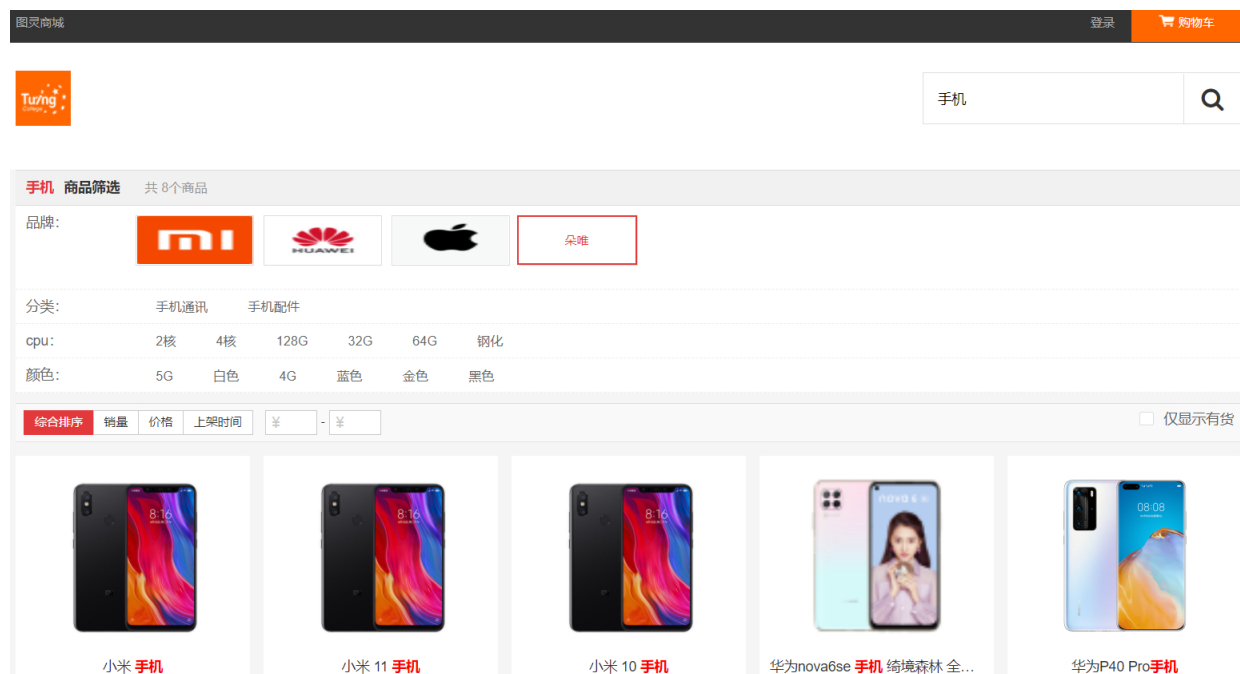主讲老师：Fox

1. 业务场景——图灵商城商品搜索

根据关键字查询、根据品牌、商品类别、商品属性信息、价格区间、是否有库存筛选查询，根据销量、价格、上架时间等排序

2. 商品文档建模

商品json文档

```json
{
  "id": "26",
  "name": "小米 11 手机",
  "keywords": "小米手机",
  "subTitle": "AI智慧全面屏 6GB +64GB 亮黑色 全网通版 移动联通电信4G手机 双卡双待 双卡双待",
  "price": "3999",
  "promotionPrice": "2999",
  "originalPrice": "5999",
  "pic": "http://macro-oss.oss-cn-shenzhen.aliyuncs.com/mall/images/20180615/xiaomi.jpg",
  "sale": 999,
  "hasStock": true,
  "salecount":999,
  "putawayDate":"2021-04-01",
  "brandId": 6,
  "brandName": "小米",
  "brandImg": "http://macro-oss.oss-cn-shenzhen.aliyuncs.com/mall/images/20190129/1e34aef2a409119018a4c6258e39ecfb_222_222.png",
  "categoryId": 19,
  "categoryName": "手机通讯",
  "attrs": [
    {
      "attrId": 1,
      "attrName": "cpu",
      "attrValue": "2核"
    },
    {
      "attrId": 2,
      "attrName": "颜色",
      "attrValue": "黑色"
    }
  ]
}

{
  "id": "30",
  "name": "HLA海澜之家简约动物印花短袖T恤",
  "keywords": "海澜之家衣服",
  "subTitle": "HLA海澜之家短袖T恤",
```

```
38      "price": "199",
39      "promotionPrice": "99",
40      "originalPrice": "299",
41      "pic": "http://macro-oss.oss-cn-
        shenzhen.aliyuncs.com/mall/images/20180615/5ad83a4fN6ff67ecd.jpg!cc_350x449.jpg",
42      "sale": 999,
43      "hasStock": true,
44      "salecount":19,
45      "putawayDate":"2021-04-05",
46      "brandId": 50,
47      "brandName": "海澜之家",
48      "brandImg": "http://macro-oss.oss-cn-
        shenzhen.aliyuncs.com/mall/images/20190129/99d3279f1029d32b929343b09d3c72de_222_222.jpg
        ",
49      "categoryId": 8,
50      "categoryName": "T恤",
51      "attrs": [
52        {
53          "attrId": 3,
54          "attrName": "尺寸",
55          "attrValue": "M"
56        },
57        {
58          "attrId": 4,
59          "attrName": "颜色",
60          "attrValue": "黑色"
61        }
62      ]
63    }
```

建模分析：

- name，keywords，subTitle 需要使用中文分词器
- categoryName，brandName 类型可以为keyword
- 不同的商品其属性也不同，属性和商品之间存在关联关系。商品属性attrs不会频繁更新，可以选择使用nested类型

