Dokumentowe bazy danych – MongoDB

Ćwiczenie/zadanie

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Odtwórz z backupu bazę north0

```
mongorestore --nsInclude='north0.*' ./dump/
```

```
use north0
```

Zadanie 1 - operacje wyszukiwania danych, przetwarzanie dokumentów

a)

stwórz kolekcję `OrdersInfo` zawierającą następujące dane o zamówieniach

- pojedynczy dokument opisuje jedno zamówienie

```
[
  {
    "_id": ...

    OrderID": ... numer zamówienia

    "Customer": {  ... podstawowe informacje o kliencie skladającym
      "CustomerID": ... identyfikator klienta
      "CompanyName": ... nazwa klienta
      "City": ... miasto
      "Country": ... kraj
    },

    "Employee": {  ... podstawowe informacje o pracowniku obsługującym zamówienie
      "EmployeeID": ... idntyfikator pracownika
      "FirstName": ... imie
      "LastName": ... nazwisko
      "Title": ... stanowisko

    },

    "Dates": {
       "OrderDate": ... data złożenia zamówienia
       "RequiredDate": data wymaganej realizacji
    }

    "Orderdetails": [  ... pozycje/szczegóły zamówienia - tablica takich pozycji
      {
        "UnitPrice": ... cena
        "Quantity": ... liczba sprzedanych jednostek towaru
        "Discount": ... zniżka
        "Value": ... wartośc pozycji zamówienia
        "product": { ... podstawowe informacje o produkcie
          "ProductID": ... identyfikator produktu
          "ProductName": ... nazwa produktu
          "QuantityPerUnit": ... opis/opakowannie
          "CategoryID": ... identyfikator kategorii do której należy produkt
          "CategoryName" ... nazwę tej kategorii
        },
      },
      ...
    ],

    "Freight": ... opłata za przesyłkę
    "OrderTotal"  ... sumaryczna wartosc sprzedanych produktów

    "Shipment" : {  ... informacja o wysyłce
        "Shipper": { ... podstawowe inf o przewoźniku
           "ShipperID":
            "CompanyName":
        }
        ... inf o odbiorcy przesyłki
        "ShipName": ...
        "ShipAddress": ...
        "ShipCity": ...
        "ShipCountry": ...
    }
  }
]
```

b)

stwórz kolekcję `CustomerInfo` zawierającą następujące dane kazdym klencie

- pojedynczy dokument opisuje jednego klienta

```
[
  {
    "_id": ...

    "CustomerID": ... identyfikator klienta
    "CompanyName": ... nazwa klienta
    "City": ... miasto
    "Country": ... kraj

    "Orders": [ ... tablica zamówień klienta o strukturze takiej jak w punkcie a) (oczywiście bez informacji o kliencie)

    ]


]
```

c)

Napisz polecenie/zapytanie: Dla każdego klienta pokaż wartość zakupionych przez niego produktów z kategorii 'Confections' w 1997r

- Spróbuj napisać to zapytanie wykorzystując
  - oryginalne kolekcje (`customers, orders, orderdertails, products, categories`)
  - kolekcję `OrderInfo`
  - kolekcję `CustomerInfo`
- porównaj zapytania/polecenia/wyniki

```
[
  {
    "_id":

    "CustomerID": ... identyfikator klienta
    "CompanyName": ... nazwa klienta
    "ConfectionsSale97": ... wartość zakupionych przez niego produktów z kategorii 'Confections'  w 1997r

  }
]
```

d)

Napisz polecenie/zapytanie: Dla każdego klienta poaje wartość sprzedaży z podziałem na lata i miesiące Spróbuj napisać to zapytanie wykorzystując - oryginalne kolekcje (`customers, orders, orderdertails, products, categories`) - kolekcję `OrderInfo` - kolekcję `CustomerInfo`

- porównaj zapytania/polecenia/wyniki

```
[
  {
    "_id":

    "CustomerID": ... identyfikator klienta
    "CompanyName": ... nazwa klienta

    "Sale": [ ... tablica zawierająca inf o sprzedazy
        {
            "Year":  ....
            "Month": ....
            "Total": ...
        }
        ...
    ]
  }
]
```

e)

Załóżmy że pojawia się nowe zamówienie dla klienta 'ALFKI', zawierające dwa produkty 'Chai' oraz "Ikura"

- pozostałe pola w zamówieniu (ceny, liczby sztuk prod, inf o przewoźniku itp. możesz uzupełnić wg własnego uznania) Napisz polecenie które dodaje takie zamówienie do bazy
- aktualizując oryginalne kolekcje `orders`, `orderdetails`
- aktualizując kolekcję `OrderInfo`
- aktualizując kolekcję `CustomerInfo`

