使用mongodb語法計算每個欄位出現的次數

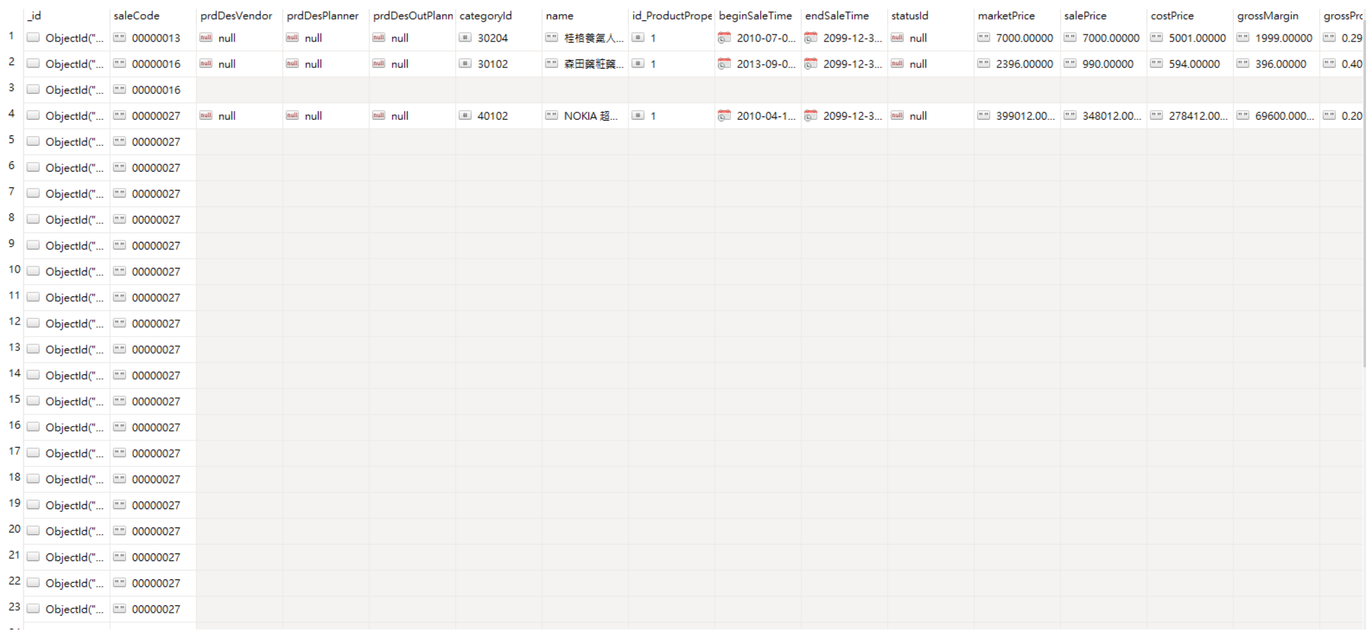
背景

mongodb中有一個collection用來記錄每次有sql欄位變動的歷程，每一次變動都會寫入一筆資料，

需求為希望統計此collection中每個欄位出現的次數，以便後續做資料分析，因此需要計算每個欄位出現的次數。

Log_salesmix_lite collection

用來記錄sql欄位變動的collection，每次sql欄位變動都會寫入一筆資料，因此可以用來計算每個欄位出現的次數。



	_id	saleCode	prdDesVendor	prdDesPlanner	prdDesOutPlann	categoryId	name	id_ProductPrope	beginSaleTime	endSaleTime	statusId	marketPrice	salePrice	costPrice	grossMargin	grossPrc
1	ObjectId("...	00000013	null	null	null	30204	桂格養氣人...	1	2010-07-0...	2099-12-3...	null	7000.00000	7000.00000	5001.00000	1999.00000	0.29
2	ObjectId("...	00000016	null	null	null	30102	森田藥粧藥...	1	2013-09-0...	2099-12-3...	null	2396.00000	990.00000	594.00000	396.00000	0.40
3	ObjectId("...	00000016														
4	ObjectId("...	00000027	null	null	null	40102	NOKIA 超...	1	2010-04-1...	2099-12-3...	null	399012.00...	348012.00...	278412.00...	69600.000...	0.20
5	ObjectId("...	00000027														
6	ObjectId("...	00000027														
7	ObjectId("...	00000027														
8	ObjectId("...	00000027														
9	ObjectId("...	00000027														
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21	ObjectId("...	00000027														
22	ObjectId("...	00000027														
23	ObjectId("...	00000027														

嘗試用nodejs程式計算

一開始想法是用nodejs程式連結mongodb撈出資料後進行計算，但後來發現效能太差，因此改用mongodb語法進行計算。

以下語法以及說明

note : 2023-11-05T00:00:00+0800 代表+8時區

目標

原有的資料結構 array，每個key代表當次有更改的欄位以及對應的數值

- 每次修改內容不同，所以每個json的key以及數量也會不同

```
[{
    "_id" : ObjectId("58c8c066275ae7289cad62ce"),
    "saleCode" : "00000013",
    "prdDesVendor" : null,
    "prdDesPlanner" : null,
    "prdDesOutPlanner" : null,
    "categoryId" : NumberLong(30204),
    "name" : "桂格養氣人蔘aa=",
    "id_ProductProperty" : NumberLong(1),
    "beginSaleTime" : ISODate("2010-07-01T16:00:00.000Z"),
    "endSaleTime" : ISODate("2099-12-30T16:00:00.000Z"),
    "statusId" : null,
    "marketPrice" : "7000.00000",
    "salePrice" : "7000.00000",
    "costPrice" : "5001.00000",
    "grossMargin" : "1999.00000",
    "grossProfit" : "0.29000",
    "presentDescription" : null,
    "shelveReservation" : 1,
    "canReturn" : 1,
    "canChange" : 1,
    "paymentPeriod" : 60,
    "installmentSetting" : 1,
    "shipmentTaxType" : null,
    "isReceipt" : null,
    "employeePrice" : "6990.00",
    "saleBonus" : null,
    "canBuyByProfit" : 1,
    "canBuyByAccount" : null,
    ...
    }
    ,...
    ]
```

