



UNIVERSITY OF
PORTSMOUTH

DATA MANAGEMENT

COURSEWORK 2: PMM Grocery
Supermarket NoSQL Database

NoSQL Database Solution for PMM Grocery Supermarket

School of Computing, University of Portsmouth

Dr Olumuyiwa Matthew

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Student ID: UP2225522

Task 1: Database/record Development

- In this report, MongoDB is connected to VSCode and all coding will be completed there.
- All the code below shows the creation of the database and collection with an insert statement of the first record (as there are at least 100 records for each). For more examples of the records, please see the appendix.

Collection 1: products

Input:

```
use('PMM');
db.products.insertMany({
  "Product_ID": 1,
  "Category": {
    "Category_Name": "Canned Goods"
  },
  "Life_Style": {
    "Life_Style_Name": "active"
  },
  "Product_Name": "Trout Rainbow Whole",
  "Price": 33.02,
  "Country_Of_Origin": "Canada",
  "Manufacturer": "Wikivu",
  "Ingredients": [
    {"Ingredient_Name": "salt"},
    {"Ingredient_Name": "cocoa powder"},
    {"Ingredient_Name": "cocoa powder"},
    {"Ingredient_Name": "flour"},
    {"Ingredient_Name": "eggs"}
  ],
  "Nutrition_Info": [
    {"Nutrition": "iron"},
    {"Nutrition": "vitamin C"},
    {"Nutrition": "fat"},
    {"Nutrition": "sugar"},
    {"Nutrition": "iron"},
    {"Nutrition": "vitamin A"}
  ],
  "Stock_Info": [
    {
      "Location_ID": 2,
      "Available_Quantity": 358,
      "Last_Stock_Date": "11/20/2023"
    },
    {
      "Location_ID": 2,
      "Available_Quantity": 637,
```

```
"Last_Stock_Date": "03/10/2023"
},
{
  "Location_ID": 5,
  "Available_Quantity": 942,
  "Last_Stock_Date": "10/26/2023"
},
{
  "Location_ID": 4,
  "Available_Quantity": 859,
  "Last_Stock_Date": "09/20/2023"
},
{
  "Location_ID": 4,
  "Available_Quantity": 145,
  "Last_Stock_Date": "03/29/2023"
},
{
  "Location_ID": 5,
  "Available_Quantity": 237,
  "Last_Stock_Date": "03/05/2023"
},
{
  "Location_ID": 2,
  "Available_Quantity": 501,
  "Last_Stock_Date": "09/03/2023"
},
{
  "Location_ID": 6,
  "Available_Quantity": 883,
  "Last_Stock_Date": "05/29/2023"
}
],
```

Output: Example of product which Product_ID equals 1, the below screenshot shows the beginning and the end of the query.

```
Currently connected to localhost:27017. Click here to change connection.
1 use('PMM');
2
3 db.products.find({"Product_ID": 1})

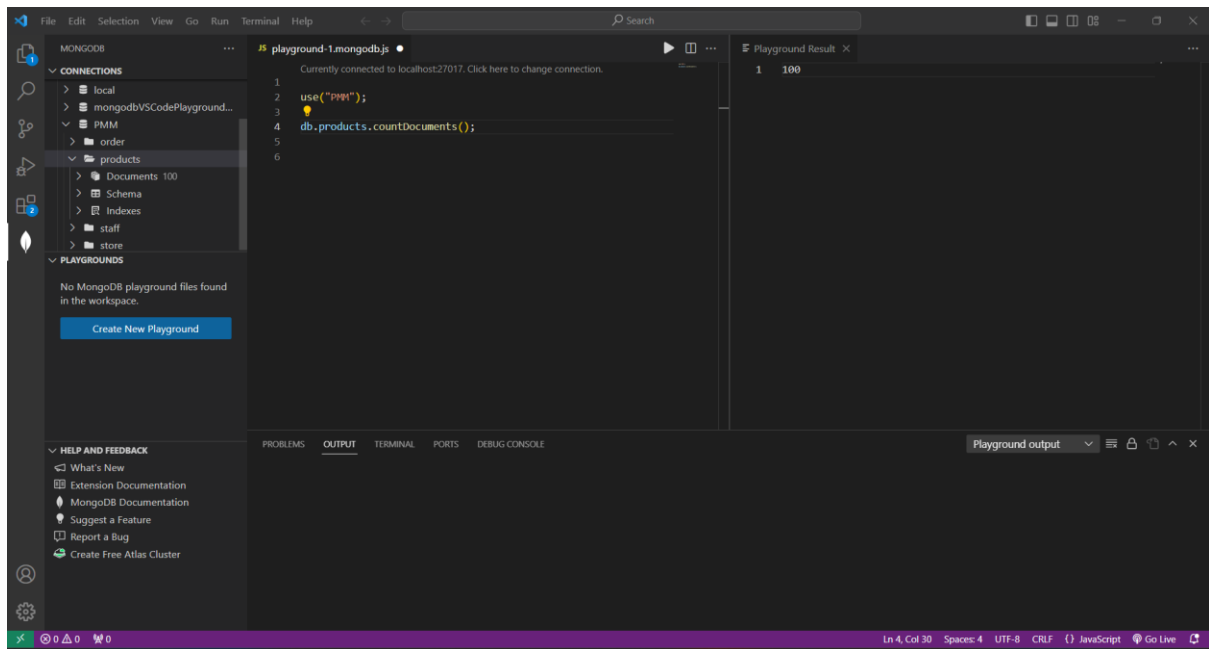
1 {
2   "_id": {
3     "$oid": "6578ced339f31b1cebb4b20b"
4   },
5   "Product_ID": 1,
6   "Category": {
7     "Category_Name": "Canned Goods"
8   },
9   "Life_Style": {
10    "Life_Style_Name": "active"
11  },
12  "Product_Name": "Trout Rainbow Whole",
13  "Price": 33.02,
14  "Country_Of_Origin": "Canada",
15  "Manufacturer": "Wikivu",
16  "Ingredients": [
17    {
18      "Ingredient_Name": "salt"
19    },
20    {
21      "Ingredient_Name": "cocoa powder"
22    },
23    {
24      "Ingredient_Name": "cocoa powder"
25    },
26    {
27      "Ingredient_Name": "flour"
28    },
29    {
30      "Ingredient_Name": "eggs"
31    }
32  ],
33  "Nutrition_Info": [
34    {
35      "Nutrition": "iron"
36    }
```

```
playground-1.mongodb.js
Currently connected to localhost:27017. Click here to change connection.
1 use('PMM');
2
3 db.products.find({"Product_ID":1})

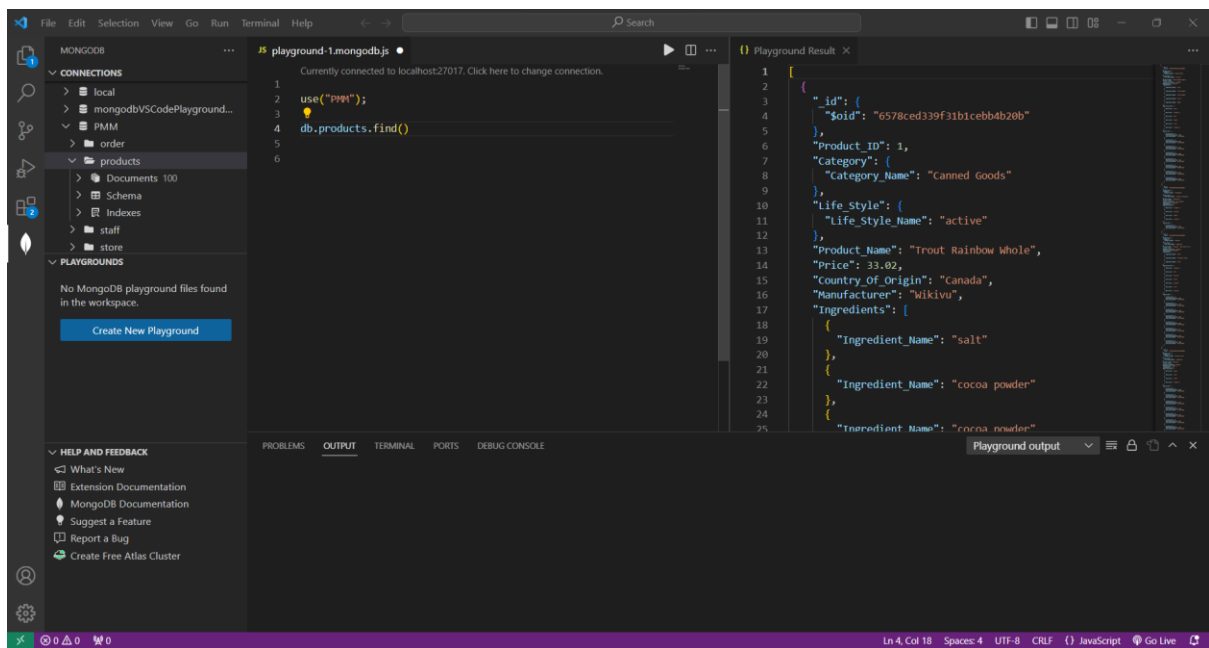
64 },
65 {
66   "Location_ID": 5,
67   "Available_Quantity": 942,
68   "Last_Stock_Date": "10/26/2023"
69 },
70 {
71   "Location_ID": 4,
72   "Available_Quantity": 859,
73   "Last_Stock_Date": "09/20/2023"
74 },
75 {
76   "Location_ID": 4,
77   "Available_Quantity": 145,
78   "Last_Stock_Date": "03/29/2023"
79 },
80 {
81   "Location_ID": 5,
82   "Available_Quantity": 237,
83   "Last_Stock_Date": "03/05/2023"
84 },
85 {
86   "Location_ID": 2,
87   "Available_Quantity": 501,
88   "Last_Stock_Date": "09/03/2023"
89 },
90 {
91   "Location_ID": 6,
92   "Available_Quantity": 883,
93   "Last_Stock_Date": "05/29/2023"
94 }
95 ]
96 }
97 ]
```

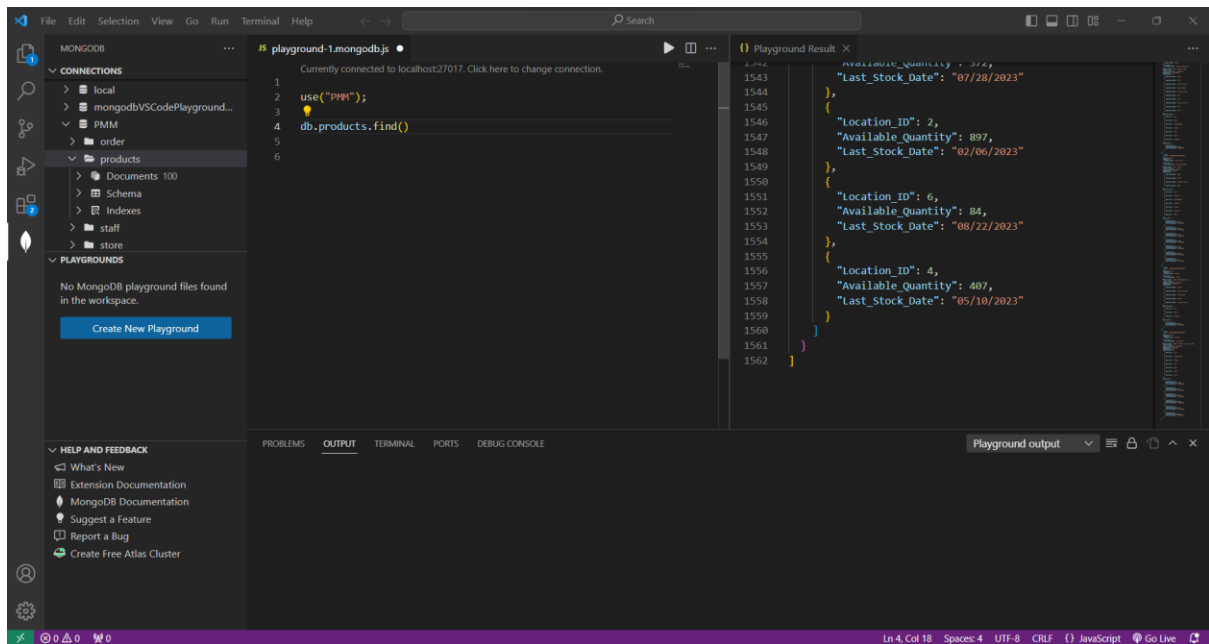
Creating this collection of products with their details like ingredients, nutrition, and stock availability helps PMM Grocery in a NoSQL solution by organizing and managing various product information flexibly. By storing data in this way, PMM can easily track product quantities across multiple locations without needing a rigid structure. This format allows them to adapt quickly to changing data needs, adding or modifying product details without disrupting the entire system. Additionally, it enables efficient retrieval of specific product information, aiding in inventory management and ensuring products are available where and when customers need them.

All product outputs:



There are 100 products as shown above





The code above returns all the products and the screenshots shows the beginning and the end of the result.