Napisz polecenie

- aktualizując oryginalną kolekcję orderdetails`
- aktualizując kolekcję `OrderInfo`
- aktualizując kolekcję `CustomerInfo`

f)

Napisz polecenie które modyfikuje zamówienie dodane w pkt e) zwiększając zniżkę o 5% (dla każdej pozycji tego zamówienia)

Napisz polecenie

- aktualizując oryginalną kolekcję `orderdetails`
- aktualizując kolekcję `OrderInfo`
- aktualizując kolekcję `CustomerInfo`

UWAGA: W raporcie należy zamieścić kod poleceń oraz uzyskany rezultat, np wynik polecenia `db.kolekcka.fimd().limit(2)` lub jego fragment

Zadanie 1 - rozwiązanie

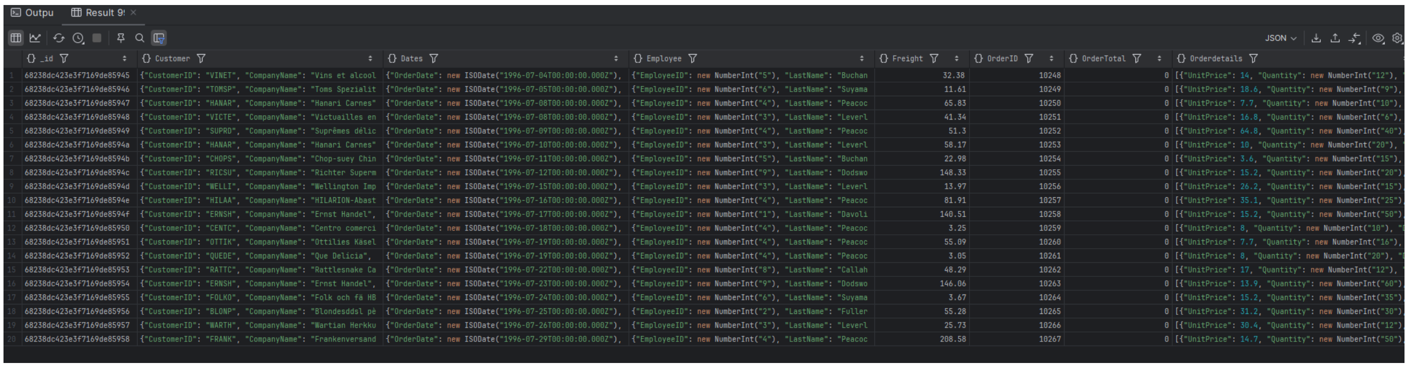
> Wyniki:
>
> przykłady, kod, zrzuty ekranów, komentarz ...