目標

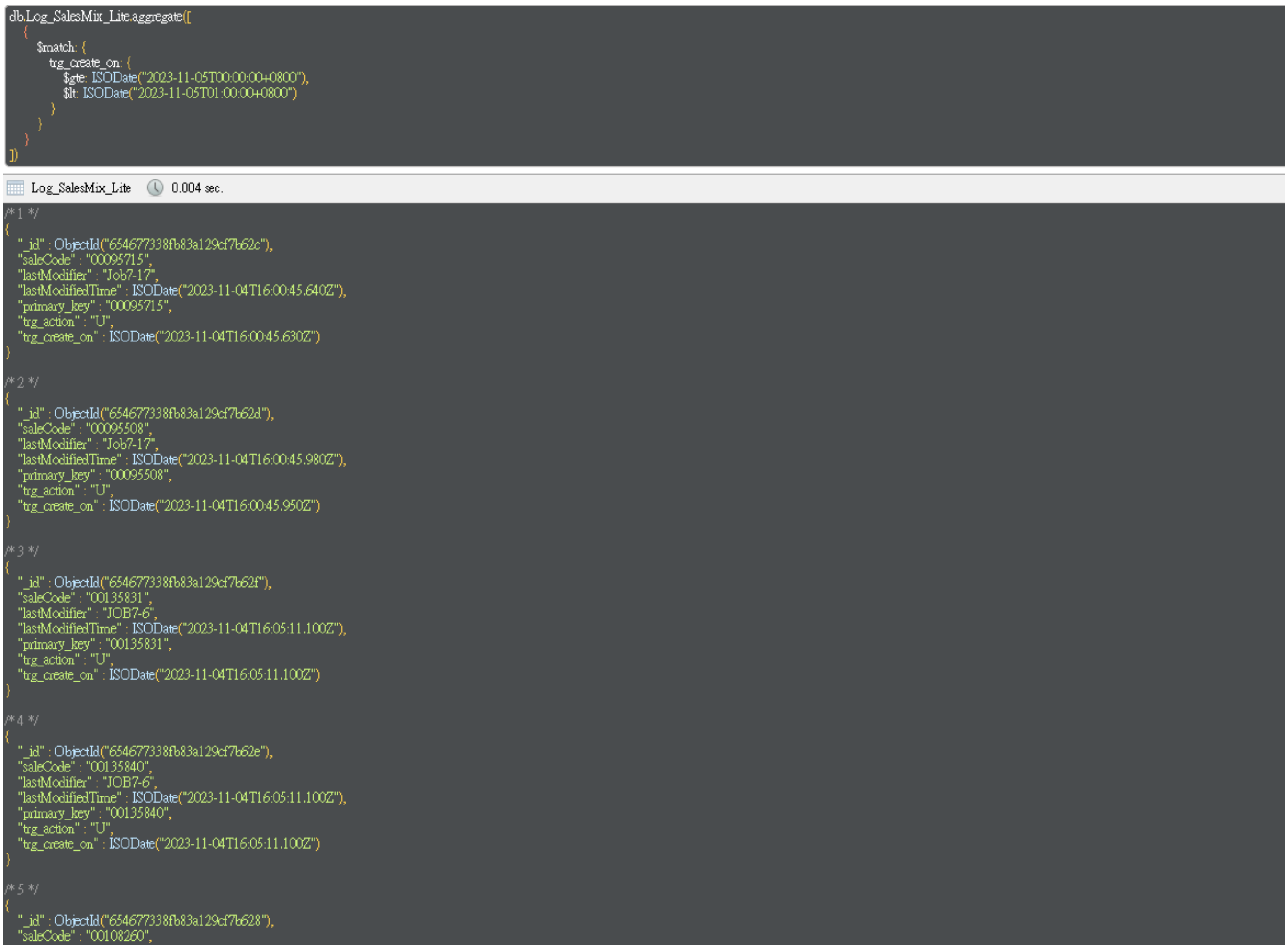
```
{
    "lastModifier" : 9.0,
    "lastModifiedTime" : 8.0,
    "primary_key" : 9.0,
    "isExpressProduct2" : 2.0,
    "fugoContractNo" : 1.0,
    "isExpressProduct" : 2.0,
    "trg_action" : 9.0,
    "_id" : 9.0,
    "trg_create_on" : 9.0,
    "saleCode" : 9.0,
    ...
}
```

使用aggregate 方法做pipeline計算，需設計各種stage達到我們想要的結果

Step.1 撈出需要計算的資料

要撈出`Log_SalesMix_Lite`此collection 中`trg_create_on`欄位在`2023-11-05T00:00:00+0800`到`2023-11-05T01:00:00+0800`之間的資料

```
    {
            $match: {
                trg_create_on: {
                    $gte: ISODate("2023-11-05T00:00:00+0800"),
                    $lt: ISODate("2023-11-05T01:00:00+0800")
                }
            }
        },
```



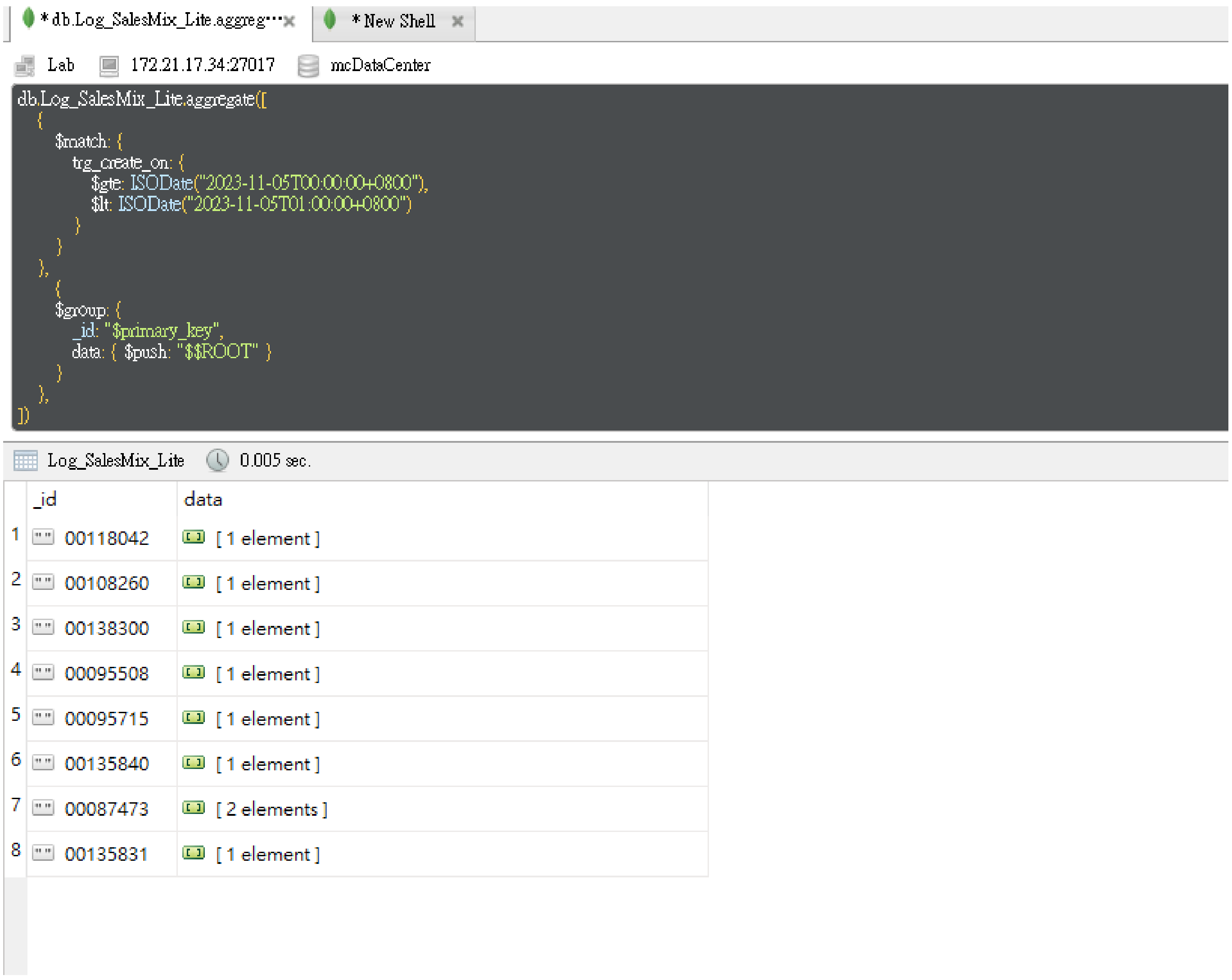
```
db.Log_SalesMix_Lite.aggregate([
  {
    $match: {
      trg_create_on: {
        $gte: ISODate("2023-11-05T00:00:00+0800"),
        $lt: ISODate("2023-11-05T01:00:00+0800")
      }
    }
  }
])
```