Collection 2: order

Input:

```
use('PMM');

db.order.insertMany({
  "Order_ID": 1,
  "Customer": {
    "Customer_ID": 1,
    "Customer_First_Name": "Fae",
    "Customer_Last_Name": "Skitt",
    "Email": "fskitt0@ning.com",
    "Address": {
      "Address_Line_1": "363 Grayhawk Junction",
      "Address_Line_2": "PO Box 88614",
      "City": "Leninskiy",
      "County": "County Name",
      "Postcode": "678944",
      "Address_Type": "Billing"
    }
  },
  "Order_Date": "06/23/2023",
  "Order_Status": "Cancelled",
  "Order_Items": [
    {"Product_ID": 1, "Quantity": 81, "Total_Price": 18.22},
    {"Product_ID": 2, "Quantity": 10, "Total_Price": 828.44},
    {"Product_ID": 3, "Quantity": 81, "Total_Price": 50.43}
  ]
})
```

```
],  
},
```

Output:

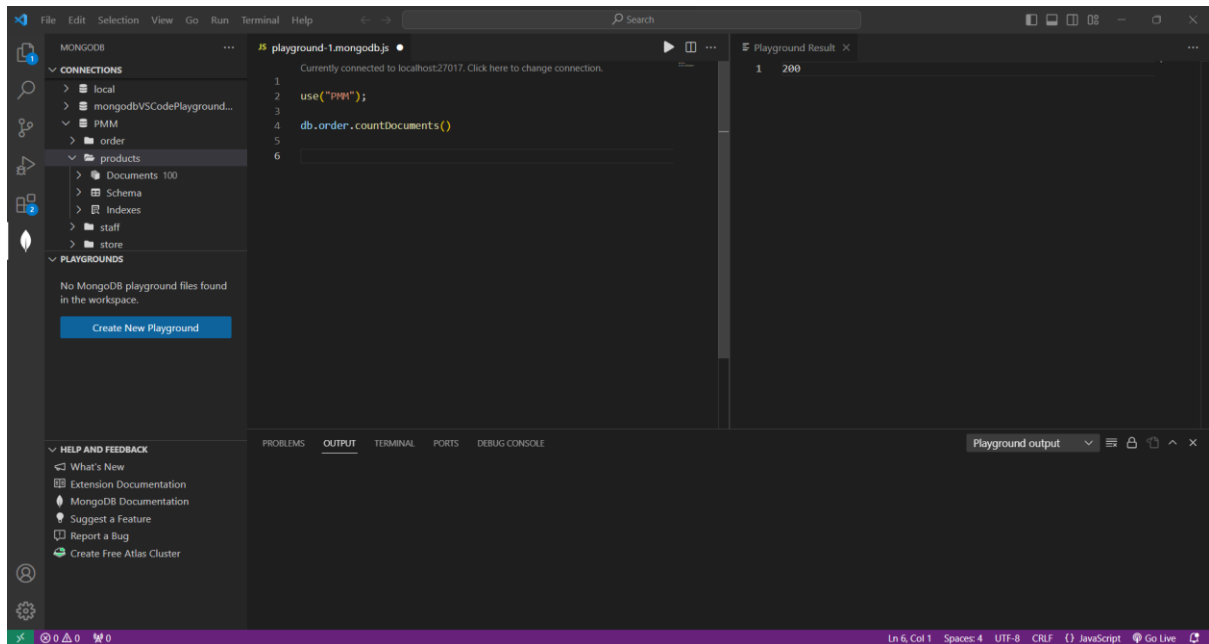
```
1 Currently connected to localhost:27017. Click here to change connection.  
2 use('PMM');  
3 db.order.find({"Order_ID": 1})  
4  
1 {  
2   {  
3     "_id": {  
4       "$oid": "6578cef239f31b1cebb4b270"  
5     },  
6     "Order_ID": 1,  
7     "Customer": {  
8       "Customer_ID": 1,  
9       "Customer_First Name": "Fae",  
10      "Customer_Last Name": "Skitt",  
11      "Email": "fskitto@ning.com",  
12      "Address": {  
13        "Address_Line 1": "363 Grayhawk Junction",  
14        "Address_Line 2": "PO Box 88614",  
15        "City": "Leninskiy",  
16        "County": "County Name",  
17        "Postcode": "678944",  
18        "Address_Type": "Billing"  
19      },  
20    },  
21    "Order_Date": "06/23/2023",  
22    "Order_Status": "Cancelled",  
23    "Order_Items": [  
24      {  
25        "Product_ID": 1,  
26        "Quantity": 81,  
27        "Total_Price": 18.22  
28      },  
29      {  
30        "Product_ID": 2,  
31        "Quantity": 10,  
32        "Total_Price": 828.44  
33      },  
34      {  
35        "Product_ID": 3,  
36        "Quantity": 81,  
37        "Total_Price": 50.43  
38    }  
39  ]  
40 }  
41 }
```

```
JS playground-1.mongodbsjs • {} Playground Result ×  
1 Currently connected to localhost:27017. Click here to change connection.  
2 use('PMM');  
3 db.order.find({"Order_ID":1})  
4  
21 "Order_Date": "06/23/2023",  
22 "Order_Status": "Cancelled",  
23 "Order_Items": [  
24   {  
25     "Product_ID": 1,  
26     "Quantity": 81,  
27     "Total_Price": 18.22  
28   },  
29   {  
30     "Product_ID": 2,  
31     "Quantity": 10,  
32     "Total_Price": 828.44  
33   },  
34   {  
35     "Product_ID": 3,  
36     "Quantity": 81,  
37     "Total_Price": 50.43  
38   }  
39 ]  
40 }  
41 }
```

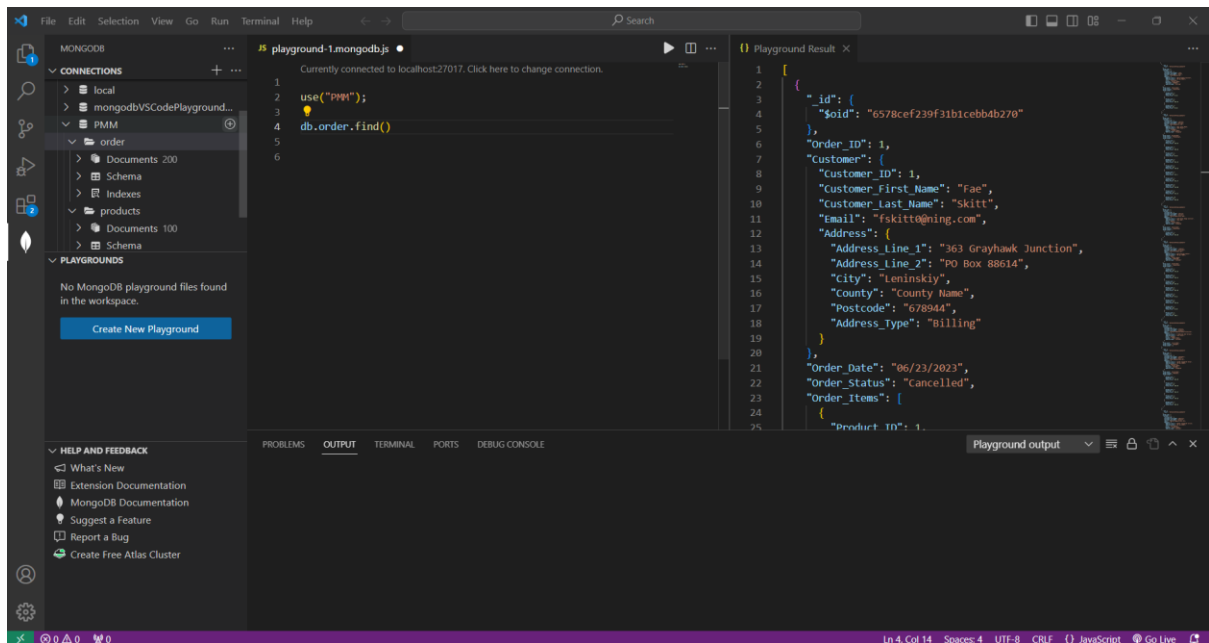
Creating this order collection for PMM Grocery proves advantageous by structuring customer orders efficiently. Storing details like customer information, order items, and statuses in nested structures allows for a flexible organization of varied data. It streamlines data retrieval for cancelled orders, helping in assessing trends or issues related to customer cancellations, while also providing insights into specific products customers order and the corresponding quantities, aiding in inventory management and future stocking decisions. Additionally, this approach allows for seamless

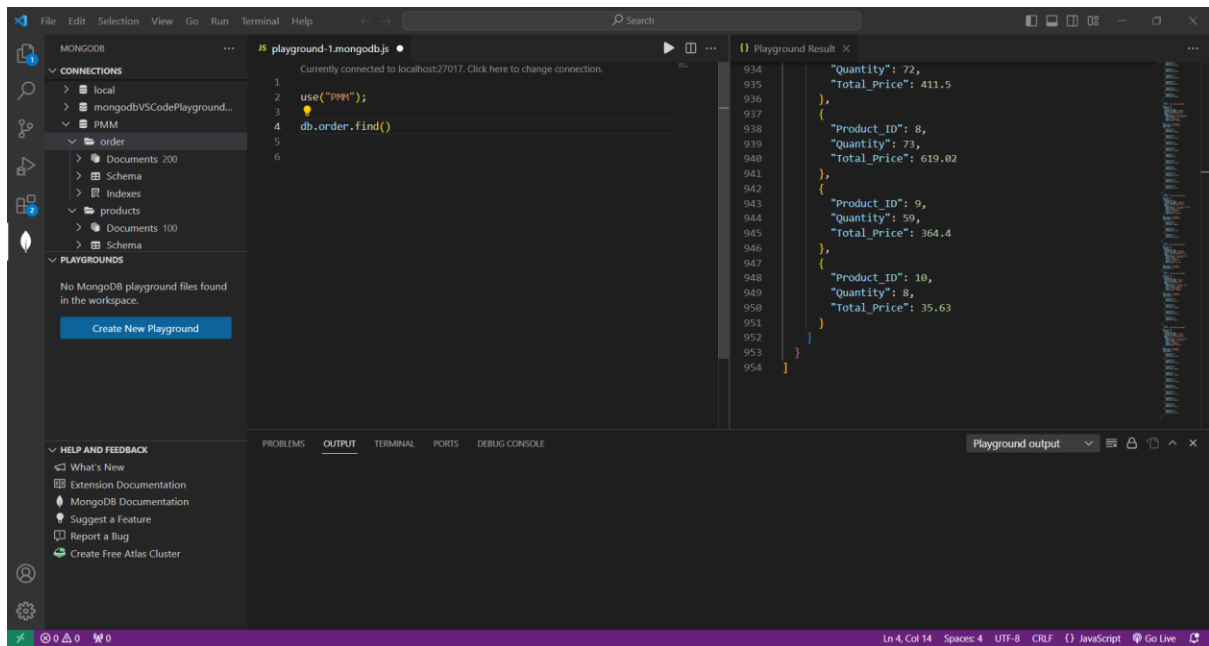
modifications or additions to order details without disrupting the overall database structure, ensuring adaptability to evolving business needs.

All order output:



There are 200 orders in this collection based on the above.





The code above returns all the orders and the screenshots shows the beginning and the end of the result.

Collection 3: store

Input:

```
use('PMM');

db.store.insertMany({
  "Location_ID": 1,
  "Location_Name": "Waterlooville",
  "Manager": {
    "First_Name": "Gabi",
    "Last_Name": "Hinzer",
    "Email": "ghinzer0@storify.com",
    "Address": {
      "Address_Line_1": "8 Forest Junction",
      "Address_Line_2": "Suite 98",
      "City": "Sukamaju",
      "County": "County Name"
    }
  },
  "Head_Office_Flag": false
},
```

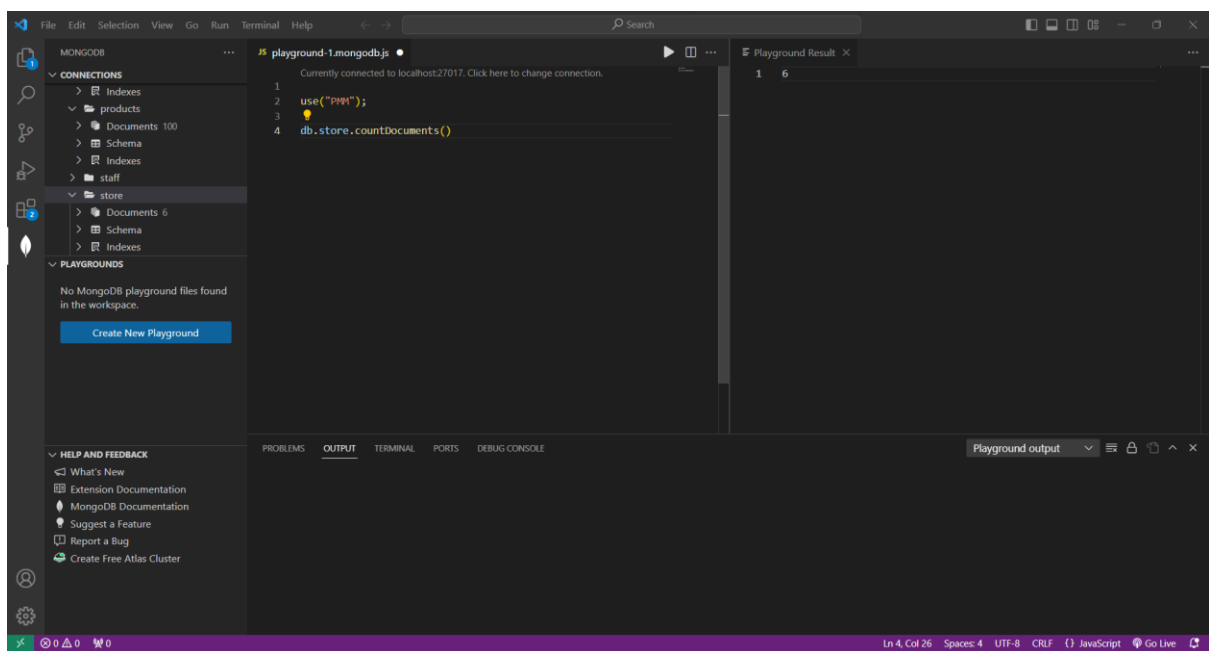
Output:

```
Currently connected to localhost:27017. Click here to change connection.
1 use("PMM");
2
3 db.store.find({"Location_ID": 1})
4
5

1 {
2   "_id": {
3     "$oid": "6578cf0539f31b1cebb4b339"
4   },
5   "Location_ID": 1,
6   "Location_Name": "Waterlooville",
7   "Manager": {
8     "First_Name": "Gabi",
9     "Last_Name": "Hinzer",
10    "Email": "ghinzer0@storify.com",
11    "Address": {
12      "Address_Line_1": "8 Forest Junction",
13      "Address_Line_2": "Suite 98",
14      "City": "Sukamaju",
15      "County": "County Name"
16    }
17  },
18  "Head_Office_Flag": false
19 }
20
21 }
```

Creating the store collection with details about different locations where PMM Grocery operates supports their NoSQL solution by structuring location-specific information efficiently. This setup aids PMM Grocery in swiftly accessing details about each store, its management, and distinguishing head offices. This design flexibility also facilitates potential expansions or alterations in location details without causing disruptions to the database structure, ensuring adaptability as PMM Grocery grows or modifies its store network.