a)

```
db.createCollection("OrdersInfo", {
  validator: {
    $jsonSchema: {
      bsonType: "object",
      required: [
        "OrderID",
        "Customer",
        "Employee",
        "Dates",
        "Orderdetails",
        "Freight",
        "OrderTotal",
        "Shipment",
      ],
      properties: {
        OrderID: { bsonType: "int", description: "int required" },
        Customer: {
          bsonType: "object",
          required: ["CustomerID", "CompanyName", "City", "Country"],
          properties: {
            CustomerID: { bsonType: "string", description: "string required" },
            CompanyName: { bsonType: "string", description: "string required" },
            City: { bsonType: "string", description: "string required" },
            Country: { bsonType: "string", description: "string required" },
          },
        },
        Employee: {
          bsonType: "object",
          required: ["EmployeeID", "FirstName", "LastName", "Title"],
          properties: {
            EmployeeID: { bsonType: "int", description: "int required" },
            FirstName: { bsonType: "string", description: "string required" },
            LastName: { bsonType: "string", description: "string required" },
            Title: { bsonType: "string", description: "string required" },
          },
        },
        Dates: {
          bsonType: "object",
          required: ["OrderDate", "RequiredDate"],
          properties: {
            OrderDate: { bsonType: "date", description: "date required" },
            RequiredDate: { bsonType: "date", description: "date required" },
          },
        },
        Orderdetails: {
          bsonType: "array",
          items: {
            bsonType: "object",
            required: ["UnitPrice", "Quantity", "Discount", "Value", "product"],
            properties: {
              UnitPrice: { bsonType: "double", description: "double required" },
              Quantity: { bsonType: "int", description: "int required" },
              Discount: { bsonType: "double", description: "double required" },
              Value: { bsonType: "double", description: "double required" },
              product: {
                bsonType: "object",
                required: [
                  "ProductID",
                  "ProductName",
                  "QuantityPerUnit",
                  "CategoryID",
                  "CategoryName",
                ],
                properties: {
                  ProductID: { bsonType: "int", description: "int required" },
                  ProductName: {
                    bsonType: "string",
                    description: "string required",
                  },
                  QuantityPerUnit: {
                    bsonType: "string",
                    description: "string required",
                  },
                  CategoryID: { bsonType: "int", description: "int required" },
                  CategoryName: {
                    bsonType: "string",
                    description: "string required",
                  },
                },
              },
            },
          },
        },
        Freight: { bsonType: "double", description: "double required" },
        OrderTotal: { bsonType: "double", description: "double required" },
        Shipment: {
          bsonType: "object",
          required: [
            "Shipper",
            "ShipName",
            "ShipAddress",
            "ShipCity",
            "ShipCountry",
          ],
          properties: {
            Shipper: {
              bsonType: "object",
              required: ["ShipperID", "CompanyName"],
              properties: {
                ShipperID: { bsonType: "int", description: "int required" },
                CompanyName: {
                  bsonType: "string",
                  description: "string required",
                },
              },
            },
            ShipName: { bsonType: "string", description: "string required" },
            ShipAddress: { bsonType: "string", description: "string required" },
            ShipCity: { bsonType: "string", description: "string required" },
            ShipCountry: { bsonType: "string", description: "string required" },
            },
          },
        },
      },
    },
  });
  //use north0;
  db.orderdetails.aggregate([
    {