Log_SalesMix_Lite 0.004 sec.

```
/* 1 */
{
  "_id" : ObjectId("654677338fb83a129cf7b62c"),
  "saleCode" : "00095715",
  "lastModifier" : "Job7-17",
  "lastModifiedTime" : ISODate("2023-11-04T16:00:45.640Z"),
  "primary_key" : "00095715",
  "trg_action" : "U",
  "trg_create_on" : ISODate("2023-11-04T16:00:45.630Z")
}

/* 2 */
{
  "_id" : ObjectId("654677338fb83a129cf7b62d"),
  "saleCode" : "00095508",
  "lastModifier" : "Job7-17",
  "lastModifiedTime" : ISODate("2023-11-04T16:00:45.980Z"),
  "primary_key" : "00095508",
  "trg_action" : "U",
  "trg_create_on" : ISODate("2023-11-04T16:00:45.950Z")
}

/* 3 */
{
  "_id" : ObjectId("654677338fb83a129cf7b62f"),
  "saleCode" : "00135831",
  "lastModifier" : "JOB7-6",
  "lastModifiedTime" : ISODate("2023-11-04T16:05:11.100Z"),
  "primary_key" : "00135831",
  "trg_action" : "U",
  "trg_create_on" : ISODate("2023-11-04T16:05:11.100Z")
}

/* 4 */
{
  "_id" : ObjectId("654677338fb83a129cf7b62e"),
  "saleCode" : "00135840",
  "lastModifier" : "JOB7-6",
  "lastModifiedTime" : ISODate("2023-11-04T16:05:11.100Z"),
  "primary_key" : "00135840",
  "trg_action" : "U",
  "trg_create_on" : ISODate("2023-11-04T16:05:11.100Z")
}

/* 5 */
{
  "_id" : ObjectId("654677338fb83a129cf7b628"),
  "saleCode" : "00108260",
```

Step.2 根據primary_key分組，並把同個key的data放進一個array中

```
   {
            $group: {
                _id: "$primary_key",
                data: { $push: "$$ROOT" }
            }
        },
```


* db.Log_SalesMix_Lite.aggreg··· × | * New Shell ×

Lab | 172.21.17.34:27017 | mcDataCenter

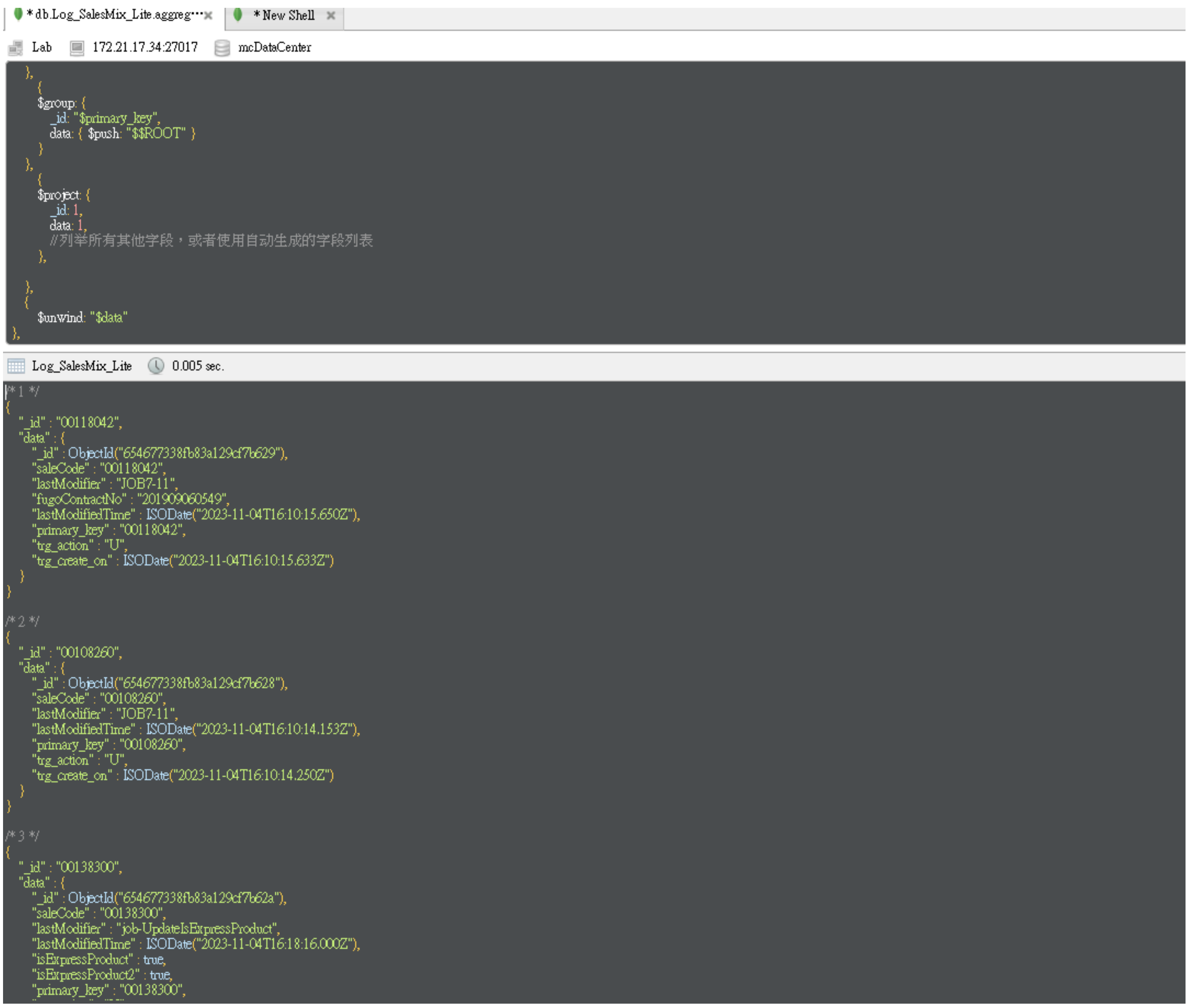
```
db.Log_SalesMix_Lite.aggregate([
   {
      $match: {
         trg_create_on: {
            $gte: ISODate("2023-11-05T00:00:00+0800"),
            $lt: ISODate("2023-11-05T01:00:00+0800")
         }
      }
   },
      {
      $group: {
         _id: "$primary_key",
         data: { $push: "$$ROOT" }
      }
   },
])
```

Log_SalesMix_Lite | 0.005 sec.

	_id	data
1	00118042	[1 element]
2	00108260	[1 element]
3	00138300	[1 element]
4	00095508	[1 element]
5	00095715	[1 element]
6	00135840	[1 element]
7	00087473	[2 elements]
8	00135831	[1 element]