思考：如何处理商品和商品属性之间的关联关系？

定义mapping，创建索引

```
PUT product_db
{
  "mappings": {
    "properties": {
      "id": {
        "type": "long"
      },
      "name": {
        "type": "text",
        "analyzer": "ik_max_word"
      },
      "keywords": {
        "type": "text",
        "analyzer": "ik_max_word"
      },
      "subTitle": {
        "type": "text",
        "analyzer": "ik_max_word"
      },
      "salecount":{
        "type": "long"
      },
       "putawayDate":{
        "type": "date"
      },
      "price": {
        "type": "double"
      },

      "promotionPrice": {
        "type": "keyword"
      },
      "originalPrice": {
        "type": "keyword"
      },
      "pic": {
        "type": "keyword"
      },
      "sale": {
```

```
        "type": "long"
      },
      "hasStock": {
        "type": "boolean"
      },
      "brandId": {
        "type": "long"
      },
      "brandName": {
        "type": "keyword"
      },
      "brandImg": {
        "type": "keyword"
      },
      "categoryId": {
        "type": "long"
      },
      "categoryName": {
        "type": "keyword"
      },
      "attrs": {
        "type": "nested",
        "properties": {
          "attrId": {
            "type": "long"
          },
          "attrName": {
            "type": "keyword"
          },
          "attrValue": {
            "type": "keyword"
          }
        }
      }
    }
  }
}
```