All stores output:



There are 6 stores based on the above.

The screenshot shows the VS Code MongoDB Playground interface. On the left, the 'CONNECTIONS' sidebar shows a connection to 'localhost:27017'. The 'PLAYGROUNDS' section is empty. The main editor shows a JavaScript file named 'playground-1.mongodb.js' with the following code:

```
1 use("PMM");
2
3
4 db.store.find()
```

The 'PLAYGROUND RESULT' pane on the right shows the output of the query:

```
1 {
2   {
3     "_id": {
4       "$oid": "6578cf0539f31b1cebb4b339"
5     },
6     "Location_ID": 1,
7     "Location_Name": "Waterloooville",
8     "Manager": {
9       "First_Name": "Gabi",
10      "Last_Name": "Hinzer",
11      "Email": "ghinzer@storify.com",
12      "Address": {
13        "Address_Line_1": "8 Forest Junction",
14        "Address_Line_2": "Suite 98",
15        "City": "Sukamaju",
16        "County": "County Name"
17      }
18    },
19    "Head_Office_Flag": false
20  },
21  {
22    "_id": {
23      "$oid": "6578cf0539f31b1cebb4b33a"
24    },
25    "Location_ID": 2,
```

The status bar at the bottom indicates 'Ln 4, Col 15', 'Spaces: 4', 'UTF-8', 'CRLF', 'JavaScript', and 'Go Live'.

The screenshot shows the VS Code MongoDB Playground interface. On the left, the 'CONNECTIONS' sidebar shows a connection to 'localhost:27017'. The 'PLAYGROUNDS' section is empty. The main editor shows a JavaScript file named 'playground-1.mongodb.js' with the following code:

```
1 use("PMM");
2
3
4 db.store.find()
5
```