Step.3 將data array轉成object

```
{
        $unwind: "$data"
},
```

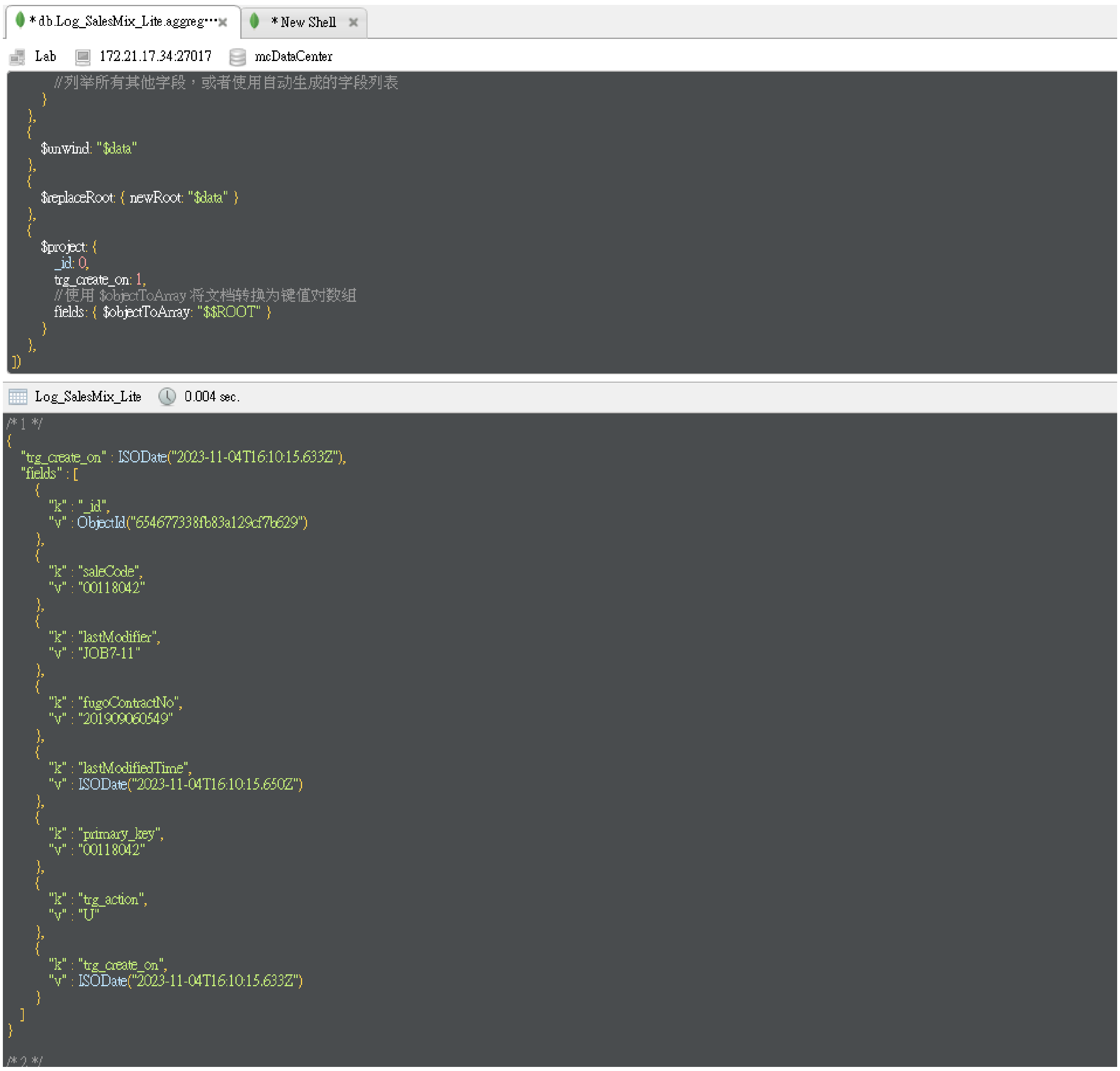


```
    },
      {
      $group: {
        _id: "$primary_key",
        data: { $push: "$$ROOT" }
      }
    },
      {
      $project: {
        _id: 1,
        data: 1,
        //列举所有其他字段，或者使用自动生成的字段列表
      },

    },
    {
      $unwind: "$data"
 },
```

```
/* 1 */
{
  "_id" : "00118042",
  "data" : {
    "_id" : ObjectId("654677338fb83a129cf7b629"),
    "saleCode" : "00118042",
    "lastModifier" : "JOB7-11",
    "fugoContractNo" : "201909060549",
    "lastModifiedTime" : ISODate("2023-11-04T16:10:15.650Z"),
    "primary_key" : "00118042",
    "trg_action" : "U",
    "trg_create_on" : ISODate("2023-11-04T16:10:15.633Z")
  }
}

/* 2 */
{
  "_id" : "00108260",
  "data" : {
    "_id" : ObjectId("654677338fb83a129cf7b628"),
    "saleCode" : "00108260",
    "lastModifier" : "JOB7-11",
    "lastModifiedTime" : ISODate("2023-11-04T16:10:14.153Z"),
    "primary_key" : "00108260",
    "trg_action" : "U",
    "trg_create_on" : ISODate("2023-11-04T16:10:14.250Z")
  }
}

/* 3 */
{
  "_id" : "00138300",
  "data" : {
    "_id" : ObjectId("654677338fb83a129cf7b62a"),
    "saleCode" : "00138300",
    "lastModifier" : "job-UpdateIsExpressProduct",
    "lastModifiedTime" : ISODate("2023-11-04T16:18:16.000Z"),
    "isExpressProduct" : true,
    "isExpressProduct2" : true,
    "primary_key" : "00138300",
```

Step.4 重新組合object，並且將每個欄位轉成key-value的形式

```
    {
        $replaceRoot: { newRoot: "$data" }
    },
    {
        $project: {
            _id: 1,
            trg_create_on: 1,
            // 使用 $objectToArray 将文档转换为键值对数组
            fields: { $objectToArray: "$$ROOT" }
        }
    },
    {
        $unwind: "$fields"
    },
```



* db.Log_SalesMix_Lite.aggreg··· | * New Shell

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```
        //列举所有其他字段，或者使用自动生成的字段列表
      }
    },
    {
      $unwind: "$data"
    },
    {
      $replaceRoot: { newRoot: "$data" }
    },
    {
      $project: {
        _id: 0,
        trg_create_on: 1,
        //使用 $objectToArray 将文档转换为键值对数组
        fields: { $objectToArray: "$$ROOT" }
      }
    },
])
```

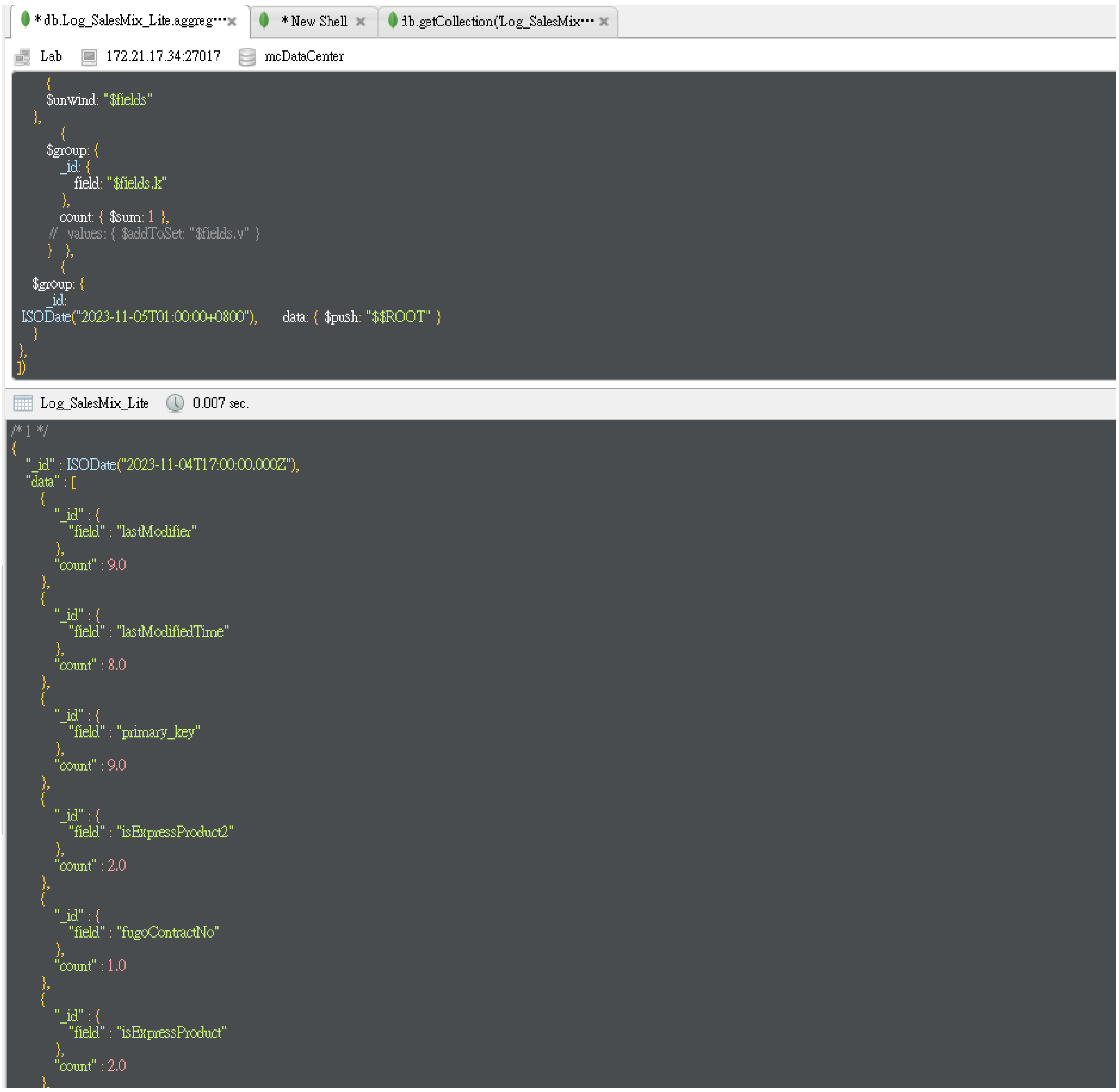
Log_SalesMix_Lite | 0.004 sec.