测试数据

测试数据

```
PUT /product_db/_doc/1
{
  "id": "26",
  "name": "小米 11 手机",
  "keywords": "小米手机",
  "subTitle": "AI智慧全面屏 6GB +64GB 亮黑色 全网通版 移动联通电信4G手机 双卡双待 双卡双待",
  "price": "3999",
  "promotionPrice": "2999",
  "originalPrice": "5999",
  "pic": "http://macro-oss.oss-cn-shenzhen.aliyuncs.com/mall/images/20180615/xiaomi.jpg",
  "sale": 999,
  "hasStock": true,
  "salecount":999,
  "putawayDate":"2021-04-01",
  "brandId": 6,
  "brandName": "小米",
  "brandImg": "http://macro-oss.oss-cn-shenzhen.aliyuncs.com/mall/images/20190129/1e34aef2a409119018a4c6258e39ecfb_222_222.png",
  "categoryId": 19,
  "categoryName": "手机通讯",
  "attrs": [
    {
      "attrId": 1,
      "attrName": "cpu",
      "attrValue": "2核"
    },
    {
      "attrId": 2,
      "attrName": "颜色",
      "attrValue": "黑色"
    }
  ]
}

PUT /product_db/_doc/2
{
  "id": "27",
  "name": "小米 10 手机",
```

```
38      "keywords": "小米手机",
39      "subTitle": "AI智慧全面屏 4GB +64GB 亮白色 全网通版 移动联通电信4G手机 双卡双待 双卡双待",
40      "price": "2999",
41      "promotionPrice": "1999",
42      "originalPrice": "3999",
43      "pic": "http://macro-oss.oss-cn-
        shenzhen.aliyuncs.com/mall/images/20180615/xiaomi.jpg",
44      "sale": 999,
45      "hasStock": false,
46      "salecount":99,
47      "putawayDate":"2021-04-02",
48      "brandId": 6,
49      "brandName": "小米",
50      "brandImg": "http://macro-oss.oss-cn-
        shenzhen.aliyuncs.com/mall/images/20190129/1e34aef2a409119018a4c6258e39ecfb_222_222.png
        ",
51      "categoryId": 19,
52      "categoryName": "手机通讯",
53      "attrs": [
54        {
55          "attrId": 1,
56          "attrName": "cpu",
57          "attrValue": "4核"
58        },
59        {
60          "attrId": 2,
61          "attrName": "颜色",
62          "attrValue": "白色"
63        }
64      ]
65    }
66    PUT /product_db/_doc/3
67    {
68      "id": "28",
69      "name": "小米　手机",
70      "keywords": "小米手机",
71      "subTitle": "AI智慧全面屏 4GB +64GB 亮蓝色 全网通版 移动联通电信4G手机 双卡双待 双卡双待",
72      "price": "2999",
73      "promotionPrice": "1999",
74      "originalPrice": "3999",
75      "pic": "http://macro-oss.oss-cn-
        shenzhen.aliyuncs.com/mall/images/20180615/xiaomi.jpg",
```

```
76      "sale": 999,
77      "hasStock": true,
78      "salecount":199,
79      "putawayDate":"2021-04-03",
80      "brandId": 6,
81      "brandName": "小米",
82      "brandImg": "http://macro-oss.oss-cn-
        shenzhen.aliyuncs.com/mall/images/20190129/1e34aef2a409119018a4c6258e39ecfb_222_222.png
        ",
83      "categoryId": 19,
84      "categoryName": "手机通讯",
85      "attrs": [
86        {
87          "attrId": 1,
88          "attrName": "cpu",
89          "attrValue": "2核"
90        },
91        {
92          "attrId": 2,
93          "attrName": "颜色",
94          "attrValue": "蓝色"
95        }
96      ]
97    }
98    PUT /product_db/_doc/4
99    {
100     "id": "29",
101     "name": "Apple iPhone 8 Plus 64GB 金色特别版 移动联通电信4G手机",
102     "keywords": "苹果手机",
103     "subTitle": "苹果手机 Apple产品年中狂欢节，好物尽享，美在智慧！速来 >> 勾选[保障服务][原厂
        保2年]，获得AppleCare+全方位服务计划，原厂延保售后无忧。",
104     "price": "5999",
105     "promotionPrice": "4999",
106     "originalPrice": "7999",
107     "pic": "http://macro-oss.oss-cn-
        shenzhen.aliyuncs.com/mall/images/20180615/5acc5248N6a5f81cd.jpg",
108     "sale": 999,
109     "hasStock": true,
110     "salecount":1199,
111     "putawayDate":"2021-04-04",
112     "brandId": 51,
113     "brandName": "苹果",
```

```
114      "brandImg": "http://macro-oss.oss-cn-
     shenzhen.aliyuncs.com/mall/images/20180607/timg.jpg",
115      "categoryId": 19,
116      "categoryName": "手机通讯",
117      "attrs": [
118        {
119          "attrId": 1,
120          "attrName": "cpu",
121          "attrValue": "4核"
122        },
123        {
124          "attrId": 2,
125          "attrName": "颜色",
126          "attrValue": "金色"
127        }
128      ]
129    }
130  PUT /product_db/_doc/5
131  {
132      "id": "30",
133      "name": "HLA海澜之家简约动物印花短袖T恤",
134      "keywords": "海澜之家衣服",
135      "subTitle": "HLA海澜之家短袖T恤",
136      "price": "199",
137      "promotionPrice": "99",
138      "originalPrice": "299",
139      "pic": "http://macro-oss.oss-cn-
     shenzhen.aliyuncs.com/mall/images/20180615/5ad83a4fN6ff67ecd.jpg!cc_350x449.jpg",
140      "sale": 999,
141      "hasStock": true,
142      "salecount":19,
143      "putawayDate":"2021-04-05",
144      "brandId": 50,
145      "brandName": "海澜之家",
146      "brandImg": "http://macro-oss.oss-cn-
     shenzhen.aliyuncs.com/mall/images/20190129/99d3279f1029d32b929343b09d3c72de_222_222.jpg
     ",
147      "categoryId": 8,
148      "categoryName": "T恤",
149      "attrs": [
150        {
151          "attrId": 3,
```

```
152        "attrName": "尺寸",
153        "attrValue": "M"
154      },
155      {
156        "attrId": 4,
157        "attrName": "颜色",
158        "attrValue": "黑色"
159      }
160    ]
161  }
162  PUT /product_db/_doc/6
163  {
164    "id": "31",
165    "name": "HLA海澜之家蓝灰花纹圆领针织布短袖T恤",
166    "keywords": "海澜之家衣服",
167    "subTitle": "HLA海澜之家短袖T恤",
168    "price": "299",
169    "promotionPrice": "199",
170    "originalPrice": "299",
171    "pic": "http://macro-oss.oss-cn-
    shenzhen.aliyuncs.com/mall/images/20180615/5ac98b64N70acd82f.jpg!cc_350x449.jpg",
172    "sale": 999,
173    "hasStock": true,
174    "salecount":399,
175    "putawayDate":"2021-04-06",
176    "brandId": 50,
177    "brandName": "海澜之家",
178    "brandImg": "http://macro-oss.oss-cn-
    shenzhen.aliyuncs.com/mall/images/20190129/99d3279f1029d32b929343b09d3c72de_222_222.jpg
    ",
179    "categoryId": 8,
180    "categoryName": "T恤",
181    "attrs": [
182      {
183        "attrId": 3,
184        "attrName": "尺寸",
185        "attrValue": "X"
186      },
187      {
188        "attrId": 4,