      $match: {},
    },
    {
      $lookup: {
        from: "products",
        localField: "ProductID",
        foreignField: "ProductID",
        as: "products",
      },
    },
    {
      $unwind: "$products",
    },
    {
      $lookup: {
        from: "categories",
        localField: "products.CategoryID",
        foreignField: "CategoryID",
        as: "categories",
      },
    },
    {
      $unwind: "$categories",
    },
    {
      $addFields: {
        Value: {
          $multiply: ["$UnitPrice", "$Quantity", { $subtract: [1, "$Discount"] }],
        },
        product: {
          ProductID: "$products.ProductID",
          ProductName: "$products.ProductName",
          QuantityPerUnit: "$products.QuantityPerUnit",
          CategoryID: "$products.CategoryID",
          CategoryName: "$categories.CategoryName",
        },
      },
    },
    {
      $project: {
        _id: 0,
        products: 0,
        categories: 0,
      },
    },
    {
      $out: "orderdetails_tmp",
    },
  ]);

  db.orders.aggregate([
    {
      $match: {},
    },
    //customers
    {
      $lookup: {
        from: "customers",
        localField: "CustomerID",
        foreignField: "CustomerID",
        as: "Customer",
      },
    },
    {
      $unwind: "$Customer",
    },
    {
      $project: {
        "Customer._id": 0,
        "Customer.ContactName": 0,
        "Customer.ContactTitle": 0,
        // "Customer.City": 0,
        // "Customer.Country": 0,
        "Customer.Address": 0,
        "Customer.PostalCode": 0,
        "Customer.Region": 0,
        "Customer.Phone": 0,
        "Customer.Fax": 0,
      },
    },
    //employees
    {
      $lookup: {
        from: "employees",
        localField: "EmployeeID",
        foreignField: "EmployeeID",
        as: "Employee",
      },
    },
    {
      $unwind: "$Employee",
    },
    {
      $project: {
        "Employee._id": 0,
        //"Employee.Title": 0,
        "Employee.TitleOfCourtesy": 0,
        "Employee.BirthDate": 0,
        "Employee.HireDate": 0,
        "Employee.Address": 0,
        "Employee.PostalCode": 0,
        "Employee.City": 0,
        "Employee.Region": 0,
        "Employee.Country": 0,
        "Employee.HomePhone": 0,
        "Employee.Extension": 0,
        "Employee.Photo": 0,
        "Employee.Notes": 0,
        "Employee.ReportsTo": 0,
        "Employee.PhotoPath": 0,
      },
    },
    //Dates
    {
      $addFields: {
        Dates: {
          OrderDate: "$OrderDate",
          RequiredDate: "$RequiredDate",
        },
      },
    },
    //Orderdetails
    {
      $lookup: {
        from: "orderdetails_tmp",
        localField: "OrderID",
        foreignField: "OrderID",
        as: "Orderdetails",
      },
    },
    {
      $project: {
        "Orderdetails.OrderID": 0,
        "Orderdetails._id": 0,
      },
    },
    //Shippers
    {
      $lookup: {
        from: "shippers",
        localField: "ShipVia",
        foreignField: "ShipperID",
        as: "shippers",
      },
    },
    {
      $unwind: "$shippers",
    },

    {
      $addFields: {
        Orderdetails: {
          $map: {
            input: "$Orderdetails",
            as: "od",
            in: {
              UnitPrice: { $toDouble: "$$od.UnitPrice" },
              Quantity: "$$od.Quantity",
              Discount: { $toDouble: "$$od.Discount" },
              Value: { $toDouble: "$$od.Value" },
              product: "$$od.product",
            },
          },
        },
        Freight: { $toDouble: "$Freight" },
        OrderTotal: { $toDouble: { $sum: "$orderdetails.Value" } },
        Shipment: {
          Shipper: {
            ShipperID: "$shippers.ShipperID",
            CompanyName: "$shippers.CompanyName",
          },
          ShipName: "$ShipName",
          ShipAddress: "$ShipAddress",
          ShipCity: "$ShipCity",
          ShipCountry: "$ShipCountry",
        },
      },
    },
    {
      $project: {
        _id: 0,
        shippers: 0,
        CustomerID: 0,
        EmployeeID: 0,
        OrderDate: 0,
        RequiredDate: 0,
        ShipAddress: 0,
        ShipCity: 0,
        ShipCountry: 0,
        ShipName: 0,
        ShipPostalCode: 0,
        ShipRegion: 0,
        ShipVia: 0,
        ShippedDate: 0,
      },
    },
    {
      $out: "OrdersInfo",
    },
  ]);
```