```
/* 1 */
{
  "trg_create_on" : ISODate("2023-11-04T16:10:15.633Z"),
  "fields" : [
    {
      "k" : "_id",
      "v" : ObjectId("654677338fb83a129cf7b629")
    },
    {
      "k" : "saleCode",
      "v" : "00118042"
    },
    {
      "k" : "lastModifier",
      "v" : "JOB7-11"
    },
    {
      "k" : "fugoContractNo",
      "v" : "201909060549"
    },
    {
      "k" : "lastModifiedTime",
      "v" : ISODate("2023-11-04T16:10:15.650Z")
    },
    {
      "k" : "primary_key",
      "v" : "00118042"
    },
    {
      "k" : "trg_action",
      "v" : "U"
    },
    {
      "k" : "trg_create_on",
      "v" : ISODate("2023-11-04T16:10:15.633Z")
    }
  ]
}

/* 2 */
```

Step.5 根據key做group並計算次數

```
{
  $group: {
     _id: {
        field: "$fields.k"
            },
            count: { $sum: 1 },
         //   values: { $addToSet: "$fields.v" }
        }   },
    {
    $group: {
        _id:
    ISODate("2023-11-05T00:00:00+0800"),
    data: { $push: "$$ROOT" }
    }
},
```

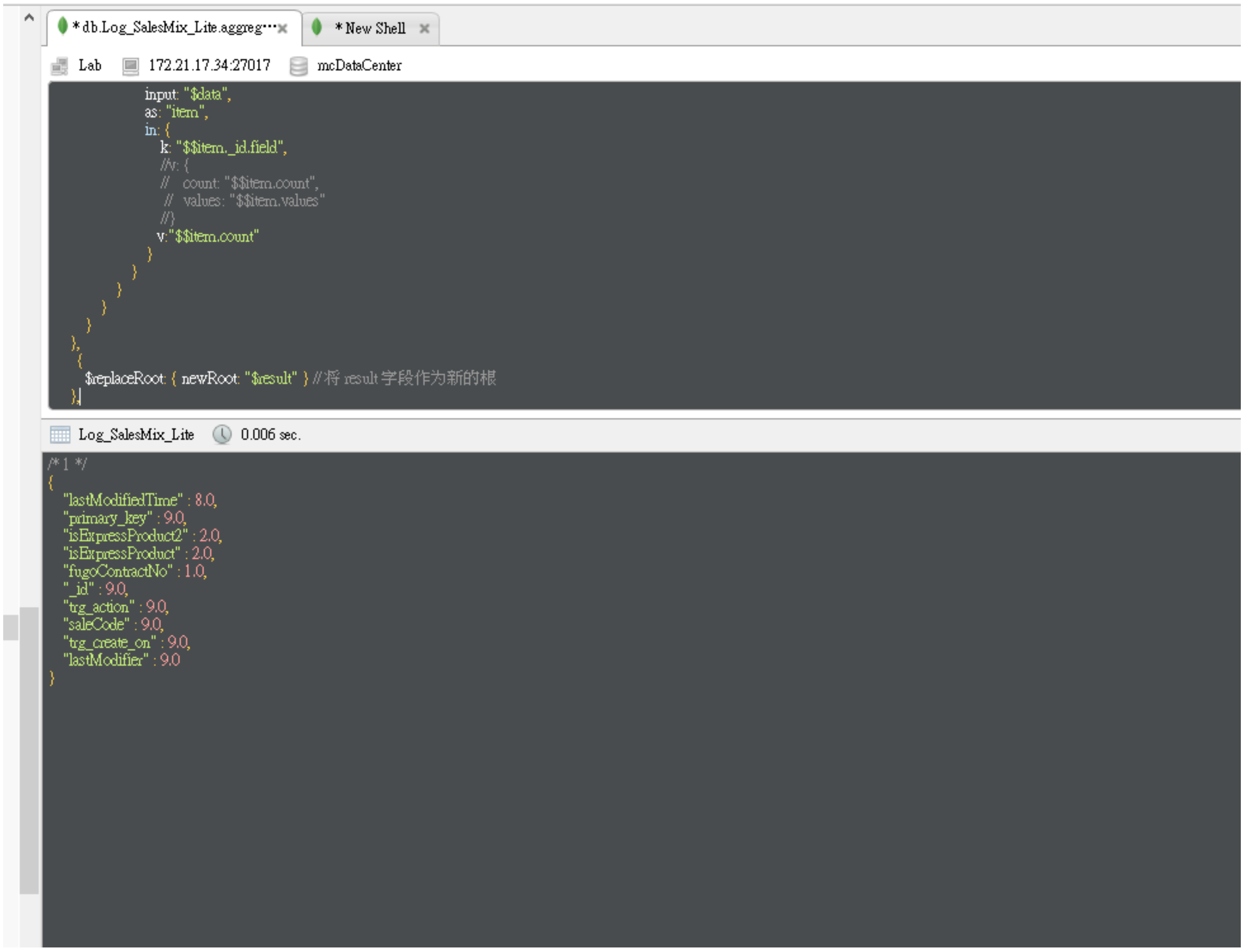


```
* db.Log_SalesMix_Lite.aggreg···    * New Shell    db.getCollection('Log_SalesMix···
Lab    172.21.17.34:27017    mcDataCenter
    {
    $unwind: "$fields"
  },
      {
    $group: {
       _id: {
          field: "$fields.k"
       },
       count: { $sum: 1 },
    //   values: { $addToSet: "$fields.v" }
    }  },
       {
  $group: {
     _id:
 ISODate("2023-11-05T01:00:00+0800"),      data: { $push: "$$ROOT" }
  }
},
])
```