189        "attrName": "颜色",
```

```
190        "attrValue": "蓝灰"
191      }
192    ]
193  }
194  PUT /product_db/_doc/7
195  {
196    "id": "32",
197    "name": "HLA海澜之家短袖T恤男基础款",
198    "keywords": "海澜之家衣服",
199    "subTitle": "HLA海澜之家短袖T恤",
200    "price": "269",
201    "promotionPrice": "169",
202    "originalPrice": "399",
203    "pic": "http://macro-oss.oss-cn-
      shenzhen.aliyuncs.com/mall/images/20180615/5a51eb88Na4797877.jpg",
204    "sale": 999,
205    "hasStock": true,
206    "salecount":399,
207    "putawayDate":"2021-04-07",
208    "brandId": 50,
209    "brandName": "海澜之家",
210    "brandImg": "http://macro-oss.oss-cn-
      shenzhen.aliyuncs.com/mall/images/20190129/99d3279f1029d32b929343b09d3c72de_222_222.jpg
      ",
211    "categoryId": 8,
212    "categoryName": "T恤",
213    "attrs": [
214      {
215        "attrId": 3,
216        "attrName": "尺寸",
217        "attrValue": "L"
218      },
219      {
220        "attrId": 4,
221        "attrName": "颜色",
222        "attrValue": "蓝色"
223      }
224    ]
225  }
226  PUT /product_db/_doc/8
227  {
```

```
228    "id": "33",
229    "name": "小米（MI）小米电视4A ",
230    "keywords": "小米电视机家用电器",
231    "subTitle": "小米（MI）小米电视4A 55英寸 L55M5-AZ/L55M5-AD 2GB+8GB HDR 4K超高清 人工智能
       网络液晶平板电视",
232    "price": "2269",
233    "promotionPrice": "2169",
234    "originalPrice": "2399",
235    "pic": "http://macro-oss.oss-cn-
       shenzhen.aliyuncs.com/mall/images/20180615/5b02804dN66004d73.jpg",
236    "sale": 999,
237    "hasStock": true,
238    "salecount":132,
239    "putawayDate":"2021-04-09",
240    "brandId": 6,
241    "brandName": "小米",
242    "brandImg": "http://macro-oss.oss-cn-
       shenzhen.aliyuncs.com/mall/images/20190129/1e34aef2a409119018a4c6258e39ecfb_222_222.png
       ",
243    "categoryId": 35,
244    "categoryName": "手机数码",
245    "attrs": [
246      {
247        "attrId": 5,
248        "attrName": "屏幕尺寸",
249        "attrValue": "52"
250      },
251      {
252        "attrId": 6,
253        "attrName": "机身颜色",
254        "attrValue": "黑色"
255      }
256    ]
257  }
258  PUT /product_db/_doc/9
259  {
260    "id": "34",
261    "name": "小米（MI）小米电视4A 65英寸",
262    "keywords": "小米电视机家用电器",
263    "subTitle": "小米（MI）小米电视4A 65英寸 L55M5-AZ/L55M5-AD 2GB+8GB HDR 4K超高清 人工智能
       网络液晶平板电视",
264    "price": "3269",
```

```
265      "promotionPrice": "3169",
266      "originalPrice": "3399",
267      "pic": "http://macro-oss.oss-cn-
     shenzhen.aliyuncs.com/mall/images/20180615/5b028530N51eee7d4.jpg",
268      "sale": 999,
269      "hasStock": true,
270      "salecount":999,
271      "putawayDate":"2021-04-10",
272      "brandId": 6,
273      "brandName": "小米",
274      "brandImg": "http://macro-oss.oss-cn-
     shenzhen.aliyuncs.com/mall/images/20190129/1e34aef2a409119018a4c6258e39ecfb_222_222.png
     ",
275      "categoryId": 35,
276      "categoryName": "手机数码",
277      "attrs": [
278        {
279          "attrId": 5,
280          "attrName": "屏幕尺寸",
281          "attrValue": "65"
282        },
283        {
284          "attrId": 6,
285          "attrName": "机身颜色",
286          "attrValue": "金色"
287        }
288      ]
289    }
290  PUT /product_db/_doc/10
291  {
292      "id": "35",
293      "name": "耐克NIKE 男子 休闲鞋 ROSHE RUN 运动鞋 511881-010黑色41码",
294      "keywords": "耐克运动鞋 鞋子",
295      "subTitle": "耐克NIKE 男子 休闲鞋 ROSHE RUN 运动鞋 511881-010黑色41码",
296      "price": "569",
297      "promotionPrice": "369",
298      "originalPrice": "899",
299      "pic": "http://macro-oss.oss-cn-
     shenzhen.aliyuncs.com/mall/images/20180615/5b235bb9Nf606460b.jpg",
300      "sale": 999,
301      "hasStock": true,
302      "salecount":399,
```

```
303     "putawayDate":"2021-04-11",
304     "brandId": 58,
305     "brandName": "NIKE",
306     "brandImg": "http://macro-oss.oss-cn-shenzhen.aliyuncs.com/mall/images/20180615/timg
        (51).jpg",
307     "categoryId": 29,
308     "categoryName": "男鞋",
309     "attrs": [
310       {
311         "attrId": 7,
312         "attrName": "尺码",
313         "attrValue": "42"
314       },
315       {
316         "attrId": 8,
317         "attrName": "颜色",
318         "attrValue": "黑色"
319       }
320     ]
321   }
322   PUT /product_db/_doc/11
323   {
324     "id": "36",
325     "name": "耐克NIKE 男子 气垫 休闲鞋 AIR MAX 90 ESSENTIAL 运动鞋 AJ1285-101白色41码",
326     "keywords": "耐克运动鞋 鞋子",
327     "subTitle": "AIR MAX 90 ESSENTIAL 运动鞋 AJ1285-101白色",
328     "price": "769",
329     "promotionPrice": "469",
330     "originalPrice": "999",
331     "pic": "http://macro-oss.oss-cn-
        shenzhen.aliyuncs.com/mall/images/20180615/5b19403eN9f0b3cb8.jpg",
332     "sale": 999,
333     "hasStock": true,
334     "salecount":499,
335     "putawayDate":"2021-04-13",
336     "brandId": 58,
337     "brandName": "NIKE",
338     "brandImg": "http://macro-oss.oss-cn-shenzhen.aliyuncs.com/mall/images/20180615/timg
        (51).jpg",
339     "categoryId": 29,
340     "categoryName": "男鞋",
```

```
341      "attrs": [
342        {
343          "attrId": 7,
344          "attrName": "尺码",
345          "attrValue": "44"
346        },
347        {
348          "attrId": 8,
349          "attrName": "颜色",
350          "attrValue": "白色"
351        }
352      ]
353    }
354    PUT /product_db/_doc/12
355    {
356      "id": "37",
357      "name": "(华为)HUAWEI MateBook X Pro 2019款 13.9英寸3K触控全面屏 轻薄笔记本",
358      "keywords": "轻薄笔记本华为 笔记本电脑",
359      "subTitle": "轻薄华为笔记本 电脑",
360      "price": "4769",
361      "promotionPrice": "4469",
362      "originalPrice": "4999",
363      "pic": "http://tuling-mall.oss-cn-
    shenzhen.aliyuncs.com/tulingmall/images/20200317/800_800_1555752016264mp.png",
364      "sale": 999,
365      "hasStock": true,
366      "salecount":699,
367      "putawayDate":"2021-04-14",