The 'PLAYGROUND RESULT' pane on the right shows the output of the query:

```
99 },
100 {
101   {
102     "_id": {
103       "$oid": "6578cf0539f31b1cebb4b33e"
104     },
105     "Location_ID": 6,
106     "Location_Name": "Portsmouth",
107     "Manager": {
108       "First_Name": "Tanya",
109       "Last_Name": "Billingsly",
110       "Email": "tbillingsly@harvard.edu",
111       "Address": {
112         "Address_Line_1": "3 Eagan Road",
113         "Address_Line_2": "PO Box 76986",
114         "City": "Sajia",
115         "County": "County Name"
116       }
117     },
118     "Head_Office_Flag": true
119   },
120   {
121     "_id": {
122       "$oid": "6578cf0539f31b1cebb4b33f"
123     },
124     "Location_ID": 7,
125     "Location_Name": "Portsmouth",
126     "Manager": {
127       "First_Name": "Tanya",
128       "Last_Name": "Billingsly",
129       "Email": "tbillingsly@harvard.edu",
130       "Address": {
131         "Address_Line_1": "3 Eagan Road",
132         "Address_Line_2": "PO Box 76986",
133         "City": "Sajia",
134         "County": "County Name"
135       }
136     },
137     "Head_Office_Flag": true
138   },
139   {
140     "_id": {
141       "$oid": "6578cf0539f31b1cebb4b340"
142     },
143     "Location_ID": 8,
144     "Location_Name": "Portsmouth",
145     "Manager": {
146       "First_Name": "Tanya",
147       "Last_Name": "Billingsly",
148       "Email": "tbillingsly@harvard.edu",
149       "Address": {
150         "Address_Line_1": "3 Eagan Road",
151         "Address_Line_2": "PO Box 76986",
152         "City": "Sajia",
153         "County": "County Name"
154       }
155     },
156     "Head_Office_Flag": true
157   },
158   {
159     "_id": {
160       "$oid": "6578cf0539f31b1cebb4b341"
161     },
162     "Location_ID": 9,
163     "Location_Name": "Portsmouth",
164     "Manager": {
165       "First_Name": "Tanya",
166       "Last_Name": "Billingsly",
167       "Email": "tbillingsly@harvard.edu",
168       "Address": {
169         "Address_Line_1": "3 Eagan Road",
170         "Address_Line_2": "PO Box 76986",
171         "City": "Sajia",
172         "County": "County Name"
173       }
174     },
175     "Head_Office_Flag": true
176   },
177   {
178     "_id": {
179       "$oid": "6578cf0539f31b1cebb4b342"
180     },
181     "Location_ID": 10,
182     "Location_Name": "Portsmouth",
183     "Manager": {
184       "First_Name": "Tanya",
185       "Last_Name": "Billingsly",
186       "Email": "tbillingsly@harvard.edu",
187       "Address": {
188         "Address_Line_1": "3 Eagan Road",
189         "Address_Line_2": "PO Box 76986",
190         "City": "Sajia",
191         "County": "County Name"
192       }
193     },
194     "Head_Office_Flag": true
195   },
196   {
197     "_id": {
198       "$oid": "6578cf0539f31b1cebb4b343"
199     },
200     "Location_ID": 11,
201     "Location_Name": "Portsmouth",
202     "Manager": {
203       "First_Name": "Tanya",
204       "Last_Name": "Billingsly",
205       "Email": "tbillingsly@harvard.edu",
206       "Address": {
207         "Address_Line_1": "3 Eagan Road",
208         "Address_Line_2": "PO Box 76986",
209         "City": "Sajia",
210         "County": "County Name"
211       }
212     },
213     "Head_Office_Flag": true
214   },
215   {
216     "_id": {
217       "$oid": "6578cf0539f31b1cebb4b344"
218     },
219     "Location_ID": 12,
220     "Location_Name": "Portsmouth",
221     "Manager": {
222       "First_Name": "Tanya",
223       "Last_Name": "Billingsly",
224       "Email": "tbillingsly@harvard.edu",
225       "Address": {
226         "Address_Line_1": "3 Eagan Road",
227         "Address_Line_2": "PO Box 76986",
228         "City": "Sajia",
229         "County": "County Name"
230       }
231     },
232     "Head_Office_Flag": true
233   },
234   {
235     "_id": {
236       "$oid": "6578cf0539f31b1cebb4b345"
237     },
238     "Location_ID": 13,
239     "Location_Name": "Portsmouth",
240     "Manager": {
241       "First_Name": "Tanya",
242       "Last_Name": "Billingsly",
243       "Email": "tbillingsly@harvard.edu",
244       "Address": {
245         "Address_Line_1": "3 Eagan Road",
246         "Address_Line_2": "PO Box 76986",
247         "City": "Sajia",
248         "County": "County Name"
249       }
250     },
251     "Head_Office_Flag": true
252   },
253   {
254     "_id": {
255       "$oid": "6578cf0539f31b1cebb4b346"
256     },
257     "Location_ID": 14,
258     "Location_Name": "Portsmouth",
259     "Manager": {
260       "First_Name": "Tanya",
261       "Last_Name": "Billingsly",
262       "Email": "tbillingsly@harvard.edu",
263       "Address": {
264         "Address_Line_1": "3 Eagan Road",
265         "Address_Line_2": "PO Box 76986",
266         "City": "Sajia",
267         "County": "County Name"
268       }
269     },
270     "Head_Office_Flag": true
271   },
272   {
273     "_id": {
274       "$oid": "6578cf0539f31b1cebb4b347"
275     },
276     "Location_ID": 15,
277     "Location_Name": "Portsmouth",
278     "Manager": {
279       "First_Name": "Tanya",
280       "Last_Name": "Billingsly",
281       "Email": "tbillingsly@harvard.edu",
282       "Address": {
283         "Address_Line_1": "3 Eagan Road",
284         "Address_Line_2": "PO Box 76986",
285         "City": "Sajia",
286         "County": "County Name"
287       }
288     },
289     "Head_Office_Flag": true
290   },
291   {
292     "_id": {
293       "$oid": "6578cf0539f31b1cebb4b348"
294     },
295     "Location_ID": 16,
296     "Location_Name": "Portsmouth",
297     "Manager": {
298       "First_Name": "Tanya",
299       "Last_Name": "Billingsly",
300       "Email": "tbillingsly@harvard.edu",
301       "Address": {
302         "Address_Line_1": "3 Eagan Road",
303         "Address_Line_2": "PO Box 76986",
304         "City": "Sajia",
305         "County": "County Name"
306       }
307     },
308     "Head_Office_Flag": true
309   },
310   {
311     "_id": {
312       "$oid": "6578cf0539f31b1cebb4b349"
313     },
314     "Location_ID": 17,
315     "Location_Name": "Portsmouth",
316     "Manager": {
317       "First_Name": "Tanya",
318       "Last_Name": "Billingsly",
319       "Email": "tbillingsly@harvard.edu",
320       "Address": {
321         "Address_Line_1": "3 Eagan Road",
322         "Address_Line_2": "PO Box 76986",
323         "City": "Sajia",
324         "County": "County Name"
325       }
326     },
327     "Head_Office_Flag": true
328   },
329   {
330     "_id": {
331       "$oid": "6578cf0539f31b1cebb4b34a"
332     },
333     "Location_ID": 18,
334     "Location_Name": "Portsmouth",
335     "Manager": {
336       "First_Name": "Tanya",
337       "Last_Name": "Billingsly",
338       "Email": "tbillingsly@harvard.edu",
339       "Address": {
340         "Address_Line_1": "3 Eagan Road",
341         "Address_Line_2": "PO Box 76986",
342         "City": "Sajia",
343         "County": "County Name"
344       }
345     },
346     "Head_Office_Flag": true
347   },
348   {
349     "_id": {
350       "$oid": "6578cf0539f31b1cebb4b34b"
351     },
352     "Location_ID": 19,
353     "Location_Name": "Portsmouth",
354     "Manager": {
355       "First_Name": "Tanya",
356       "Last_Name": "Billingsly",
357       "Email": "tbillingsly@harvard.edu",
358       "Address": {
359         "Address_Line_1": "3 Eagan Road",
360         "Address_Line_2": "PO Box 76986",
361         "City": "Sajia",
362         "County": "County Name"
363       }
364     },
365     "Head_Office_Flag": true
366   },
367   {
368     "_id": {
369       "$oid": "6578cf0539f31b1cebb4b34c"
370     },
371     "Location_ID": 20,
372     "Location_Name": "Portsmouth",
373     "Manager": {
374       "First_Name": "Tanya",
375       "Last_Name": "Billingsly",
376       "Email": "tbillingsly@harvard.edu",
377       "Address": {
378         "Address_Line_1": "3 Eagan Road",
379         "Address_Line_2": "PO Box 76986",
380         "City": "Sajia",
381         "County": "County Name"
382       }
383     },
384     "Head_Office_Flag": true
385   },
386   {
387     "_id": {
388       "$oid": "6578cf0539f31b1cebb4b34d"
389     },
390     "Location_ID": 21,
391     "Location_Name": "Portsmouth",
392     "Manager": {
393       "First_Name": "Tanya",
394       "Last_Name": "Billingsly",
395       "Email": "tbillingsly@harvard.edu",
396       "Address": {
397         "Address_Line_1": "3 Eagan Road",
398         "Address_Line_2": "PO Box 76986",
399         "City": "Sajia",
400         "County": "County Name"
401       }
402     },
403     "Head_Office_Flag": true
404   },
405   {
406     "_id": {
407       "$oid": "6578cf0539f31b1cebb4b34e"
408     },
409     "Location_ID": 22,
410     "Location_Name": "Portsmouth",
411     "Manager": {
412       "First_Name": "Tanya",
413       "Last_Name": "Billingsly",
414       "Email": "tbillingsly@harvard.edu",
415       "Address": {
416         "Address_Line_1": "3 Eagan Road",
417         "Address_Line_2": "PO Box 76986",
418         "City": "Sajia",
419         "County": "County Name"
420       }
421     },
422     "Head_Office_Flag": true
423   },
424   {
425     "_id": {
426       "$oid": "6578cf0539f31b1cebb4b34f"
427     },
428     "Location_ID": 23,
429     "Location_Name": "Portsmouth",
430     "Manager": {
431       "First_Name": "Tanya",
432       "Last_Name": "Billingsly",
433       "Email": "tbillingsly@harvard.edu",
434       "Address": {
435         "Address_Line_1": "3 Eagan Road",
436         "Address_Line_2": "PO Box 76986",
437         "City": "Sajia",
438         "County": "County Name"
439       }
440     },
441     "Head_Office_Flag": true
442   },
443   {
444     "_id": {
445       "$oid": "6578cf0539f31b1cebb4b350"
446     },
447     "Location_ID": 24,
448     "Location_Name": "Portsmouth",
449     "Manager": {
450       "First_Name": "Tanya",
451       "Last_Name": "Billingsly",
452       "Email": "tbillingsly@harvard.edu",
453       "Address": {
454         "Address_Line_1": "3 Eagan Road",
455         "Address_Line_2": "PO Box 76986",
456         "City": "Sajia",
457         "County": "County Name"
458       }
459     },
460     "Head_Office_Flag": true
461   },
462   {
463     "_id": {
464       "$oid": "6578cf0539f31b1cebb4b351"
465     },
466     "Location_ID": 25,
467     "Location_Name": "Portsmouth",
468     "Manager": {
469       "First_Name": "Tanya",
470       "Last_Name": "Billingsly",
471       "Email": "tbillingsly@harvard.edu",
472       "Address": {
473         "Address_Line_1": "3 Eagan Road",
474         "Address_Line_2": "PO Box 76986",
475         "City": "Sajia",
476         "County": "County Name"
477       }
478     },
479     "Head_Office_Flag": true
480   },
481   {
482     "_id": {
483       "$oid": "6578cf0539f31b1cebb4b352"
484     },
485     "Location_ID": 26,
486     "Location_Name": "Portsmouth",
487     "Manager": {
488       "First_Name": "Tanya",
489       "Last_Name": "Billingsly",
490       "Email": "tbillingsly@harvard.edu",
491       "Address": {
492         "Address_Line_1": "3 Eagan Road",
493         "Address_Line_2": "PO Box 76986",
494         "City": "Sajia",
495         "County": "County Name"
496       }
497     },
498     "Head_Office_Flag": true
499   },
500   {
501     "_id": {
502       "$oid": "6578cf0539f31b1cebb4b353"
503     },
504     "Location_ID": 27,
505     "Location_Name": "Portsmouth",
506     "Manager": {
507       "First_Name": "Tanya",
508       "Last_Name": "Billingsly",
509       "Email": "tbillingsly@harvard.edu",
510       "Address": {
511         "Address_Line_1": "3 Eagan Road",
512         "Address_Line_2": "PO Box 76986",
513         "City": "Sajia",
514         "County": "County Name"
515       }
516     },
517     "Head_Office_Flag": true
518   },
519   {
520     "_id": {
521       "$oid": "6578cf0539f31b1cebb4b354"
522     },
523     "Location_ID": 28,
524     "Location_Name": "Portsmouth",
525     "Manager": {
526       "First_Name": "Tanya",
527       "Last_Name": "Billingsly",
528       "Email": "tbillingsly@harvard.edu",
529       "Address": {
530         "Address_Line_1": "3 Eagan Road",
531         "Address_Line_2": "PO Box 76986",
532         "City": "Sajia",
533         "County": "County Name"
534       }
535     },
536     "Head_Office_Flag": true
537   },
538   {
539     "_id": {
540       "$oid": "6578cf0539f31b1cebb4b355"
541     },
542     "Location_ID": 29,
543     "Location_Name": "Portsmouth",
544     "Manager": {
545       "First_Name": "Tanya",
546       "Last_Name": "Billingsly",
547       "Email": "tbillingsly@harvard.edu",
548       "Address": {
549         "Address_Line_1": "3 Eagan Road",
550         "Address_Line_2": "PO Box 76986",
551         "City": "Sajia",
552         "County": "County Name"
553       }
554     },
555     "Head_Office_Flag": true
556   },
557   {
558     "_id": {
559       "$oid": "6578cf0539f31b1cebb4b356"
560     },
561     "Location_ID": 30,
562     "Location_Name": "Portsmouth",
563     "Manager": {
564       "First_Name": "Tanya",
565       "Last_Name": "Billingsly",
566       "Email": "tbillingsly@harvard.edu",
567       "Address": {
568         "Address_Line_1": "3 Eagan Road",
569         "Address_Line_2": "PO Box 76986",
570         "City": "Sajia",
571         "County": "County Name"
572       }
573     },
574     "Head_Office_Flag": true
575   },
576   {
577     "_id": {
578       "$oid": "6578cf0539f31b1cebb4b357"
579     },
580     "Location_ID": 31,
581     "Location_Name": "Portsmouth",
582     "Manager": {
583       "First_Name": "Tanya",
584       "Last_Name": "Billingsly",
585       "Email": "tbillingsly@harvard.edu",
586       "Address": {
587         "Address_Line_1": "3 Eagan Road",
588         "Address_Line_2": "PO Box 76986",
589         "City": "Sajia",
590         "County": "County Name"
591       }
592     },
593     "Head_Office_Flag": true
594   },
595   {
596     "_id": {
597       "$oid": "6578cf0539f31b1cebb4b358"
598     },
599     "Location_ID": 32,
600     "Location_Name": "Portsmouth",
601     "Manager": {
602       "First_Name": "Tanya",
603       "Last_Name": "Billingsly",
604       "Email": "tbillingsly@harvard.edu",
605       "Address": {
606         "Address_Line_1": "3 Eagan Road",
607         "Address_Line_2": "PO Box 76986",
608         "City": "Sajia",
609         "County": "County Name"
610       }
611     },
612     "Head_Office_Flag": true
613   },
614   {
615     "_id": {
616       "$oid": "6578cf0539f31b1cebb4b359"
617     },
618     "Location_ID": 33,
619     "Location_Name": "Portsmouth",
620     "Manager": {
621       "First_Name": "Tanya",
622       "Last_Name": "Billingsly",
623       "Email": "tbillingsly@harvard.edu",
624       "Address": {
625         "Address_Line_1": "3 Eagan Road",
626         "Address_Line_2": "PO Box 76986",
627         "City": "Sajia",
628         "County": "County Name"
629       }
630     },
631     "Head_Office_Flag": true
632   },
633   {
634     "_id": {
635       "$oid": "6578cf0539f31b1cebb4b35a"
636     },
637     "Location_ID": 34,
638     "Location_Name": "Portsmouth",
639     "Manager": {
640       "First_Name": "Tanya",
641       "Last_Name": "Billingsly",
642       "Email": "tbillingsly@harvard.edu",
643       "Address": {
644         "Address_Line_1": "3 Eagan Road",
645         "Address_Line_2": "PO Box 76986",
646         "City": "Sajia",
647         "County": "County Name"
648       }
649     },
650     "Head_Office_Flag": true
651   },
652   {
653     "_id": {
654       "$oid": "6578cf0539f31b1cebb4b35b"
655     },
656     "Location_ID": 35,
657     "Location_Name": "Portsmouth",
658     "Manager": {
659       "First_Name": "Tanya",
660       "Last_Name": "Billingsly",
661       "Email": "tbillingsly@harvard.edu",
662       "Address": {
663         "Address_Line_1": "3 Eagan Road",
664         "Address_Line_2": "PO Box 76986",
665         "City": "Sajia",
666         "County": "County Name"
667       }
668     },
669     "Head_Office_Flag": true
670   },
671   {
672     "_id": {
673       "$oid": "6578cf0539f31b1cebb4b35c"
674     },
675     "Location_ID": 36,
676     "Location_Name": "Portsmouth",
677     "Manager": {
678       "First_Name": "Tanya",
679       "Last_Name": "Billingsly",
680       "Email": "tbillingsly@harvard.edu",
681       "Address": {
682         "Address_Line_1": "3 Eagan Road",
683         "Address_Line_2": "PO Box 76986",
684         "City": "Sajia",
685         "County": "County Name"
686       }
687     },
688     "Head_Office_Flag": true
689   },
690   {
691     "_id": {
692       "$oid": "6578cf0539f31b1cebb4b35d"
693     },
694     "Location_ID": 37,
695     "Location_Name": "Portsmouth",
696     "Manager": {
697       "First_Name": "Tanya",
698       "Last_Name": "Billingsly",
699       "Email": "tbillingsly@harvard.edu",
700       "Address": {
701         "Address_Line_1": "3 Eagan Road",
702         "Address_Line_2": "PO Box 76986",
703         "City": "Sajia",
704         "County": "County Name"
705       }
706     },
707     "Head_Office_Flag": true
708   },
709   {
710     "_id": {
711       "$oid": "6578cf0539f31b1cebb4b35e"
712     },
713     "Location_ID": 38,
714     "Location_Name": "Portsmouth",
715     "Manager": {
716       "First_Name": "Tanya",
717       "Last_Name": "Billingsly",
718       "Email": "tbillingsly@harvard.edu",
719       "Address": {
720         "Address_Line_1": "3 Eagan Road",
721         "Address_Line_2": "PO Box 76986",
722         "City": "Sajia",
723         "County": "County Name"
724       }
725     },
726     "Head_Office_Flag": true
727   },
728   {
729     "_id": {
730       "$oid": "6578cf0539f31b1cebb4b35f"
731     },
732     "Location_ID": 39,
733     "Location_Name": "Portsmouth",
734     "Manager": {
735       "First_Name": "Tanya",
736       "Last_Name": "Billingsly",
737       "Email": "tbillingsly@harvard.edu",
738       "Address": {
739         "Address_Line_1": "3 Eagan Road",
740         "Address_Line_2": "PO Box 76986",
741         "City": "Sajia",
742         "County": "County Name"
743       }
744     },
745     "Head_Office_Flag": true
746   },
747   {
748     "_id": {
749       "$oid": "6578cf0539f31b1cebb4b360"
750     },
751     "Location_ID": 40,
752     "Location_Name": "Portsmouth",
753     "Manager": {
754       "First_Name": "Tanya",
755       "Last_Name": "Billingsly",
756       "Email": "tbillingsly@harvard.edu",
757       "Address": {
758         "Address_Line_1": "3 Eagan Road",
759         "Address_Line_2": "PO Box 76986",
760         "City": "Sajia",
761         "County": "County Name"
762       }
763     },
764     "Head_Office_Flag": true
765   },
766   {
767     "_id": {
768       "$oid": "6578cf0539f31b1cebb4b361"
769     },
770     "Location_ID": 41,
771     "Location_Name": "Portsmouth",
772     "Manager": {
773       "First_Name": "Tanya",
774       "Last_Name": "Billingsly",
775       "Email": "tbillingsly@harvard.edu",
776       "Address": {
777         "Address_Line_1": "3 Eagan Road",
778         "Address_Line_2": "PO Box 76986",
779         "City": "Sajia",
780         "County": "County Name"
781       }
782     },
783     "Head_Office_Flag": true
784   },
785   {
786     "_id": {
787       "$oid": "6578cf0539f31b1cebb4b362"
788     },
789     "Location_ID": 42,
790     "Location_Name": "Portsmouth",
791     "Manager": {
792       "First_Name": "Tanya",
793       "Last_Name": "Billingsly",
794       "Email": "tbillingsly@harvard.edu",
795       "Address": {
796         "Address_Line_1": "3 Eagan Road",
797         "Address_Line_2": "PO Box 76986",
798         "City": "Sajia",
799         "County": "County Name"
800       }
801     },
802     "Head_Office_Flag": true
803   },
804   {
805     "_id": {
806       "$oid": "6578cf0539f31b1cebb4b363"
807     },
808     "Location_ID": 43,
809     "Location_Name": "Portsmouth",
810     "Manager": {
811       "First_Name": "Tanya",
812       "Last_Name": "Billingsly",
813       "Email": "tbillingsly@harvard.edu",
814       "Address": {
815         "Address_Line_1": "3 Eagan Road",
816         "Address_Line_2": "PO Box 76986",
817         "City": "Sajia",
818         "County": "County Name"
819       }
820     },
821     "Head_Office_Flag": true
822   },
823   {
824     "_id": {
825       "$oid": "6578cf0539f31b1cebb4b364"
826     },
827     "Location_ID": 44,
828     "Location_Name": "Portsmouth",
829     "Manager": {
830       "First_Name": "Tanya",
831       "Last_Name": "Billingsly",
832       "Email": "tbillingsly@harvard.edu",
833       "Address": {
834         "Address_Line_1": "3 Eagan Road",
835         "Address_Line_2": "PO Box 76986",
836         "City": "Sajia",
837         "County": "County Name"
838       }
839     },
840     "Head_Office_Flag": true
841   },
842   {
843     "_id": {
844       "$oid": "6578cf0539f31b1cebb4b365"
845     },
846     "Location_ID": 45,
847     "Location_Name": "Portsmouth",
848     "Manager": {
849       "First_Name": "Tanya",
850       "Last_Name": "Billingsly",
851       "Email": "tbillingsly@harvard.edu",
852       "Address": {
853         "Address_Line_1": "3 Eagan Road",
854         "Address_Line_2": "PO Box 76986",
855         "City": "Sajia",
856         "County": "County Name"
857       }
858     },
859     "Head_Office_Flag": true
860   },
861   {
862     "_id": {
863       "$oid": "6578cf0539f31b1cebb4b366"
864     },
865     "Location_ID": 46,
866     "Location_Name": "Portsmouth",
867     "Manager": {
868       "First_Name": "Tanya",
869       "Last_Name": "Billingsly",
870       "Email": "tbillingsly@harvard.edu",
871       "Address": {
872         "Address_Line_1": "3 Eagan Road",
873         "Address_Line_2": "PO Box 76986",
874         "City": "Sajia",
875         "County": "County Name"
876       }
877     },
878     "Head_Office_Flag": true
879   },
880   {
881     "_id": {
882       "$oid": "6578cf0539f31b1cebb4b367"
883     },
884     "Location_ID": 47,
885     "Location_Name": "Portsmouth",
886     "Manager": {
887       "First_Name": "Tanya",
888       "Last_Name": "Billingsly",
889       "Email": "tbillingsly@harvard.edu",
890       "Address": {
891         "Address_Line_1": "3 Eagan Road",
892         "Address_Line_2": "PO Box 76986",
893         "City": "Sajia",
894         "County": "County Name"
895       }
896     },
897     "Head_Office_Flag": true
898   },
899   {
900     "_id": {
901       "$oid": "6578cf0539f31b1cebb4b368"
902     },
903     "Location_ID": 48,
904     "Location_Name": "Portsmouth",
905     "Manager": {
906       "First_Name": "Tanya",
907       "Last_Name": "Billingsly",
908       "Email": "tbillingsly@harvard.edu",
909       "Address": {
910         "Address_Line_1": "3 Eagan Road",
911         "Address_Line_2": "PO Box 76986",
912         "City": "Sajia",
913         "County": "County Name"
914       }
915     },
916     "Head_Office_Flag": true
917   },
918   {
919     "_id": {
920       "$oid": "6578cf0539f31b1cebb4b369"
921     },
922     "Location_ID": 49,
923     "Location_Name": "Portsmouth",
924     "Manager": {
925       "First_Name": "Tanya",
926       "Last_Name": "Billingsly",
927       "Email": "tbillingsly@harvard.edu",
928       "Address": {
929         "Address_Line_1": "3 Eagan Road",
930         "Address_Line_2": "PO Box 76986",
931         "City": "Sajia",
932         "County": "County Name"
933       }
934     },
935     "Head_Office_Flag": true
936   },
937   {
938     "_id": {
939       "$oid": "6578cf0539f31b1cebb4b36a"
940     },
941     "Location_ID": 50,
942     "Location_Name": "Portsmouth",
943     "Manager": {
944       "First_Name": "Tanya",
945       "Last_Name": "Billingsly",
946       "Email": "tbillingsly@harvard.edu",
947       "Address": {
948         "Address_Line_1": "3 Eagan Road",
949         "Address_Line_2": "PO Box 76986",
950         "City": "Sajia",
951         "County": "County Name"
952       }
953     },
954     "Head_Office_Flag": true
955   },
956   {
957     "_id": {
958       "$oid": "6578cf0539f31b1cebb4b36b"
959     },
960     "Location_ID": 51,
961     "Location_Name": "Portsmouth",
962     "Manager": {
963       "First_Name": "Tanya",
964       "Last_Name": "Billingsly",
965       "Email": "tbillingsly@harvard.edu",
966       "Address": {
967         "Address_Line_1": "3 Eagan Road",
968         "Address_Line_2": "PO Box 76986",
969         "City": "Sajia",
970         "County": "County Name"
971       }
972     },
973     "Head_Office_Flag": true
974   },
975   {
976     "_id": {
977       "$oid": "6578cf0539f31b1cebb4b36c"
978     },
979     "Location_ID": 52,
980     "Location_Name": "Portsmouth",
981     "Manager": {
982       "First_Name": "Tanya",
983       "Last_Name": "Billingsly",
984       "Email": "tbillingsly@harvard.edu",
985       "Address": {
986         "Address_Line_1": "3 Eagan Road",
987         "Address_Line_2": "PO Box 76986",
988         "City": "Sajia",
989         "County": "County Name"
990       }
991     },
992     "Head_Office_Flag": true
993   },
994   {
995     "_id": {
996       "$oid": "6578cf0539f31b1cebb4b36d"
997     },
998     "Location_ID": 53,
999     "Location_Name": "Portsmouth",
1000    "Manager": {
1001      "First_Name": "Tanya",
1002      "Last_Name": "Billingsly",
1003      "Email": "tbillingsly@harvard.edu",
1004      "Address": {
1005        "Address_Line_1": "3 Eagan Road",
1006        "Address_Line_2": "PO Box 76986",
1007        "City": "Sajia",
1008        "County": "County Name"
1009      }
1010    },
1011    "Head_Office_Flag": true
1012  },
1013  {
1014    "_id": {
1015      "$oid": "6578cf0539f31b1cebb4b36e"
1016    },
1017    "Location_ID": 54,
1018    "Location_Name": "Portsmouth",
1019    "Manager": {
1020      "First_Name": "Tanya",
1021      "Last_Name": "Billingsly",
1022      "Email": "tbillingsly@harvard.edu",
1023      "Address": {
1024        "Address_Line_1": "3 Eagan Road",
1025        "Address_Line_2": "PO Box 76986",
1026        "City": "Sajia",
1027        "County": "County Name"
1028      }
1029    },
1030    "Head_Office_Flag": true
1031  },
1032  {
1033    "_id": {
1034      "$oid": "6578cf0539f31b1cebb4b36f"
1035    },
1036    "Location_ID": 55,
1037    "Location_Name": "Portsmouth",
1038    "Manager": {
1039      "First_Name": "Tanya",
1040      "Last_Name": "Billingsly",
1041      "Email": "tbillingsly@harvard.edu",
1042      "Address": {
1043        "Address_Line_1": "3 Eagan Road",
1044        "Address_Line_2": "PO Box 76986",
1045        "City": "Sajia",
1046        "County": "County Name"
1047      }
1048    },
1049    "Head_Office_Flag": true
1050  },
1
```