```
Log_SalesMix_Lite    0.007 sec.
/* 1 */
{
    "_id" : ISODate("2023-11-04T17:00:00.000Z"),
    "data" : [
        {
            "_id" : {
                "field" : "lastModifier"
            },
            "count" : 9.0
        },
        {
            "_id" : {
                "field" : "lastModifiedTime"
            },
            "count" : 8.0
        },
        {
            "_id" : {
                "field" : "primary_key"
            },
            "count" : 9.0
        },
        {
            "_id" : {
                "field" : "isExpressProduct2"
            },
            "count" : 2.0
        },
        {
            "_id" : {
                "field" : "fugoContractNo"
            },
            "count" : 1.0
        },
        {
            "_id" : {
                "field" : "isExpressProduct"
            },
            "count" : 2.0
        },
```

Step6. 重新組合資料並取出所需要的data

```
{
        $project: {
            _id: 1,
            result: {
                $arrayToObject: {
                    $map: {
                        input: "$data",
                        as: "item",
                        in: {
                            k: "$$item._id.field",
                            //v: {
                            //    count: "$$item.count",
                             //   values: "$$item.values"
                    //}
                   v:"$$item.count"
                 }
               }
             }
           }
         }
     },
     {
         $replaceRoot: { newRoot: "$result" } // 将 result 字段作为新的根
     },
```



```
               input: "$data",
               as: "item",
               in: {
                 k: "$$item._id.field",
                 //v: {
                 //   count: "$$item.count",
                  //  values: "$$item.values"
                 //}
                v:"$$item.count"
              }
            }
          }
        }
      }
   },
    {
     $replaceRoot: { newRoot: "$result" } //将 result 字段作为新的根
   },
```

```
/* 1 */
{
    "lastModifiedTime" : 8.0,
    "primary_key" : 9.0,
    "isExpressProduct2" : 2.0,
    "isExpressProduct" : 2.0,
    "fugoContractNo" : 1.0,
    "_id" : 9.0,
    "trg_action" : 9.0,
    "saleCode" : 9.0,
    "trg_create_on" : 9.0,
    "lastModifier" : 9.0
}
```

Step7. 加入新的欄位並將結果寫入新的collection

```
 {
   $addFields: { _id: ISODate("2023-11-05T00:00:00+0800")  } },
  {
        $merge: {
             into: "Log_SalesMix_Summary" // 将结果添加到现有集合
       }
   }
```

以下為全部語法

```
db.Log_SalesMix_Lite.aggregate([
    {
        $match: {
            trg_create_on: {
                $gte: ISODate("2023-11-05T00:00:00+0800"),
                $lt: ISODate("2023-11-05T01:00:00+0800")
            }
        }
    },
    {
        $group: {
            _id: "$primary_key",
            data: { $push: "$$ROOT" }
        }
    },
    {
        $project: {
            _id: 1,
            data: 1,
            // 列举所有其他字段，或者使用自动生成的字段列表
        }
    },
    {
        $unwind: "$data"
    },
    {
        $replaceRoot: { newRoot: "$data" }
    },
    {
        $project: {
            _id: 0,
            trg_create_on: 1,
            // 使用 $objectToArray 将文档转换为键值对数组
            fields: { $objectToArray: "$$ROOT" }
        }
    },
    {
        $unwind: "$fields"
    },
        {
        $group: {
            _id: {
                field: "$fields.k"
            },
            count: { $sum: 1 },
       //   values: { $addToSet: "$fields.v" }
        }   },
    {
    $group: {
        _id:
 ISODate("2023-11-05T01:00:00+0800"),       data: { $push: "$$ROOT" }
```

```
            }
        },
        {
                $project: {
                    _id: 1,
                    result: {
                        $arrayToObject: {
                            $map: {
                                input: "$data",
                                as: "item",
                                in: {
                                    k: "$$item._id.field",
                                    //v: {
                                    //     count: "$$item.count",
                                     //    values: "$$item.values"
                                    //}
                                   v:"$$item.count"
                                }
                            }
                        }
                    }
                }
            },
            {
                $replaceRoot: { newRoot: "$result" } // 将 result 字段作为新的根
            },
            { $addFields: { _id: ISODate("2023-11-05T00:00:00+0800")  } },
         {
                $merge: {
                    into: "Log_SalesMix_Summary" // 将结果添加到现有集合
              }
          }
        ])
```

後來用C#語法改寫以便可以加入排程

```
using System;
using System.Linq;
using MongoDB.Bson;
using MongoDB.Driver;


namespace runMongoDailyJob
{
    internal class Program
    {
        static void Main(string[] args)
        {

            string mongodbHost =
Environment.GetEnvironmentVariable("MONGODB_HOST") ??
```

```
"admin:Aa123456@172.21.17.34"; // 默认值为 "localhost"
            string mongodbPort =
Environment.GetEnvironmentVariable("MONGODB_PORT") ?? "27017"; // 默认值为 "27017"
            string databaseName = "mcDataCenter"; // 你的数据库名称

            string connectionString = $"mongodb://{mongodbHost}:{mongodbPort}";

            MongoClient client = new MongoClient(connectionString);
            IMongoDatabase database = client.GetDatabase(databaseName);
            IMongoCollection<BsonDocument> collection =
database.GetCollection<BsonDocument>("Log_SalesMix_Lite");

            DateTime currentTime = DateTime.Now;
            DateTime currentHour = currentTime.Date.AddHours(currentTime.Hour);

            // 计算前一个小时的时间
            DateTime oneHourAgo = currentHour.AddHours(-1);

            var matchStage = new BsonDocument("$match", new BsonDocument
            {
    { "trg_create_on", new BsonDocument
        {
            { "$gte", oneHourAgo },
            { "$lt", currentHour }
        }
    }
});

            var sortStage = new BsonDocument("$sort", new BsonDocument
        {
            { "trg_create_on", 1 }
        });

            var groupStage = new BsonDocument("$group", new BsonDocument
        {
            { "_id", "$primary_key" },
            { "data", new BsonDocument("$push", "$$ROOT") }
        });

            var unwindStage1 = new BsonDocument("$unwind", "$data");

            var replaceRootStage = new BsonDocument("$replaceRoot", new
BsonDocument
        {
            { "newRoot", "$data" }
        });

            var projectStage = new BsonDocument("$project", new BsonDocument
        {
            { "_id", 0 },
            { "trg_create_on", 1 },
            { "fields", new BsonDocument("$objectToArray", "$$ROOT") }
        });
```