368      "brandId": 3,
369      "brandName": "华为",
370      "brandImg": "http://macro-oss.oss-cn-
    shenzhen.aliyuncs.com/mall/images/20190129/17f2dd9756d9d333bee8e60ce8c03e4c_222_222.jpg
    ",
371      "categoryId": 19,
372      "categoryName": "手机通讯",
373      "attrs": [
374        {
375          "attrId": 9,
376          "attrName": "容量",
377          "attrValue": "16G"
378        },
```

```
379        {
380          "attrId": 10,
381          "attrName": "网络",
382          "attrValue": "4G"
383        }
384      ]
385  }
386  PUT /product_db/_doc/13
387  {
388    "id": "38",
389    "name": "华为nova6se 手机 绮境森林 全网通（8G+128G)",
390    "keywords": "轻薄笔记本华为 手机",
391    "subTitle": "华为nova6se 手机",
392    "price": "6769",
393    "promotionPrice": "6469",
394    "originalPrice": "6999",
395    "pic": "http://macro-oss.oss-cn-
       shenzhen.aliyuncs.com/mall/images/20180607/5ac1bf58Ndefaac16.jpg",
396    "sale": 999,
397    "hasStock": true,
398    "salecount":899,
399    "putawayDate":"2021-04-15",
400    "brandId": 3,
401    "brandName": "华为",
402    "brandImg": "http://macro-oss.oss-cn-
       shenzhen.aliyuncs.com/mall/images/20190129/17f2dd9756d9d333bee8e60ce8c03e4c_222_222.jpg
       ",
403    "categoryId": 19,
404    "categoryName": "手机通讯",
405    "attrs": [
406      {
407        "attrId": 9,
408        "attrName": "容量",
409        "attrValue": "64G"
410      },
411      {
412        "attrId": 10,
413        "attrName": "网络",
414        "attrValue": "5G"
415      }
416    ]
```

```
417    }
418    PUT /product_db/_doc/14
419    {
420      "id": "39",
421      "name": "iPhone7/6s/8钢化膜苹果8Plus全屏复盖抗蓝光防窥防偷看手机膜",
422      "keywords": "手机膜",
423      "subTitle": "iPhone7/6s/8钢化膜苹果8Plus全屏复盖抗蓝光防窥防偷看手机膜",
424      "price": "29",
425      "promotionPrice": "39",
426      "originalPrice": "49",
427      "pic": "http://tuling-mall.oss-cn-
       shenzhen.aliyuncs.com/tulingmall/images/20200311/6df99dab78bb2014.jpg",
428      "sale": 999,
429      "hasStock": true,
430      "salecount":799,
431      "putawayDate":"2021-04-16",
432      "brandId": 51,
433      "brandName": "苹果",
434      "brandImg": "http://tuling-mall.oss-cn-
       shenzhen.aliyuncs.com/tulingmall/images/20200311/2b84746650fc122d67749a876c453619.png",
435      "categoryId": 30,
436      "categoryName": "手机配件",
437      "attrs": [
438        {
439          "attrId": 11,
440          "attrName": "手机膜-材料",
441          "attrValue": "钢化"
442        },
443        {
444          "attrId": 12,
445          "attrName": "手机膜-颜色",
446          "attrValue": "白色"
447        }
448      ]
449    }
450
451    PUT /product_db/_doc/15
452    {
453      "id": "40",
454      "name": "七匹狼短袖T恤男纯棉舒适春夏修身运动休闲短袖三条装 圆领3条装",
455      "keywords": "七匹狼服装 衣服",
```

```
456        "subTitle": "七匹狼短袖T恤男纯棉舒适春夏修身运动休闲短袖三条装  圆领3条装",
457        "price": "129",
458        "promotionPrice": "139",
459        "originalPrice": "149",
460        "pic": "http://tuling-mall.oss-cn-
       shenzhen.aliyuncs.com/tulingmall/images/20200311/19e846e727dff337.jpg",
461        "sale": 999,
462        "hasStock": true,
463        "salecount":199,
464        "putawayDate":"2021-04-20",
465        "brandId": 49,
466        "brandName": "七匹狼",
467        "brandImg": "http://macro-oss.oss-cn-
       shenzhen.aliyuncs.com/mall/images/20190129/18d8bc3eb13533fab466d702a0d3fd1f40345bcd.jpg
       ",
468        "categoryId": 8,
469        "categoryName": "T恤",
470        "attrs": [
471          {
472            "attrId": 3,
473            "attrName": "尺寸",
474            "attrValue": "M"
475          },
476          {
477            "attrId": 4,
478            "attrName": "颜色",
479            "attrValue": "白色"
480          }
481        ]
482    }
483    PUT /product_db/_doc/16
484    {
485        "id": "41",
486        "name": "华为P40 Pro手机",
487        "keywords": "华为手机",
488        "subTitle": "华为P40 Pro手机",
489        "price": "2129",
490        "promotionPrice": "2139",
491        "originalPrice": "2149",
492        "pic": "http://macro-oss.oss-cn-
       shenzhen.aliyuncs.com/mall/images/20180607/5ac1bf58Ndefaac16.jpg",
493        "sale": 999,
```

```
494    "hasStock": true,
495    "salecount":199,
496    "putawayDate":"2021-05-03",
497    "brandId": 3,
498    "brandName": "华为",
499    "brandImg": "http://macro-oss.oss-cn-
       shenzhen.aliyuncs.com/mall/images/20190129/17f2dd9756d9d333bee8e60ce8c03e4c_222_222.jpg
       ",
500    "categoryId": 19,
501    "categoryName": "手机通讯",
502    "attrs": [
503       {
504          "attrId": 9,
505          "attrName": "容量",
506          "attrValue": "128G"
507       },
508       {
509          "attrId": 10,
510          "attrName": "网络",
511          "attrValue": "5G"
512       }
513    ]
514 }
515 PUT /product_db/_doc/17
516 {
517    "id": "42",
518    "name": "朵唯智能手机 4G全网通 老人学生双卡双待手机",
519    "keywords": "朵唯手机",
520    "subTitle": "朵唯手机后置双摄，国产虎贲芯片！优化散热结构！浅薄机身！朵唯4月特惠！",
521    "price": "3129",
522    "promotionPrice": "3139",
523    "originalPrice": "3249",
524    "pic": "http://macro-oss.oss-cn-
       shenzhen.aliyuncs.com/mall/images/20180615/xiaomi.jpg",
525    "sale": 999,
526    "hasStock": true,
527    "salecount":1199,
528    "putawayDate":"2021-06-01",
529    "brandId": 59,
530    "brandName": "朵唯",
531    "brandImg": "http://tuling-mall.oss-cn-
       shenzhen.aliyuncs.com/tulingmall/images/20200311/2b84746650fc122d67749a876c453619.png",
```

```
532      "categoryId": 19,
533      "categoryName": "手机通讯",
534      "attrs": [
535        {
536          "attrId": 9,
537          "attrName": "容量",
538          "attrValue": "32G"
539        },
540        {
541          "attrId": 10,
542          "attrName": "网络",
543          "attrValue": "4G"
544        }
545      ]
546    }
547
```