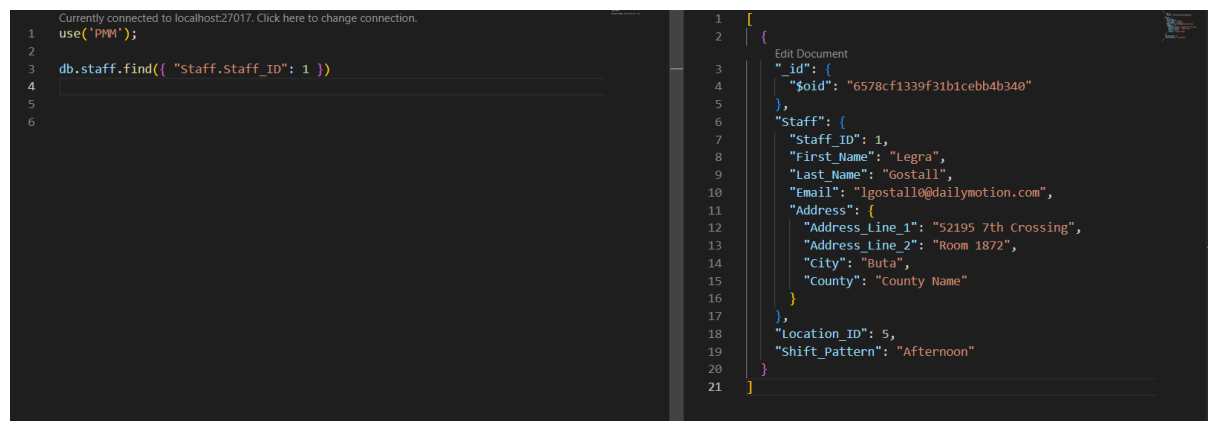
Collection 4: staff

Input:

```
use('PMM');

db.staff.insertMany({
  "Staff": {
    "Staff_ID": 1,
    "First_Name": "Legra",
    "Last_Name": "Gostall",
    "Email": "lgostall0@dailyemotion.com",
    "Address": {
      "Address_Line_1": "52195 7th Crossing",
      "Address_Line_2": "Room 1872",
      "City": "Buta",
      "County": "County Name"
    }
  },
  "Location_ID": 5,
  "Shift_Pattern": "Afternoon"
},
```

Output:

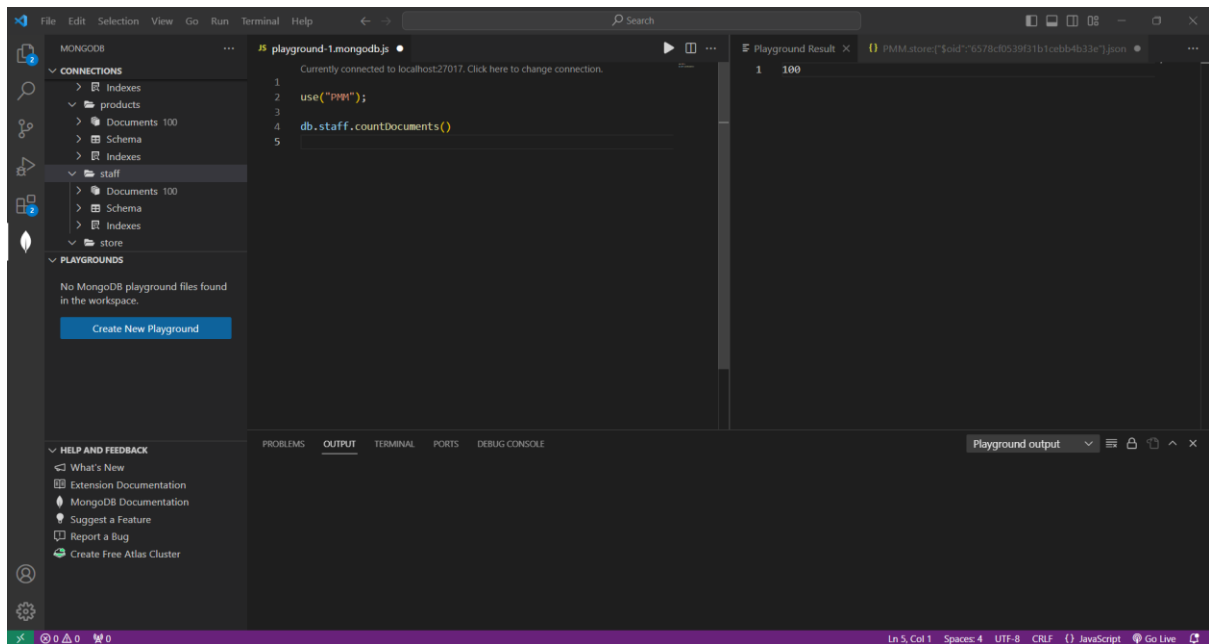


The screenshot displays two side-by-side windows. The left window is the MongoDB command line interface (CLI), showing the execution of the `use('PMM');` command and the `db.staff.find({ "Staff.Staff_ID": 1 })` query. The right window is the MongoDB Compass application, showing the 'Edit Document' view for the inserted document. The document structure is as follows:

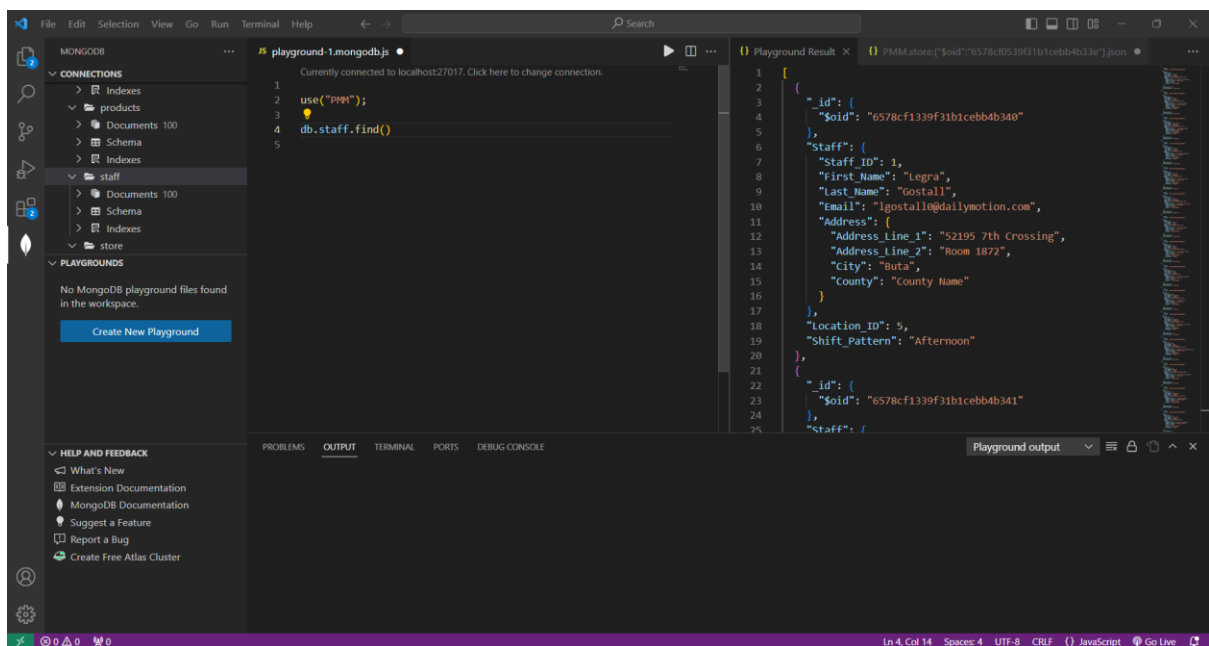
```
{
  "_id": {
    "$oid": "6578cf1339f31b1cebb4b340"
  },
  "Staff": {
    "Staff_ID": 1,
    "First_Name": "Legra",
    "Last_Name": "Gostall",
    "Email": "lgostall0@dailyemotion.com",
    "Address": {
      "Address_Line_1": "52195 7th Crossing",
      "Address_Line_2": "Room 1872",
      "City": "Buta",
      "County": "County Name"
    }
  },
  "Location_ID": 5,
  "Shift_Pattern": "Afternoon"
}
```

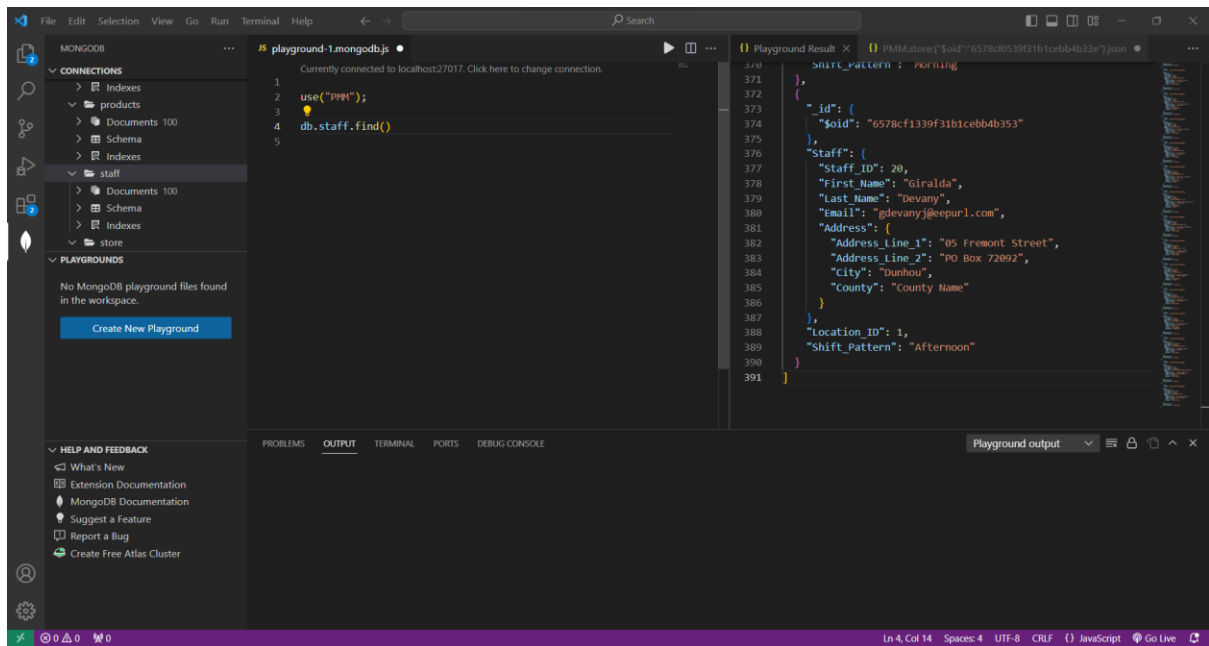
Establishing the staff collection with employee details, including their assigned locations and shift patterns, greatly benefits PMM Grocery's NoSQL approach. Structuring data such as staff identifiers, contact information, and work schedules in nested structures, enables flexibility management of various employee data without fixed schema restrictions. This setup aids PMM Grocery in efficiently tracking staff assignments to specific locations and shifts, facilitating streamlined scheduling and workforce management. Additionally, this flexible design allows for seamless updates or additions to employee information, ensuring adaptability to changing staffing needs without disrupting the overall database structure.