```
            var unwindStage2 = new BsonDocument("$unwind", "$fields");

            var groupStage2 = new BsonDocument("$group", new BsonDocument
        {
            { "_id", new BsonDocument("field", "$fields.k") },
            { "count", new BsonDocument("$sum", 1) }
        });

            var groupStage3 = new BsonDocument("$group", new BsonDocument
        {
            { "_id", oneHourAgo },
            { "data", new BsonDocument("$push", "$$ROOT") }
        });

            var projectStage2 = new BsonDocument("$project", new BsonDocument
        {
            { "_id", 1 },
            { "result", new BsonDocument("$arrayToObject", new BsonDocument
                {
                    { "$map", new BsonDocument
                        {
                            { "input", "$data" },
                            { "as", "item" },
                            { "in", new BsonDocument
                                {
                                    { "k", "$$item._id.field" },
                                    { "v", "$$item.count" }
                                }
                            }
                        }
                    }
                })
            }
        });

            var replaceRootStage2 = new BsonDocument("$replaceRoot", new
BsonDocument
        {
            { "newRoot", "$result" }
        });

            var addFieldsStage = new BsonDocument("$addFields", new BsonDocument
        {
            { "_id", oneHourAgo }
        });
            var mergeStage = new BsonDocument("$merge", new BsonDocument
        {
            { "into", "Log_SalesMix_Summary" }
        });
            var pipeline = new[]
            {
            matchStage, sortStage, groupStage, unwindStage1, replaceRootStage,
            projectStage, unwindStage2, groupStage2, groupStage3,
            projectStage2, replaceRootStage2, addFieldsStage,mergeStage
            // 添加其他阶段...
        };
            collection.Aggregate<BsonDocument>(pipeline)
        }
    }
}
```

在正式區執行一次約為3秒，可將約10萬筆的record所有欄位計算出來並寫入新的collection中

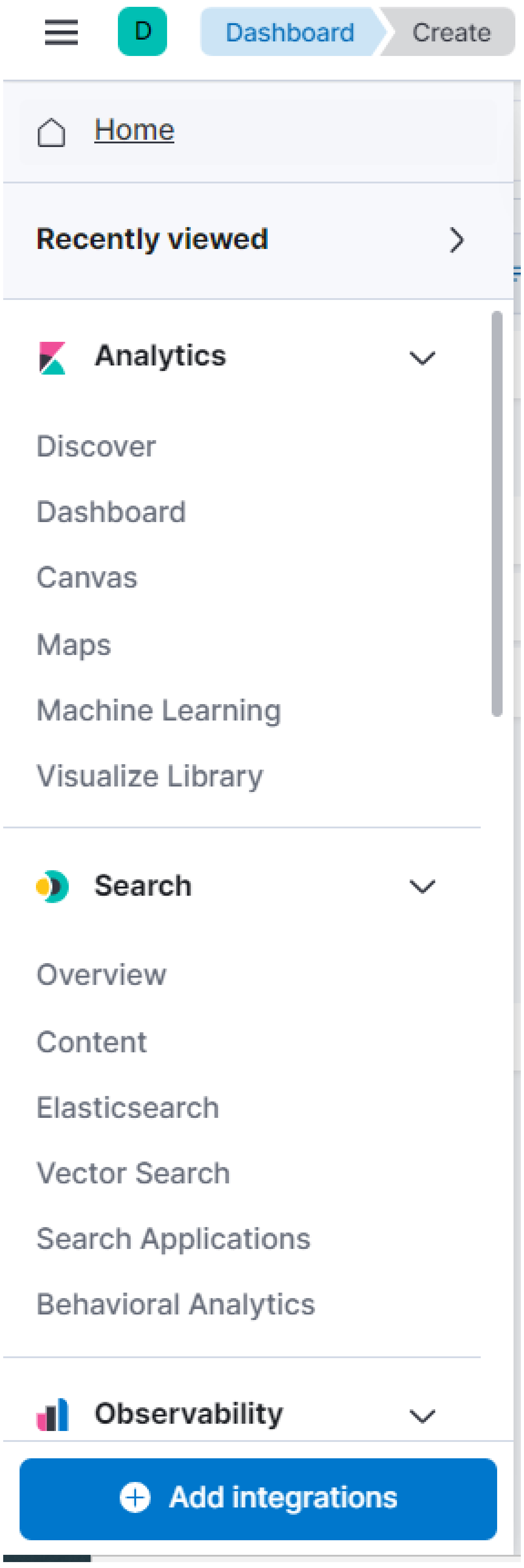
透過ELK視覺化

1. 修改C#程式碼如下，可以將結果寫入ELK中

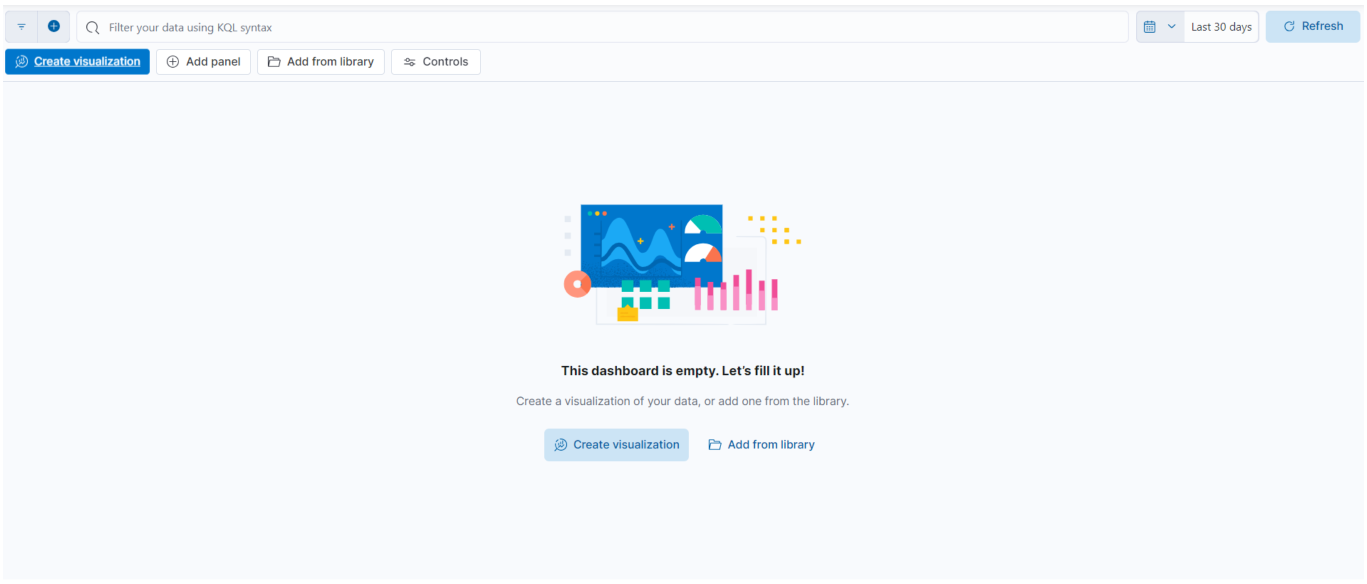
   參考

2. 建立dashboard 把結果視覺化，可依此觀察各欄位次數的變化

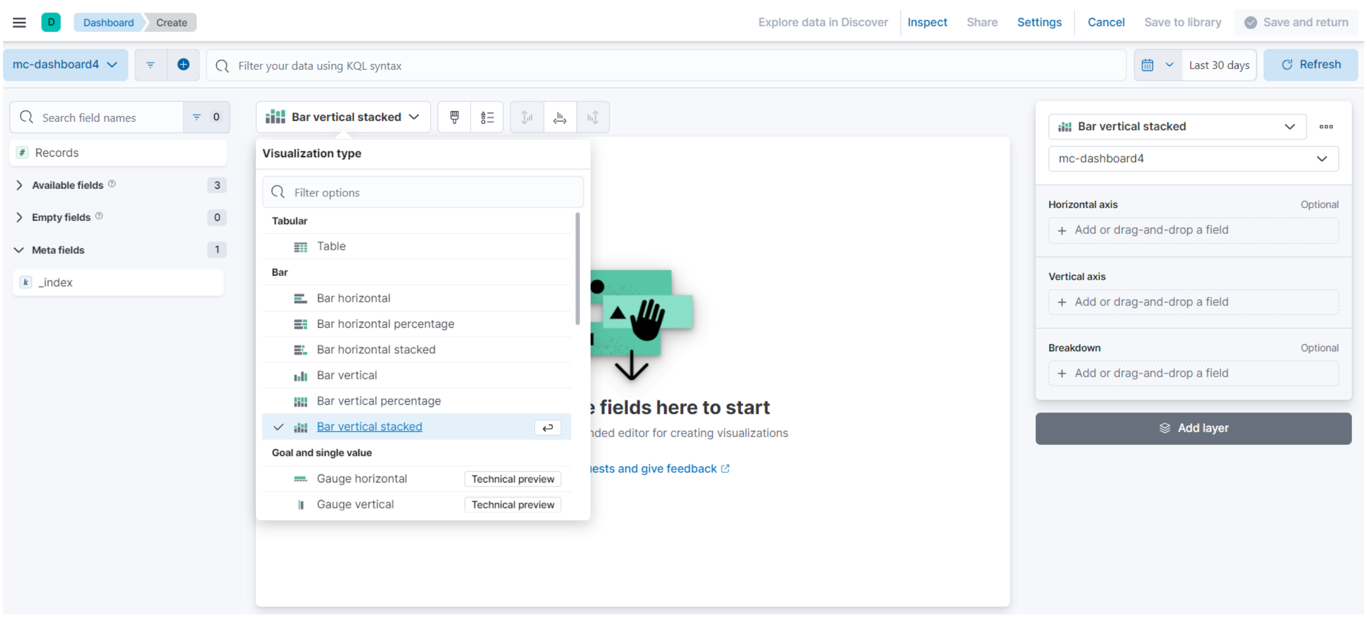
- 選取左方的dashboard



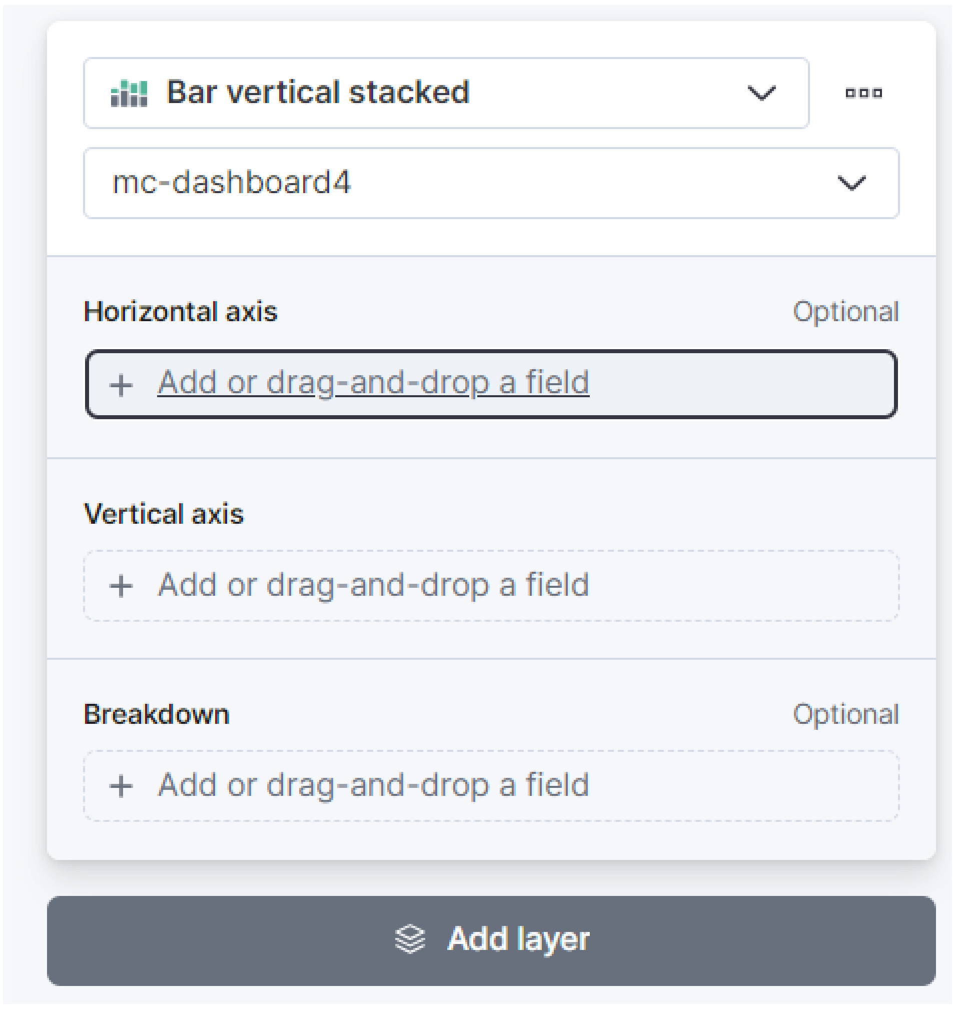
- Create Visualization


Filter your data using KQL syntax
Last 30 days
Refresh
Create visualization
Add panel
Add from library
Controls
This dashboard is empty. Let's fill it up!
Create a visualization of your data, or add one from the library.
Create visualization
Add from library

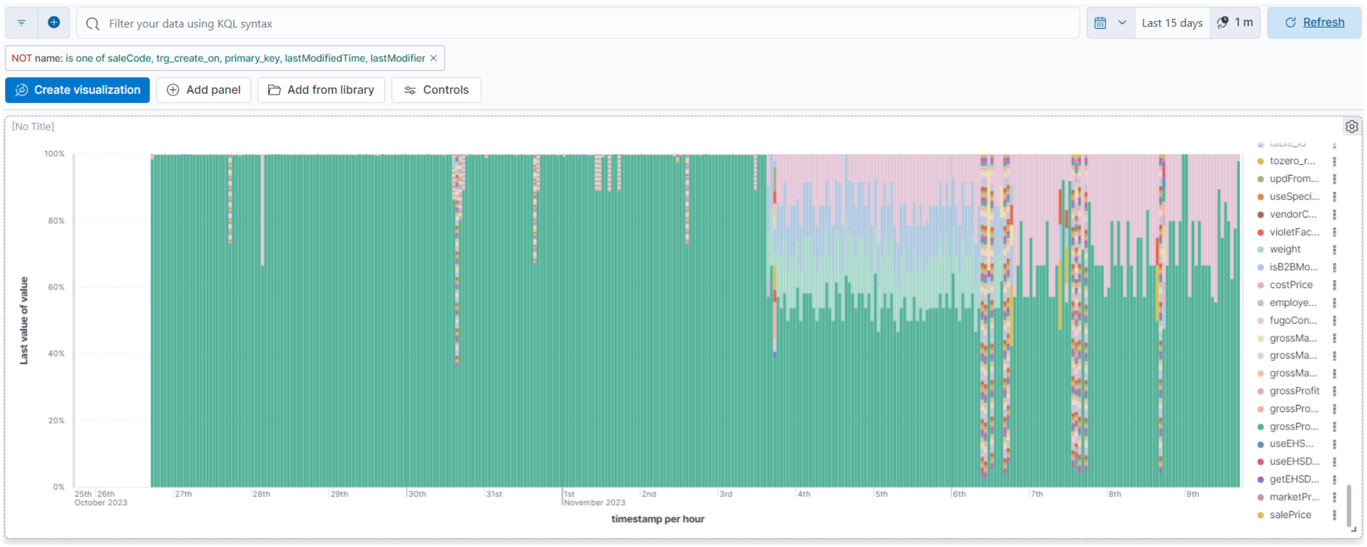
- 圖表類型選取 `Bar vertical percentage`



- 設定右方x-axis以及y-axis，breakdown的部分記得選`name`



- 結果


NOT name: is one of saleCode, trg_create_on, primary_key, lastModifiedTime, lastModifier