3. 构建DSL语句实现商品搜索

```
POST /product_db/_doc/_search
{
  "from": 0,
  "size": 8,
  "query": {
    "bool": {
      "must": [
        {
          "match": {
            "name": {
              "query": "手机"
            }
          }
        }
      ],
      "filter": [
        {
          "term": {
            "hasStock": {
              "value": true
            }
          }
        },
        {
          "range": {
            "price": {
              "from": "1",
              "to": "5000"
            }
          }
        }
      ]
    }
  },"sort": [
    {
      "salecount": {
        "order": "asc"
      }
    }
```

```json
    ],
    "aggregations": {
      "brand_agg": {
        "terms": {
          "field": "brandId",
          "size": 50
        },
        "aggregations": {
          "brand_name_agg": {
            "terms": {
              "field": "brandName"
            }
          },
          "brand_img_agg": {
            "terms": {
              "field": "brandImg"
            }
          }
        }
      },
      "category_agg": {
        "terms": {
          "field": "categoryId",
          "size": 50,
          "min_doc_count": 1
        },
        "aggregations": {
          "category_name_agg": {
            "terms": {
              "field": "categoryName"
            }
          }
        }
      },
      "attr_agg": {
        "nested": {
          "path": "attrs"
        },
        "aggregations": {
          "attr_id_agg": {
```

```json
             "terms": {
               "field": "attrs.attrId"
             },
           "aggregations": {
             "attr_name_agg": {
               "terms": {
                 "field": "attrs.attrName"
               }
             },
             "attr_value_agg": {
               "terms": {
                 "field": "attrs.attrValue"
               }
             }
           }
         }
       }
     },
   "highlight": {
     "pre_tags": [
       "<b style='color:red'>"
     ],
     "post_tags": [
       "</b>"
     ],
     "fields": {
       "name": {}
     }
   }
}
```

```
1   GET product_db/_search
2   {
3     "from": 0,
4     "size": 20,
5     "query": {
6       "bool": {
7         "must": [
8           {
9             "multi_match": {
10              "query": "手机",
11              "fields": [
12                "name",
13                "keywords",
14                "subTitle"
15              ]
16            }
17          }
18        ],
19        "filter": [
20          {
21            "term": {
22              "hasStock": "true"
23            }
24          },
25          {
26            "range": {
27              "price": {
28                "gte": 2000,
29                "lte": 5000
30              }
31            }
32          }
33        ]
34      }
35    },
36    "aggs": {
37      "brandId_aggs": {
38        "terms": {
39          "field": "brandId",
```

```
40            "size": 10
41          },
42        "aggs": {
43          "brandName_aggs": {
44            "terms": {
45              "field": "brandName"
46            }
47          },
48          "brandImg_aggs": {
49            "terms": {
50              "field": "brandImg"
51            }
52          }
53        }
54      },
55      "categoryId_aggs": {
56        "terms": {
57          "field": "categoryId",
58          "size": 10
59        },
60        "aggs": {
61          "categoryName_aggs": {
62            "terms": {
63              "field": "categoryName"
64            }
65          }
66        }
67      },
68      "attrs_aggs": {
69        "nested": {
70          "path": "attrs"
71        },
72        "aggs": {
73          "attrId_aggs": {
74            "terms": {
75              "field": "attrs.attrId"
76            },
77            "aggs": {
78              "attrName_aggs": {
79                "terms": {
```

```
 80                "field": "attrs.attrName"
 81              }
 82            },
 83            "attrValue_aggs": {
 84              "terms": {
 85                "field": "attrs.attrValue"
 86              }
 87            }
 88          }
 89        }
 90      }
 91    }
 92  },
 93  "sort": [
 94    {
 95      "salecount": {
 96        "order": "desc"
 97      }
 98    }
 99  ],
100  "highlight": {
101    "fields": {
102      "*": {}
103    }
104  }
105 }
```