All staff output:

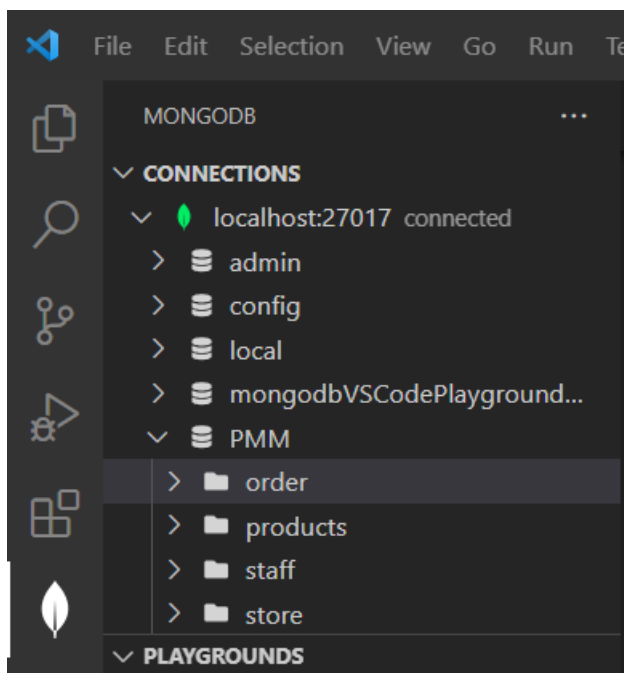


There are a hundred staff based on the above.





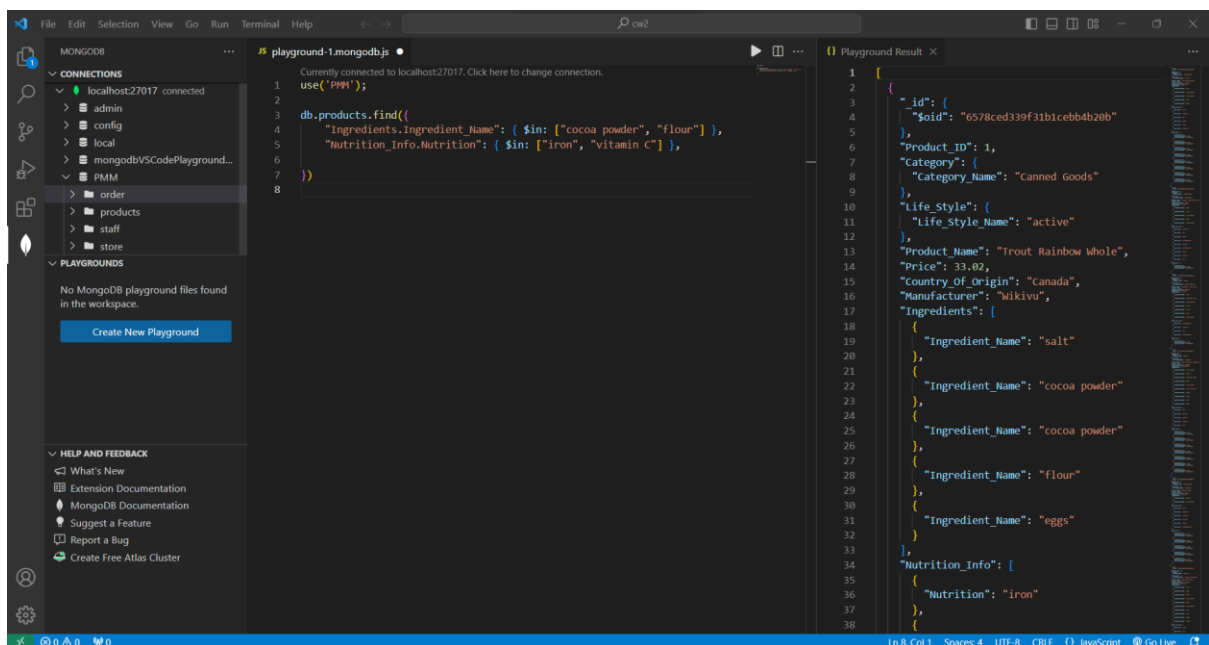
The code above returns all the staffs and the screenshots shows the beginning and the end of the result.



Task 2: Queries

Query 1: Look for products for a specific season with specific ingredients and nutritional content.

```
db.products.find({
  "Ingredients.Ingredient_Name": { $in: ["cocoa powder", "flour"] },
  "Nutrition_Info.Nutrition": { $in: ["iron", "vitamin C"] },
})
```

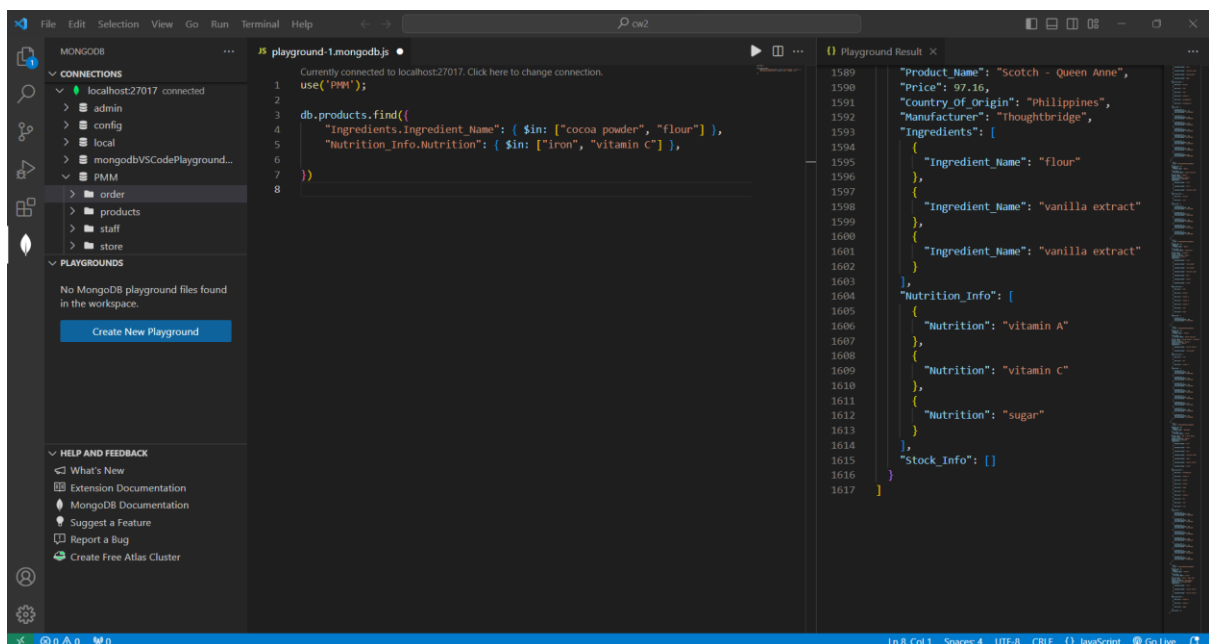


The screenshot shows the MongoDB Playground interface. On the left, the 'CONNECTIONS' panel shows 'localhost27017' connected. The 'PLAYGROUNDS' panel is empty. The 'HELP AND FEEDBACK' panel is visible. The main editor shows a JavaScript query:

```
1 use('PMM');
2
3 db.products.find({
4   "Ingredients.Ingredient_Name": { $in: ["cocoa powder", "flour"] },
5   "Nutrition_Info.Nutrition": { $in: ["iron", "vitamin C"] },
6 })
7
8
```

The 'Playground Result' panel shows the following JSON document:

```
1 {
2   "_id": {
3     "$oid": "6578ced339f31b1cebb4b20b"
4   },
5   "Product_ID": 1,
6   "Category": {
7     "Category_Name": "Canned Goods"
8   },
9   "Life_Style": {
10    "Life_Style_Name": "active"
11  },
12  "Product_Name": "Trout Rainbow Whole",
13  "Price": 33.82,
14  "Country_of_Origin": "Canada",
15  "Manufacturer": "Wikivu",
16  "Ingredients": [
17    {
18      "Ingredient_Name": "salt"
19    },
20    {
21      "Ingredient_Name": "cocoa powder"
22    },
23    {
24      "Ingredient_Name": "cocoa powder"
25    },
26    {
27      "Ingredient_Name": "flour"
28    },
29    {
30      "Ingredient_Name": "eggs"
31    }
32  ],
33  "Nutrition_Info": [
34    {
35      "Nutrition": "iron"
36    },
37  ],
38 }
```



The screenshot shows the MongoDB Playground interface. On the left, the 'CONNECTIONS' panel shows 'localhost27017' connected. The 'PLAYGROUNDS' panel is empty. The 'HELP AND FEEDBACK' panel is visible. The main editor shows a JavaScript query:

```
1 use('PMM');
2
3 db.products.find({
4   "Ingredients.Ingredient_Name": { $in: ["cocoa powder", "flour"] },
5   "Nutrition_Info.Nutrition": { $in: ["iron", "vitamin C"] },
6 })
7
8
```

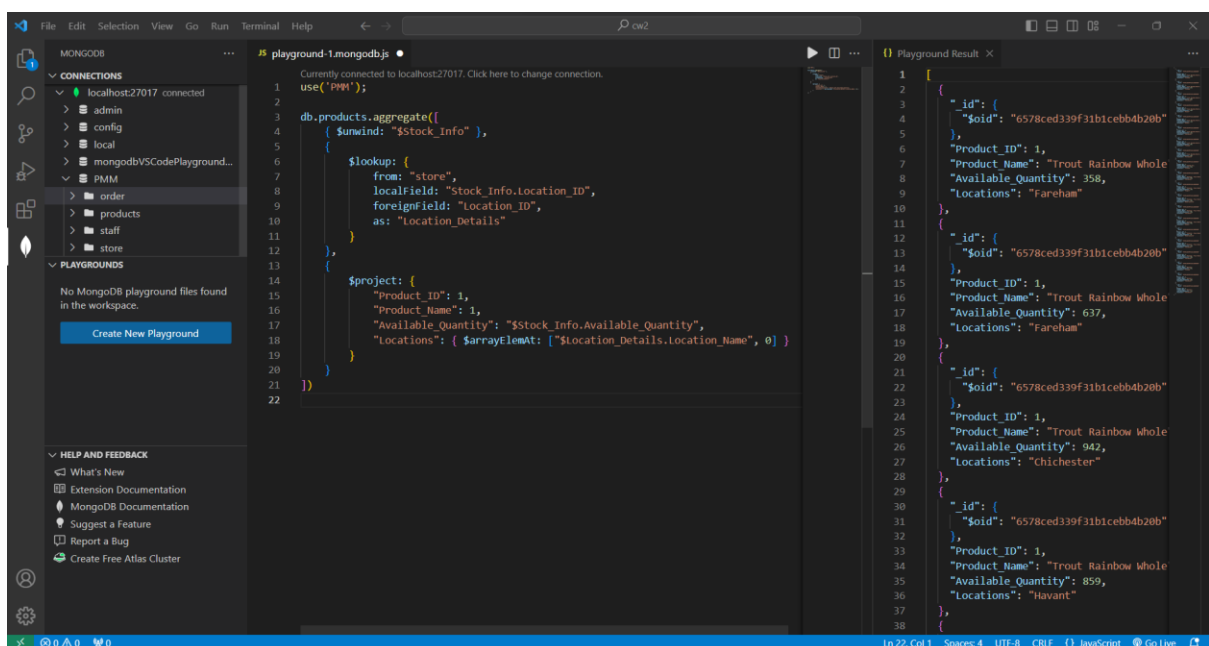
The 'Playground Result' panel shows the following JSON document:

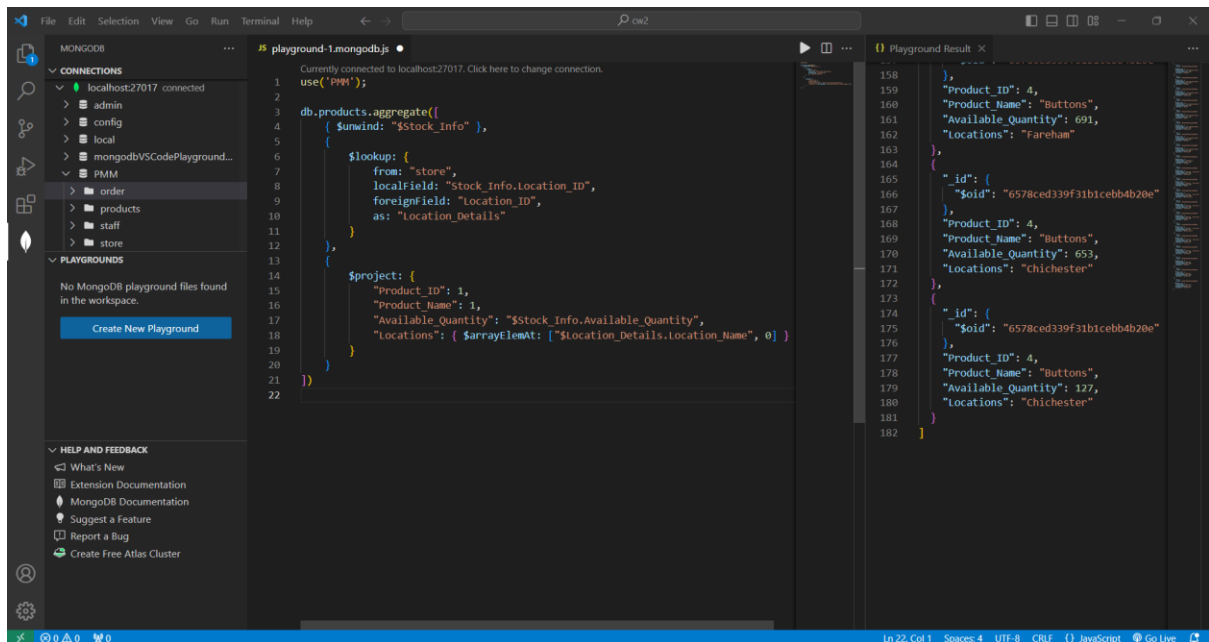
```
1589 "Product_Name": "Scotch - Queen Anne",
1590 "Price": 97.16,
1591 "Country_of_Origin": "Philippines",
1592 "Manufacturer": "thoughtbridge",
1593 "Ingredients": [
1594   {
1595     "Ingredient_Name": "flour"
1596   },
1597   {
1598     "Ingredient_Name": "vanilla extract"
1599   },
1600   {
1601     "Ingredient_Name": "vanilla extract"
1602   }
1603 ],
1604 "Nutrition_Info": [
1605   {
1606     "Nutrition": "vitamin A"
1607   },
1608   {
1609     "Nutrition": "vitamin C"
1610   },
1611   {
1612     "Nutrition": "sugar"
1613   }
1614 ],
1615 "Stock_Info": []
1616 }
1617
```


This query searches for products containing "cocoa powder" or "flour" in their ingredients and having "iron" or "vitamin C" in their nutritional information. This provides a tool for PMM Grocery Supermarket to cater to customer preferences, and strategies marketing efforts based on the ingredients and nutritional content of its products.

Query 2: Product availability and locations

```
db.products.aggregate([
  { $unwind: "$Stock_Info" },
  {
    $lookup: {
      from: "store",
      localField: "Stock_Info.Location_ID",
      foreignField: "Location_ID",
      as: "Location_Details"
    }
  },
  {
    $project: {
      "Product_ID": 1,
      "Product_Name": 1,
      "Available_Quantity": "$Stock_Info.Available_Quantity",
      "Locations": { $arrayElemAt: ["$Location_Details.Location_Name",
0] }
    }
  }
])
```

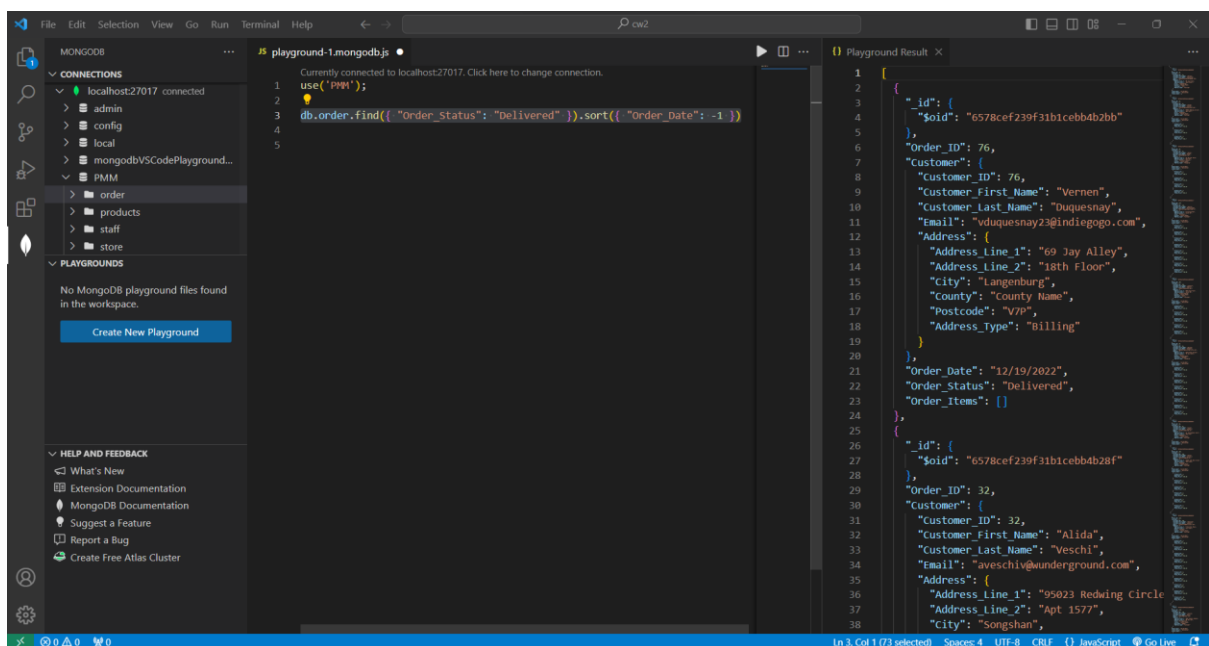


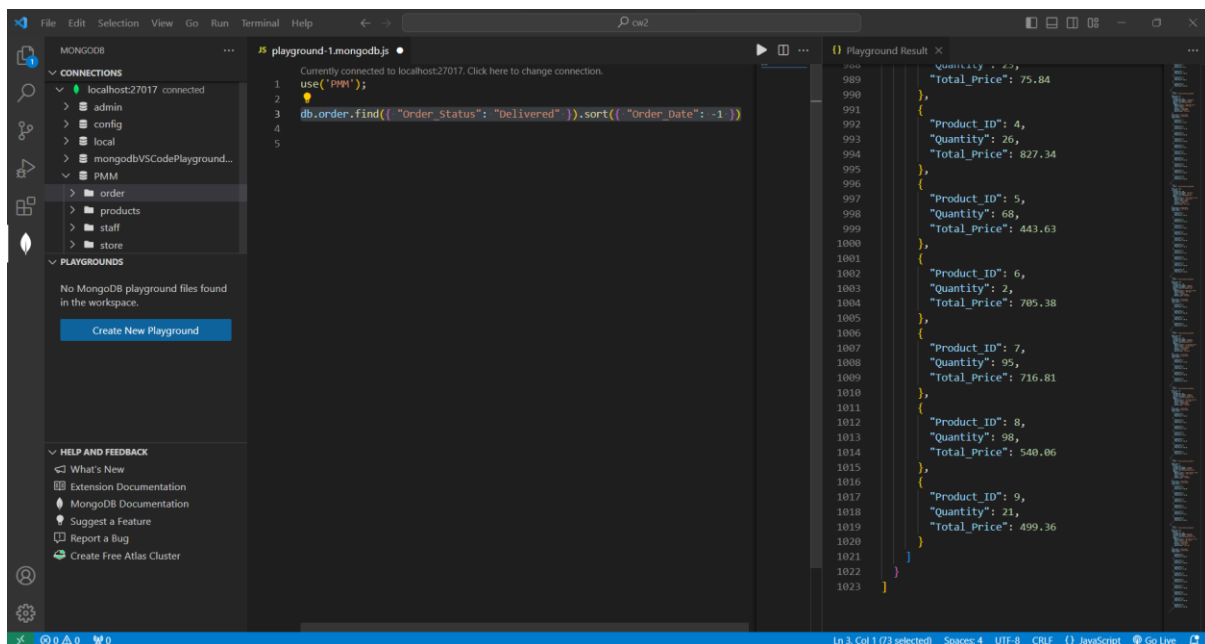


This query assists PMM Grocery by providing a detailed overview of product availability across their various stores. By combining product data with store information, it allows PMM to efficiently track the quantity of each product available at specific locations. This helps the supermarket to optimise restocking decisions, ensuring popular items are adequately stocked in each store, reducing instances of stockouts, and enhancing customer satisfaction. Additionally, it aids in strategic planning for promotions or marketing campaigns, directing efforts to specific stores based on available product quantities, ultimately improving overall store performance and customer experience.

Query 3: History of delivery of orders

```
db.order.find({ "Order_Status": "Delivered" }).sort({ "Order_Date": -1 })
```





This query retrieves orders with the status "Delivered" and sorts them based on their order dates in descending order, showing a history of delivered orders from most recent to oldest. This helps PMM Grocery see all the orders that are delivered, sorting them from the newest to the oldest. This way, they can easily track what orders have been completed recently, making sure everything gets to customers on time. It also helps them keep an eye on what customers are buying a lot of, so they can make sure they have enough stock of those items. Plus, by looking at this information, they can figure out what customers like the most and plan future things they might want to sell based on that.

Task 3: Reflective Report

Switching from SQL to NoSQL database development marked a significant learning curve for me. With a solid background in SQL databases, jumping into NoSQL felt like exploring uncharted territory. Unlike SQL, where data fits into tables, NoSQL uses a different approach, storing information as flexible documents instead of predefined schemas. Creating a database structure in MongoDB meant thinking in terms of nested documents, where everything's more like a bunch of folders within folders, making it highly adaptable. This was a big shift from the rows-and-columns setup in SQL.

Picking queries in this new NoSQL world was difficult at first. Back in SQL, my queries were straightforward, but MongoDB's way of retrieving data, using things like `$lookup` and `$group`, felt like learning a new language. I had to adapt my thinking, focusing on how to link data together across different collections without traditional joins. The queries I chose were all about getting the right information for PMM Grocery, like figuring out what was in stock, how orders were fulfilled, and product details.

The queries I ended up selecting were all about solving real problems for PMM Grocery. I wanted to make sure they could manage their inventory well, track orders efficiently, and understand the

ingredients and nutrition of each product. So, I dug into the collections I'd set up, trying to connect the dots between orders, products, and availability. It was challenging, but also exciting to see how NoSQL databases handle these interconnected pieces of information without getting all tangled up like in SQL.

Looking back, this shift to NoSQL was eye-opening. It showed me a whole new side of databases, one that's all about flexibility and adapting to change. It's like going from a super structured, organized filing cabinet to a more fluid, adaptable way of storing information. This experience helped me understand the importance of matching the database setup with what the business needs. NoSQL isn't just a different way of storing data; it's a whole new mindset that values adaptability and scalability. It taught me to think differently about data management and how to meet specific business needs using a more flexible database approach.

Appendix

The records are created by using <https://mockaroo.com>

Note that to limit the length; only samples of the whole insert are selected here.

