名规则

关键字	命名规则	解释	示例
and	findByField1AndField2	根据Field1和Field2获得数据	findByTitleAndContent
or	findByField1OrField2	根据Field1或Field2获得数据	findByTitleOrContent
is	findByField	根据Field获得数据	findByTitle
not	findByFieldNot	根据Field获得补集数据	findByTitleNot
between	findByFieldBetween	获得指定范围的数据	findByPriceBetween
lessThanEqual	findByFieldLessThan	获得小于等于指定值的数据	findByPriceLessThan

2.3.3 查询方法测试

需求：根据指定标题查询数据

1) dao层实现

```
package com.itheima.dao;

import com.itheima.domain.Article;
import org.springframework.data.domain.Page;
import org.springframework.data.domain.Pageable;
import org.springframework.data.elasticsearch.repository.ElasticsearchRepository;
import java.util.List;

public interface ArticleRepository extends ElasticsearchRepository<Article, Integer> {
    //根据标题查询
    List<Article> findByTitle(String condition);
    //根据标题查询(含分页)
    Page<Article> findByTitle(String condition, Pageable pageable);
}
```

2) service层实现

```
public interface ArticleService {
    //根据标题查询
    List<Article> findByTitle(String condition);
    //根据标题查询(含分页)
    Page<Article> findByTitle(String condition, Pageable pageable);
}
```

```
package com.itheima.service.impl;

import com.itheima.dao.ArticleRepository;
import com.itheima.domain.Article;
import com.itheima.service.ArticleService;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.data.domain.Page;
import org.springframework.data.domain.Pageable;
import org.springframework.stereotype.Service;

import java.util.List;

@Service
public class ArticleServiceImpl implements ArticleService {

    @Autowired
    private ArticleRepository articleRepository;

    public List<Article> findByTitle(String condition) {
        return articleRepository.findByTitle(condition);
    }
}
```

```

    public Page<Article> findByTitle(String condition, Pageable pageable) {
        return articleRepository.findByTitle(condition,pageable);
    }

}

```

3) 测试代码

```

package com.itheima.test;

import com.itheima.domain.Article;
import com.itheima.service.ArticleService;
import org.elasticsearch.client.transport.TransportClient;
import org.junit.Test;
import org.junit.runner.RunWith;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.data.domain.Page;
import org.springframework.data.domain.PageRequest;
import org.springframework.data.domain.Pageable;
import org.springframework.data.elasticsearch.core.ElasticsearchTemplate;
import org.springframework.test.context.ContextConfiguration;
import org.springframework.test.context.junit4.SpringJUnit4ClassRunner;

import java.util.List;

@RunWith(SpringJUnit4ClassRunner.class)
@ContextConfiguration(locations="classpath:applicationContext.xml")
public class SpringDataESTest {

    @Autowired
    private ArticleService articleService;

    @Autowired
    private TransportClient client;

    @Autowired
    private ElasticsearchTemplate elasticsearchTemplate;

    /**条件查询*/
    @Test
    public void findByTitle(){
        String condition = "版本";
        List<Article> articleList = articleService.findByTitle(condition);
        for(Article article:articleList){
            System.out.println(article);
        }
    }

    /**条件分页查询*/
    @Test
    public void findByTitlePage(){

```

```
String condition = "版本";
Pageable pageable = new PageRequest(0, 5);
Page<Article> page = articleService.findByTitle(condition,pageable);
for(Article article:page.getContent()){
    System.out.println(article);
}

}
```