4. 微服务实现商品搜索功能

1）引入依赖

```xml
1  <dependency>
2      <groupId>org.springframework.boot</groupId>
3      <artifactId>spring-boot-starter-data-elasticsearch</artifactId>
4  </dependency>
```

2）核心代码

```java
import co.elastic.clients.elasticsearch.ElasticsearchClient;
import co.elastic.clients.elasticsearch._types.FieldSort;
import co.elastic.clients.elasticsearch._types.FieldValue;
import co.elastic.clients.elasticsearch._types.SortOptionsBuilders;
import co.elastic.clients.elasticsearch._types.SortOrder;
import co.elastic.clients.elasticsearch._types.aggregations.*;

import co.elastic.clients.elasticsearch._types.query_dsl.*;
import co.elastic.clients.elasticsearch.core.SearchRequest;
import co.elastic.clients.elasticsearch.core.SearchResponse;

import co.elastic.clients.elasticsearch.core.search.*;
import co.elastic.clients.json.JsonData;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.beans.factory.annotation.Qualifier;

import org.springframework.stereotype.Service;
import org.springframework.util.StringUtils;
import org.tuling.tlmall_search.common.SearchConstant;
import org.tuling.tlmall_search.domain.EsProduct;
import org.tuling.tlmall_search.service.TulingMallSearchService;
import org.tuling.tlmall_search.vo.ESRequestParam;
import org.tuling.tlmall_search.vo.ESResponseResult;

import java.util.*;
import java.util.stream.Collectors;


@Service(value = "tulingMallSearchService")
public class TulingMallSearchServiceImpl implements TulingMallSearchService {


    @Qualifier("elasticsearchClient")
    @Autowired
    ElasticsearchClient client;


    /************************图灵商城搜索************************/
```

```java
40        @Override
41        public ESResponseResult search(ESRequestParam param) {
42
43            try {
44                //1、构建检索对象-封装请求相关参数信息
45                SearchRequest searchRequest = startBuildRequestParam(param);
46
47                //2、进行检索操作
48                SearchResponse response = client.search(searchRequest, EsProduct.class);
49                System.out.println("response:" + response);
50                //3、分析响应数据，封装成指定的格式
51                ESResponseResult responseResult = startBuildResponseResult(response,
    param);
52                return responseResult;
53            } catch (Exception e) {
54                e.printStackTrace();
55            }
56
57            return null;
58
59        }
60
61        /**
62         * 封装请求参数信息
63         * 关键字查询、根据属性、分类、品牌、价格区间、是否有库存等进行过滤、分页、高亮、以及聚合统
    计品牌分类属性
64         * price=1_5000&keyword=手机
    &sort=salecount_asc&hasStock=1&pageNum=1&pageSize=20&categoryId=19&attrs=2_蓝色
    &attrs=1_2核
65         */
66        private SearchRequest startBuildRequestParam(ESRequestParam param) {
67
68            //构建搜索请求
69            SearchRequest.Builder searchRequestBuilder = new SearchRequest.Builder();
70
71            /**
72             * 关键字查询、根据属性、分类、品牌、价格区间、是否有库存等进行过滤、分页、高亮、以及聚
    合统计品牌分类属性
73             */
74
75            //构建bool查询
76            BoolQuery.Builder boolQueryBuilder = new BoolQuery.Builder();
```

```java
77
78            //1、查询关键字
79            if (!StringUtils.isEmpty(param.getKeyword())) {
80                //单字段查询
81 //              boolQueryBuilder.must(QueryBuilders.match(
82 //                    m->m.field("name").query(param.getKeyword())
83 //              ));
84                //多字段查询
85                boolQueryBuilder.must(m->m.multiMatch(
86                    q->q.fields("name", "keywords",
   "subTitle").query(param.getKeyword())
87                ));
88            }
89            //2、根据类目ID进行过滤
90            if (null != param.getCategoryId()) {
91                boolQueryBuilder.filter(QueryBuilders.term(t ->
   t.field("categoryId").value(param.getCategoryId())));
92
93            }
94
95            //3、根据品牌ID进行过滤
96            if (null != param.getBrandId() && param.getBrandId().size() > 0) {
97                List<FieldValue> brandIds = param.getBrandId().stream().map(b ->
   FieldValue.of(b)).collect(Collectors.toList());
98                boolQueryBuilder.filter(QueryBuilders.terms(t ->
   t.field("brandId").terms(v -> v.value(brandIds))));
99            }
100
101            //4、根据属性进行相关过滤
102            if (param.getAttrs() != null && param.getAttrs().size() > 0) {
103
104                param.getAttrs().forEach(item -> {
105                    //attrs=1_白色&2_4核
106                    BoolQuery.Builder boolQuery = QueryBuilders.bool();
107
108                    //attrs=1_64G
109                    String[] s = item.split("_");
110                    String attrId = s[0];
111                    String[] attrValues = s[1].split(":");//这个属性检索用的值
112
113                    boolQuery.filter(QueryBuilders.term(t ->
   t.field("attrs.attrId").value(attrId)));
```

```java
                List<FieldValue> attrValueList = Arrays.stream(attrValues).map(b ->
FieldValue.of(b)).collect(Collectors.toList());
                boolQuery.filter(QueryBuilders.terms(t ->
t.field("attrs.attrValue").terms(v -> v.value(attrValueList))));

                NestedQuery.Builder nestedQueryBuilder = new NestedQuery.Builder();
                //nested查询
                nestedQueryBuilder.path("attrs").query(q ->
q.bool(boolQuery.build())).scoreMode(ChildScoreMode.None);

                boolQueryBuilder.filter(q -> q.nested(nestedQueryBuilder.build()));
            });

        }


        //5、是否有库存
        if (null != param.getHasStock()) {
            boolQueryBuilder.filter(QueryBuilders.term(t ->
t.field("hasStock").value(param.getHasStock() == 1)));
        }


        //6、根据价格过滤
        if (!StringUtils.isEmpty(param.getPrice())) {
            //价格的输入形式为：10_100（起始价格和最终价格）或_100（不指定起始价格）或10_（不
限制最终价格）
            RangeQuery.Builder rangeQueryBuilder =
QueryBuilders.range().field("price");

            String[] price = param.getPrice().split("_");
            if (price.length == 2) {
                //price: _5000   [, 5000]
                if (param.getPrice().startsWith("_")) {
                    rangeQueryBuilder.lte(JsonData.of(price[1]));
                } else {
                    //price: 1_5000  [1, 5000]

rangeQueryBuilder.gte(JsonData.of(price[0])).lte(JsonData.of(price[1]));
                }

            } else if (price.length == 1) {
                //price: 1_      [1]
```

```java
150                    if (param.getPrice().endsWith("_")) {
151                        rangeQueryBuilder.gte(JsonData.of(price[0]));
152                    }
153                }
154                boolQueryBuilder.filter(r -> r.range(rangeQueryBuilder.build()));
155            }

156

157            //封装所有查询条件
158            searchRequestBuilder.query(q -> q.bool(boolQueryBuilder.build()));

159

160

161            /**
162             * 实现排序、高亮、分页操作
163             */

164

165            //排序
166            //页面传入的参数值形式 sort=price_asc/desc
167            if (!StringUtils.isEmpty(param.getSort())) {
168                String sort = param.getSort();
169                String[] sortFileds = sort.split("_");

170

171                if (!StringUtils.isEmpty(sortFileds[0])) {

172

173                    SortOrder sortOrder = "asc".equalsIgnoreCase(sortFileds[1]) ?
    SortOrder.Asc : SortOrder.Desc;

174

175                    //排序
176                    FieldSort fieldSort =
    SortOptionsBuilders.field().field(sortFileds[0]).order(sortOrder).build();
177                    searchRequestBuilder.sort(s -> s.field(fieldSort));
178                }
179            }

180

181

182            //分页查询
183            searchRequestBuilder.from((param.getPageNum() - 1) * SearchConstant.PAGE_SIZE);
184            searchRequestBuilder.size(SearchConstant.PAGE_SIZE);

185

186            //高亮显示
187            if (!StringUtils.isEmpty(param.getKeyword())) {

188
```

```java
189            HighlightField highlightField = new HighlightField.Builder().preTags("<b
   style='color:red'>").postTags("</b>").build();
190            searchRequestBuilder.highlight(h -> h.fields("name", highlightField));
191        }
192
193
194        /**
195         * 对品牌、分类信息、属性信息进行聚合分析
196         */
197        //1. 按照品牌进行聚合
198        //1.1 品牌的子聚合-品牌名聚合
199        Aggregation brand_name_agg = AggregationBuilders.terms(t ->
   t.field("brandName").size(1));
200        //1.2 品牌的子聚合-品牌图片聚合
201        Aggregation brand_img_agg = AggregationBuilders.terms(t ->
   t.field("brandImg").size(1));
202
203        Aggregation brand_agg = new Aggregation.Builder()
204                //按照品牌id进行聚合
205                .terms(t -> t.field("brandId").size(50)).aggregations("brand_name_agg",
   brand_name_agg).aggregations("brand_img_agg", brand_img_agg).build();
206        searchRequestBuilder.aggregations("brand_agg", brand_agg);
207
208        //2. 按照分类信息进行聚合
209        Aggregation category_agg = new Aggregation.Builder().terms(t ->
   t.field("categoryId").size(50)).aggregations("category_name_agg",
   AggregationBuilders.terms(t -> t.field("categoryName").size(1))).build();
210        searchRequestBuilder.aggregations("category_agg", category_agg);
211
212
213        //2. 按照属性信息进行聚合
214        NestedAggregation attrs = new
   NestedAggregation.Builder().path("attrs").build();
215
216        Aggregation attr_id_agg = new Aggregation.Builder()
217                //2.1 按照属性ID进行聚合
218                .terms(t -> t.field("attrs.attrId"))
219                //2.1.1 在每个属性ID下，按照属性名进行聚合
220                .aggregations("attr_name_agg", AggregationBuilders.terms(t ->
   t.field("attrs.attrName").size(1)))
221                //2.1.1 在每个属性ID下，按照属性值进行聚合
222                .aggregations("attr_value_agg", AggregationBuilders.terms(t ->
   t.field("attrs.attrValue").size(1))).build();
```

```java
223
224        Aggregation attrs_agg = new
      Aggregation.Builder().nested(attrs).aggregations("attr_id_agg", attr_id_agg).build();
225
226        searchRequestBuilder.aggregations("attrs_agg", attrs_agg);
227
228        System.out.println("构建的DSL语句:" + searchRequestBuilder.toString());
229
230
231        SearchRequest searchRequest =
      searchRequestBuilder.index(SearchConstant.INDEX_NAME).build();
232
233        return searchRequest;
234    }
235
236
237    /**
238     * 封装查询到的结果信息
239     * 关键字查询、根据属性、分类、品牌、价格区间、是否有库存等进行过滤、分页、高亮、以及聚合统
      计品牌分类属性
240     */
241    private ESResponseResult startBuildResponseResult(SearchResponse response,
      ESRequestParam param) {
242        //构建返回结果
243        ESResponseResult result = new ESResponseResult();
244
245        //1、获取查询到的商品信息
246        HitsMetadata<EsProduct> hitsMetadata = response.hits();
247        List<Hit<EsProduct>> hits = hitsMetadata.hits();
248
249        List<EsProduct> esProducts = new ArrayList<>();
250        //2、遍历所有商品信息
251        if (!hits.isEmpty()) {
252            for (Hit<EsProduct> hit : hits) {
253                EsProduct product = hit.source();
254
255                //2.1 判断是否按关键字检索，若是就显示高亮，否则不显示
256                if (!StringUtils.isEmpty(param.getKeyword())) {
257                    //2.2 拿到高亮信息显示标题
258                    List<String> name = hit.highlight().get("name");
259                    //2.3 判断name中是否含有查询的关键字(因为是多字段查询，因此可能不包含指定
      的关键字，假设不包含则显示原始name字段的信息)
```

```java
                    String nameValue = name != null ? name.get(0) : product.getName();
                    product.setName(nameValue);
                }
                esProducts.add(product);

            }
        }
        result.setProducts(esProducts);


        //3、当前商品涉及到的所有品牌信息，小米手机和小米电脑都属于小米品牌，过滤重复品牌信息
        List<ESResponseResult.BrandVo> brandVos = new ArrayList<>();


        // 获取聚合结果
        Map<String, Aggregate> aggs = response.aggregations();
        //获取到品牌的聚合
        Aggregate brandAgg = aggs.get("brand_agg");
        if (brandAgg != null) {
            List<LongTermsBucket> brandIdBuckets = brandAgg.lterms().buckets().array();
            for (LongTermsBucket brandIdBucket : brandIdBuckets) {
                //构建品牌信息
                ESResponseResult.BrandVo brandVo = new ESResponseResult.BrandVo();
                //设置品牌ID
                brandVo.setBrandId(brandIdBucket.key());

                Aggregate brandImgAgg =
    brandIdBucket.aggregations().get("brand_img_agg");
                Aggregate brandNameAgg =
    brandIdBucket.aggregations().get("brand_name_agg");
                if (brandImgAgg != null && brandNameAgg != null) {
                    StringTermsBucket imgBucket =
    brandImgAgg.sterms().buckets().array().get(0);
                    StringTermsBucket nameBucket =
    brandNameAgg.sterms().buckets().array().get(0);
                    //设置品牌的图片和名称
                    brandVo.setBrandImg(imgBucket.key().stringValue());
                    brandVo.setBrandName(nameBucket.key().stringValue());
                }
                brandVos.add(brandVo);
            }
        }
        result.setBrands(brandVos);