1)products (first 10 records)

```
{
  "Product_ID":1,
  "Category":{"Category_Name":"Canned Goods"},
  "Life_Style":{"Life_Style_Name":"active"},
  "Product_Name":"Trout Rainbow Whole",
  "Price":33.02,
  "Country_Of_Origin":"Canada",
  "Manufacturer":"Wikivu",
  "Ingredients": [
    {"Ingredient_Name":"salt"},
    {"Ingredient_Name":"cocoa powder"},
    {"Ingredient_Name":"cocoa powder"},
    {"Ingredient_Name":"flour"},
    {"Ingredient_Name":"eggs"}
  ],
  "Nutrition_Info": [
    {"Nutrition":"iron"},
    {"Nutrition":"vitamin C"},
    {"Nutrition":"fat"},
    {"Nutrition":"sugar"},
    {"Nutrition":"iron"},
    {"Nutrition":"vitamin A"}
  ],
  "Stock_Info": [
    {"Location_ID":2, "Available_Quantity":358, "Last_Stock_Date":"11/20/2023"},
    {"Location_ID":2, "Available_Quantity":637, "Last_Stock_Date":"03/10/2023"},
    {"Location_ID":5, "Available_Quantity":942, "Last_Stock_Date":"10/26/2023"},
    {"Location_ID":4, "Available_Quantity":859, "Last_Stock_Date":"09/20/2023"},
    {"Location_ID":4, "Available_Quantity":145, "Last_Stock_Date":"03/29/2023"},
    {"Location_ID":5, "Available_Quantity":237, "Last_Stock_Date":"03/05/2023"},
    {"Location_ID":2, "Available_Quantity":501, "Last_Stock_Date":"09/03/2023"},
    {"Location_ID":6, "Available_Quantity":883, "Last_Stock_Date":"05/29/2023"}
  ],
  "Product_ID":2,
  "Category":{"Category_Name":"Condiments"},
  "Life_Style":{"Life_Style_Name":"outdoor enthusiast"},
  "Product_Name":"Canada Dry",
  "Price":92.13,
  "Country_Of_Origin":"El Salvador",
  "Manufacturer":"Quimba",
  "Ingredients": [],
  "Nutrition_Info": [
    {"Nutrition":"vitamin C"},
    {"Nutrition":"calcium"},
    {"Nutrition":"sugar"},
    {"Nutrition":"vitamin"}
  ]
}
```

```
C"}], "Stock_Info": [{"Location_ID": 2, "Available_Quantity": 558, "Last_Stock_Date": "01/21/2023"}]],  
{ "Product_ID": 3, "Category": {"Category_Name": "Produce"}, "Life_Style": {"Life_Style_Name": "sedentary"}, "Product_Name": "Potatoes - Mini White 3 Oz", "Price": 78.5, "Country_Of_Origin": "Poland", "Manufacturer": "Zoombox", "Ingredients": [{"Ingredient_Name": "milk"}, {"Ingredient_Name": "chocolate chips"}, {"Ingredient_Name": "milk"}], "Nutrition_Info": [{"Nutrition": "vitamin A"}, {"Nutrition": "fat"}, {"Nutrition": "calcium"}, {"Nutrition": "fiber"}, {"Nutrition": "protein"}, {"Nutrition": "iron"}, {"Nutrition": "calcium"}], "Stock_Info": [{"Location_ID": 5, "Available_Quantity": 938, "Last_Stock_Date": "04/21/2023"}, {"Location_ID": 3, "Available_Quantity": 740, "Last_Stock_Date": "10/31/2023"}, {"Location_ID": 1, "Available_Quantity": 950, "Last_Stock_Date": "11/25/2023"}, {"Location_ID": 5, "Available_Quantity": 998, "Last_Stock_Date": "07/27/2023"}, {"Location_ID": 4, "Available_Quantity": 882, "Last_Stock_Date": "01/17/2023"}, {"Location_ID": 1, "Available_Quantity": 39, "Last_Stock_Date": "06/16/2023"}, {"Location_ID": 5, "Available_Quantity": 718, "Last_Stock_Date": "03/27/2023"}, {"Location_ID": 5, "Available_Quantity": 488, "Last_Stock_Date": "04/25/2023"}]],  
{ "Product_ID": 4, "Category": {"Category_Name": "Personal Care"}, "Life_Style": {"Life_Style_Name": "sedentary"}, "Product_Name": "Buttons", "Price": 41.48, "Country_Of_Origin": "China", "Manufacturer": "Katz", "Ingredients": [], "Nutrition_Info": [{"Nutrition": "sugar"}, {"Nutrition": "iron"}, {"Nutrition": "fiber"}, {"Nutrition": "vitamin C"}], "Stock_Info": [{"Location_ID": 2, "Available_Quantity": 691, "Last_Stock_Date": "08/08/2023"}, {"Location_ID": 5, "Available_Quantity": 653, "Last_Stock_Date": "11/01/2023"}, {"Location_ID": 5, "Available_Quantity": 127, "Last_Stock_Date": "06/14/2023"}, {"Location_ID": 3, "Available_Quantity": 921, "Last_Stock_Date": "12/04/2023"}, {"Location_ID": 3, "Available_Quantity": 521, "Last_Stock_Date": "01/31/2023"}, {"Location_ID": 6, "Available_Quantity": 527, "Last_Stock_Date": "05/03/2023"}, {"Location_ID": 1, "Available_Quantity": 339, "Last_Stock_Date": "04/21/2023"}, {"Location_ID": 3, "Available_Quantity": 961, "Last_Stock_Date": "09/10/2023"}, {"Location_ID": 6, "Available_Quantity": 445, "Last_Stock_Date": "02/11/2023"}, {"Location_ID": 5, "Available_Quantity": 21, "Last_Stock_Date": "07/06/2023"}]],  
{ "Product_ID": 5, "Category": {"Category_Name": "Canned Goods"}, "Life_Style": {"Life_Style_Name": "adventurous"}, "Product_Name": "Langers - Ruby Red Grapfruit", "Price": 97.9, "Country_Of_Origin": "China", "Manufacturer": "Skinder", "Ingredients": [{"Ingredient_Name": "salt"}, {"Ingredient_Name": "flour"}, {"Ingredient_Name": "cocoa powder"}, {"Ingredient_Name": "eggs"}, {"Ingredient_Name": "cocoa powder"}], "Nutrition_Info": [{"Nutrition": "vitamin A"}, {"Nutrition": "fat"}, {"Nutrition": "fiber"}, {"Nutrition": "carbohydrates"}, {"Nutrition": "protein"}, {"Nutrition": "carbohydrates"}, {"Nutrition": "fiber"}, {"Nutrition": "vitamin C"}, {"Nutrition": "fat"}], "Stock_Info": [{"Location_ID": 5, "Available_Quantity": 648, "Last_Stock_Date": "02/13/2023"}]],  
{ "Product_ID": 6, "Category": {"Category_Name": "Snacks"}, "Life_Style": {"Life_Style_Name": "health-conscious"}, "Product_Name": "Container - Clear 32 Oz", "Price": 37.36, "Country_Of_Origin": "Poland", "Manufacturer": "Gigabox", "Ingredients": [{"Ingredient_Name": "milk"}, {"Ingredient_Name": "chocolate
```

```
chips"}, {"Ingredient_Name": "baking powder"}, {"Ingredient_Name": "butter"}, {"Ingredient_Name": "flour"}, {"Ingredient_Name": "salt"}, {"Ingredient_Name": "cocoa powder"}], "Nutrition_Info": [{"Nutrition": "carbohydrates"}, {"Nutrition": "vitamin C"}, {"Nutrition": "fat"}, {"Nutrition": "carbohydrates"}], "Stock_Info": [{"Location_ID": 5, "Available_Quantity": 467, "Last_Stock_Date": "03/16/2023"}]}, {"Product_ID": 7, "Category": {"Category_Name": "Bakery"}, "Life_Style": {"Life_Style_Name": "sedentary"}, "Product_Name": "Wine - Pinot Noir Mondavi Coastal", "Price": 26.1, "Country_Of-Origin": "Poland", "Manufacturer": "Browsezoom", "Ingredients": [{"Ingredient_Name": "cocoa powder"}, {"Ingredient_Name": "butter"}, {"Ingredient_Name": "chocolate chips"}, {"Ingredient_Name": "milk"}, {"Ingredient_Name": "cocoa powder"}, {"Ingredient_Name": "vanilla extract"}, {"Ingredient_Name": "sugar"}, {"Ingredient_Name": "milk"}, {"Ingredient_Name": "salt"}, {"Ingredient_Name": "eggs"}], "Nutrition_Info": [{"Nutrition": "fat"}, {"Nutrition": "calcium"}, {"Nutrition": "protein"}, {"Nutrition": "vitamin C"}, {"Nutrition": "fat"}], "Stock_Info": [{"Location_ID": 2, "Available_Quantity": 217, "Last_Stock_Date": "01/16/2023"}, {"Location_ID": 4, "Available_Quantity": 79, "Last_Stock_Date": "12/17/2023"}, {"Location_ID": 4, "Available_Quantity": 961, "Last_Stock_Date": "12/11/2023"}, {"Location_ID": 4, "Available_Quantity": 690, "Last_Stock_Date": "08/23/2023"}, {"Location_ID": 2, "Available_Quantity": 599, "Last_Stock_Date": "09/17/2023"}, {"Location_ID": 5, "Available_Quantity": 983, "Last_Stock_Date": "04/18/2023"}, {"Location_ID": 2, "Available_Quantity": 80, "Last_Stock_Date": "10/18/2023"}]}, {"Product_ID": 8, "Category": {"Category_Name": "Frozen Foods"}, "Life_Style": {"Life_Style_Name": "outdoor enthusiast"}, "Product_Name": "Energy Drink", "Price": 25.36, "Country_Of-Origin": "China", "Manufacturer": "Meezy", "Ingredients": [{"Ingredient_Name": "vanilla extract"}, {"Ingredient_Name": "eggs"}], "Nutrition_Info": [{"Nutrition": "iron"}, {"Nutrition": "calcium"}, {"Nutrition": "protein"}, {"Nutrition": "iron"}, {"Nutrition": "fat"}, {"Nutrition": "carbohydrates"}, {"Nutrition": "vitamin A"}, {"Nutrition": "fat"}, {"Nutrition": "calcium"}, {"Nutrition": "vitamin C"}], "Stock_Info": [{"Location_ID": 3, "Available_Quantity": 755, "Last_Stock_Date": "02/21/2023"}, {"Location_ID": 2, "Available_Quantity": 466, "Last_Stock_Date": "08/19/2023"}, {"Location_ID": 1, "Available_Quantity": 29, "Last_Stock_Date": "01/05/2023"}, {"Location_ID": 2, "Available_Quantity": 269, "Last_Stock_Date": "11/08/2023"}, {"Location_ID": 5, "Available_Quantity": 665, "Last_Stock_Date": "07/09/2023"}, {"Location_ID": 4, "Available_Quantity": 667, "Last_Stock_Date": "07/18/2023"}]}, {"Product_ID": 9, "Category": {"Category_Name": "Canned Goods"}, "Life_Style": {"Life_Style_Name": "sedentary"}, "Product_Name": "Sprouts - Bean", "Price": 70.88, "Country_Of-Origin": "China", "Manufacturer": "Skalith", "Ingredients": [{"Ingredient_Name": "butter"}, {"Ingredient_Name": "cocoa powder"}], "Nutrition_Info": [{"Nutrition": "iron"}, {"Nutrition": "vitamin C"}, {"Nutrition": "vitamin A"}, {"Nutrition": "calcium"}, {"Nutrition": "fiber"}, {"Nutrition": "carbohydrates"}], "Stock_Info": [{"Location_ID": 5, "Available_Quantity": 579, "Last_Stock_Date": "03/16/2023"}]}
```



```

10/23/2023"}, {"Location_ID":2, "Available_Quantity":566, "Last_Stock_Date":"08/24/2023"}, {"Location_ID":1, "Available_Quantity":198, "Last_Stock_Date":"04/01/2023"}, {"Location_ID":6, "Available_Quantity":239, "Last_Stock_Date":"05/13/2023"}, {"Location_ID":6, "Available_Quantity":874, "Last_Stock_Date":"12/22/2023"}]}, {"Product_ID":10, "Category":{"Category_Name":"Frozen Foods"}, "Life_Style":{"Life_Style_Name":"active"}, "Product_Name":"Arctic Char - Fresh, Whole", "Price":89.8, "Country_Of_Origin":"Ireland", "Manufacturer":"Quinu", "Ingredients":[{"Ingredient_Name":"baking powder"}, {"Ingredient_Name":"vanilla extract"}, {"Ingredient_Name":"milk"}]}, "Nutrition_Info":[{"Nutrition":"calcium"}, {"Nutrition":"fat"}, {"Nutrition":"iron"}, {"Nutrition":"fiber"}, {"Nutrition":"calcium"}, {"Nutrition":"carbohydrates"}]}, "Stock_Info":[{"Location_ID":4, "Available_Quantity":570, "Last_Stock_Date":"08/09/2023"}]}],

```

2)stores (all 6 stores)

```

[{"Location_ID":1, "Location_Name":"Waterlooville", "Manager":{"First_Name":"Gabi", "Last_Name":"Hinzer", "Email":"ghinzer0@storify.com", "Address":{"Address_Line_1":"8 Forest Junction", "Address_Line_2":"Suite 98", "City":"Sukamaju", "County":"County Name"}}, "Head_Office_Flag":false}, {"Location_ID":2, "Location_Name":"Fareham", "Manager":{"First_Name":"Suzi", "Last_Name":"Herety", "Email":"sherety1@weibo.com", "Address":{"Address_Line_1":"817 37 Meadow Vale Road", "Address_Line_2":"Suite 4", "City":"Ngrayun", "County":"County Name"}}, "Head_Office_Flag":false}, {"Location_ID":3, "Location_Name":"Gosport", "Manager":{"First_Name":"Aleksandr", "Last_Name":"Casserly", "Email":"acasserly2@netvibes.com", "Address":{"Address_Line_1":"287 Esker Terrace", "Address_Line_2":"Room 503", "City":"Bhātpāra Abhaynagar", "County":"County Name", "Postcode":"7461"}}, "Head_Office_Flag":false}, {"Location_ID":4, "Location_Name":"Havant", "Manager":{"First_Name":"Nobie", "Last_Name":"Cake", "Email":"ncake3@ovh.net", "Address":{"Address_Line_1":"31159 Transport Terrace", "Address_Line_2":"PO Box 9625", "City":"Babice", "County":"County Name", "Postcode":"37-754"}}, "Head_Office_Flag":false}, {"Location_ID":5, "Location_Name":"Chichester", "Manager":{"First_Name":"Sergio", "Last_Name":"Iannuzzelli", "Email":"siannuzzelli4@mozilla.org", "Address":{"Address_Line_1":"8 Logan Street", "Address_Line_2":"Apt 1126", "City":"Wiesbaden", "County":"County Name", "Postcode":"65191"}}, "Head_Office_Flag":false}, {"Location_ID":6, "Location_Name":"Portsmouth", "Manager":{"First_Name":"Tanya", "Last_Name":"Billingsly", "Email":"tbillingsly5@harvard.edu", "Address":{"Address_Line_1":"3 Eagan Road", "Address_Line_2":"PO Box 76986", "City":"Sajia", "County":"County Name"}}, "Head_Office_Flag":true}]

```

3)order (first 10 records)

```

{"Order_ID":1, "Customer":{"Customer_ID":1, "Customer_First_Name":"Fae", "Customer_Last_Name":"Skitt", "Email":"fskitt0@ning.com", "Address":{"Address_Line_1":"3

```

```
63 Grayhawk Junction", "Address_Line_2": "PO Box
88614", "City": "Leninskiy", "County": "County
Name", "Postcode": "678944", "Address_Type": "Billing"}}}, {"Order_Date": "06/23/2023",
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4)staff (first 10 records)

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