```

```java
//4、当前商品相关的所有类目信息
//获取到分类的聚合
List<ESResponseResult.categoryVo> categoryVos = new ArrayList<>();

Aggregate categoryAgg = aggs.get("category_agg");
if (categoryAgg != null) {
    List<LongTermsBucket> categoryBuckets =
categoryAgg.lterms().buckets().array();
    for (LongTermsBucket categoryBucket : categoryBuckets) {
        //构建分类信息
        ESResponseResult.categoryVo categoryVo = new
ESResponseResult.categoryVo();
        //设置分类ID
        categoryVo.setCategoryId(categoryBucket.key());

        Aggregate categoryNameAgg =
categoryBucket.aggregations().get("category_name_agg");
        if (categoryNameAgg != null) {
            StringTermsBucket nameBucket =
categoryNameAgg.sterms().buckets().array().get(0);
            //设置分类名称
            categoryVo.setCategoryName(nameBucket.key().stringValue());
        }
        categoryVos.add(categoryVo);
    }
}
result.setCategorys(categoryVos);


//5、获取商品相关的所有属性信息
List<ESResponseResult.AttrVo> attrVos = new ArrayList<>();
//获取属性信息的聚合
Aggregate attrsAgg = aggs.get("attrs_agg");
if (attrsAgg != null) {
    //获取属性id的集合
    Aggregate attrIdAgg = attrsAgg.nested().aggregations().get("attr_id_agg");
    List<LongTermsBucket> attrBuckets = attrIdAgg.lterms().buckets().array();
    for (LongTermsBucket attrBucket : attrBuckets) {
        //构建属性信息
        ESResponseResult.AttrVo attrVo = new ESResponseResult.AttrVo();
        //设置属性ID
```

```java
                    attrVo.setAttrId(attrBucket.key());

                    Aggregate attrNameAgg = attrBucket.aggregations().get("attr_name_agg");
                    Aggregate attrValueAgg =
attrBucket.aggregations().get("attr_value_agg");
                    if (attrNameAgg != null && attrValueAgg != null) {
                        StringTermsBucket attrNameBucket =
attrNameAgg.sterms().buckets().array().get(0);
                        //设置属性名称
                        attrVo.setAttrName(attrNameBucket.key().stringValue());

                        List<StringTermsBucket> attrValueBuckets =
attrValueAgg.sterms().buckets().array();
                        List<String> attrValues = new ArrayList<>();
                        for (StringTermsBucket attrValueBucket : attrValueBuckets) {
                            attrValues.add(attrValueBucket.key().stringValue());
                        }
                        //设置属性值
                        attrVo.setAttrValue(attrValues);
                    }
                    attrVos.add(attrVo);
                }
            }
        result.setAttrs(attrVos);

        //6、进行分页操作
        result.setPageNum(param.getPageNum());
        //获取总记录数
        long total = hitsMetadata.total().value();
        result.setTotal(total);

        //计算总页码
        int totalPages = (int) total % SearchConstant.PAGE_SIZE == 0 ? (int) total /
SearchConstant.PAGE_SIZE : ((int) total / SearchConstant.PAGE_SIZE + 1);
        result.setTotalPages(totalPages);

        List<Integer> pageNavs = new ArrayList<>();
        for (int i = 1; i <= totalPages; i++) {
            pageNavs.add(i);
        }
        result.setPageNavs(pageNavs);
```

```
374            return result;
375        }
376
377  }
378
379
380
381
382
```

测试

http://localhost:8054/searchList?price=1_5000&keyword=%E6%89%8B%E6%9C%BA&sort=salecount_asc&hasStock=1&pageNum=1&pageSize=20&categoryId=19&attrs=2_%E8%93%9D%E8%89%B2&attrs=1_2%E6%A0%B8