_id	Customer	Dates	Employee	Freight	OrderID	OrderTotal	Orderdetails
68238dc423e3f7169de85945	{"CustomerID": "VINET", "CompanyName": "Vins et alcool	{"OrderDate": new ISODate("1996-07-04T00:00:00.000Z"),	{"EmployeeID": new NumberInt("5"), "LastName": "Buchan	32.38	10248	0	[{"UnitPrice": 14, "Quantity": new NumberInt("12"),
68238dc423e3f7169de85946	{"CustomerID": "TOMSP", "CompanyName": "Toms Spezialit	{"OrderDate": new ISODate("1996-07-05T00:00:00.000Z"),	{"EmployeeID": new NumberInt("6"), "LastName": "Suyama	11.61	10249	0	[{"UnitPrice": 18.6, "Quantity": new NumberInt("9"),
68238dc423e3f7169de85947	{"CustomerID": "HANAR", "CompanyName": "Hanari Carnes"	{"OrderDate": new ISODate("1996-07-08T00:00:00.000Z"),	{"EmployeeID": new NumberInt("4"), "LastName": "Peacoc	65.83	10250	0	[{"UnitPrice": 7.7, "Quantity": new NumberInt("10"),
68238dc423e3f7169de85948	{"CustomerID": "VICTE", "CompanyName": "Victuailles en	{"OrderDate": new ISODate("1996-07-08T00:00:00.000Z"),	{"EmployeeID": new NumberInt("3"), "LastName": "Leverl	41.34	10251	0	[{"UnitPrice": 16.8, "Quantity": new NumberInt("6"),
68238dc423e3f7169de85949	{"CustomerID": "SUPRD", "CompanyName": "Suprêmes délic	{"OrderDate": new ISODate("1996-07-09T00:00:00.000Z"),	{"EmployeeID": new NumberInt("4"), "LastName": "Peacoc	51.3	10252	0	[{"UnitPrice": 64.8, "Quantity": new NumberInt("40")
68238dc423e3f7169de8594a	{"CustomerID": "HANAR", "CompanyName": "Hanari Carnes"	{"OrderDate": new ISODate("1996-07-10T00:00:00.000Z"),	{"EmployeeID": new NumberInt("3"), "LastName": "Leverl	58.17	10253	0	[{"UnitPrice": 10, "Quantity": new NumberInt("20"),
68238dc423e3f7169de8594b	{"CustomerID": "CHOPS", "CompanyName": "Chop-suey Chin	{"OrderDate": new ISODate("1996-07-11T00:00:00.000Z"),	{"EmployeeID": new NumberInt("5"), "LastName": "Buchan	22.98	10254	0	[{"UnitPrice": 3.6, "Quantity": new NumberInt("15"),
68238dc423e3f7169de8594c	{"CustomerID": "RICSU", "CompanyName": "Richter Superm	{"OrderDate": new ISODate("1996-07-12T00:00:00.000Z"),	{"EmployeeID": new NumberInt("9"), "LastName": "Dodswo	148.33	10255	0	[{"UnitPrice": 15.2, "Quantity": new NumberInt("20")
68238dc423e3f7169de8594d	{"CustomerID": "WELLI", "CompanyName": "Wellington Imp	{"OrderDate": new ISODate("1996-07-15T00:00:00.000Z"),	{"EmployeeID": new NumberInt("3"), "LastName": "Leverl	13.97	10256	0	[{"UnitPrice": 26.2, "Quantity": new NumberInt("15")
68238dc423e3f7169de8594e	{"CustomerID": "HILAA", "CompanyName": "HILARION-Abast	{"OrderDate": new ISODate("1996-07-16T00:00:00.000Z"),	{"EmployeeID": new NumberInt("4"), "LastName": "Peacoc	81.91	10257	0	[{"UnitPrice": 35.1, "Quantity": new NumberInt("25")
68238dc423e3f7169de8594f	{"CustomerID": "ERNSH", "CompanyName": "Ernst Handel",	{"OrderDate": new ISODate("1996-07-17T00:00:00.000Z"),	{"EmployeeID": new NumberInt("1"), "LastName": "Davoli	140.51	10258	0	[{"UnitPrice": 15.2, "Quantity": new NumberInt("50")
68238dc423e3f7169de85950	{"CustomerID": "CENTC", "CompanyName": "Centro comerci	{"OrderDate": new ISODate("1996-07-18T00:00:00.000Z"),	{"EmployeeID": new NumberInt("4"), "LastName": "Peacoc	3.25	10259	0	[{"UnitPrice": 8, "Quantity": new NumberInt("10"),
68238dc423e3f7169de85951	{"CustomerID": "OTTIK", "CompanyName": "Ottilies Käsel	{"OrderDate": new ISODate("1996-07-19T00:00:00.000Z"),	{"EmployeeID": new NumberInt("4"), "LastName": "Peacoc	55.09	10260	0	[{"UnitPrice": 7.7, "Quantity": new NumberInt("16"),
68238dc423e3f7169de85952	{"CustomerID": "QUEDE", "CompanyName": "Que Delícia",	{"OrderDate": new ISODate("1996-07-19T00:00:00.000Z"),	{"EmployeeID": new NumberInt("4"), "LastName": "Peacoc	3.05	10261	0	[{"UnitPrice": 8, "Quantity": new NumberInt("20"),
68238dc423e3f7169de85953	{"CustomerID": "RATTC", "CompanyName": "Rattlesnake Ca	{"OrderDate": new ISODate("1996-07-22T00:00:00.000Z"),	{"EmployeeID": new NumberInt("8"), "LastName": "Callah	48.29	10262	0	[{"UnitPrice": 17, "Quantity": new NumberInt("12"),
68238dc423e3f7169de85954	{"CustomerID": "ERNSH", "CompanyName": "Ernst Handel",	{"OrderDate": new ISODate("1996-07-23T00:00:00.000Z"),	{"EmployeeID": new NumberInt("9"), "LastName": "Dodswo	146.06	10263	0	[{"UnitPrice": 13.9, "Quantity": new NumberInt("60")
68238dc423e3f7169de85955	{"CustomerID": "FOLKO", "CompanyName": "Folk och fä HB	{"OrderDate": new ISODate("1996-07-24T00:00:00.000Z"),	{"EmployeeID": new NumberInt("6"), "LastName": "Suyama	3.67	10264	0	[{"UnitPrice": 15.2, "Quantity": new NumberInt("35")
68238dc423e3f7169de85956	{"CustomerID": "BLONP", "CompanyName": "Blondesddsl pè	{"OrderDate": new ISODate("1996-07-25T00:00:00.000Z"),	{"EmployeeID": new NumberInt("2"), "LastName": "Fuller	55.28	10265	0	[{"UnitPrice": 31.2, "Quantity": new NumberInt("30")
68238dc423e3f7169de85957	{"CustomerID": "WARTH", "CompanyName": "Wartian Herkku	{"OrderDate": new ISODate("1996-07-26T00:00:00.000Z"),	{"EmployeeID": new NumberInt("3"), "LastName": "Leverl	25.73	10266	0	[{"UnitPrice": 30.4, "Quantity": new NumberInt("12")
68238dc423e3f7169de85958	{"CustomerID": "FRANK", "CompanyName": "Frankenversand	{"OrderDate": new ISODate("1996-07-29T00:00:00.000Z"),	{"EmployeeID": new NumberInt("4"), "LastName": "Peacoc	208.58	10267	0	[{"UnitPrice": 14.7, "Quantity": new NumberInt("50")

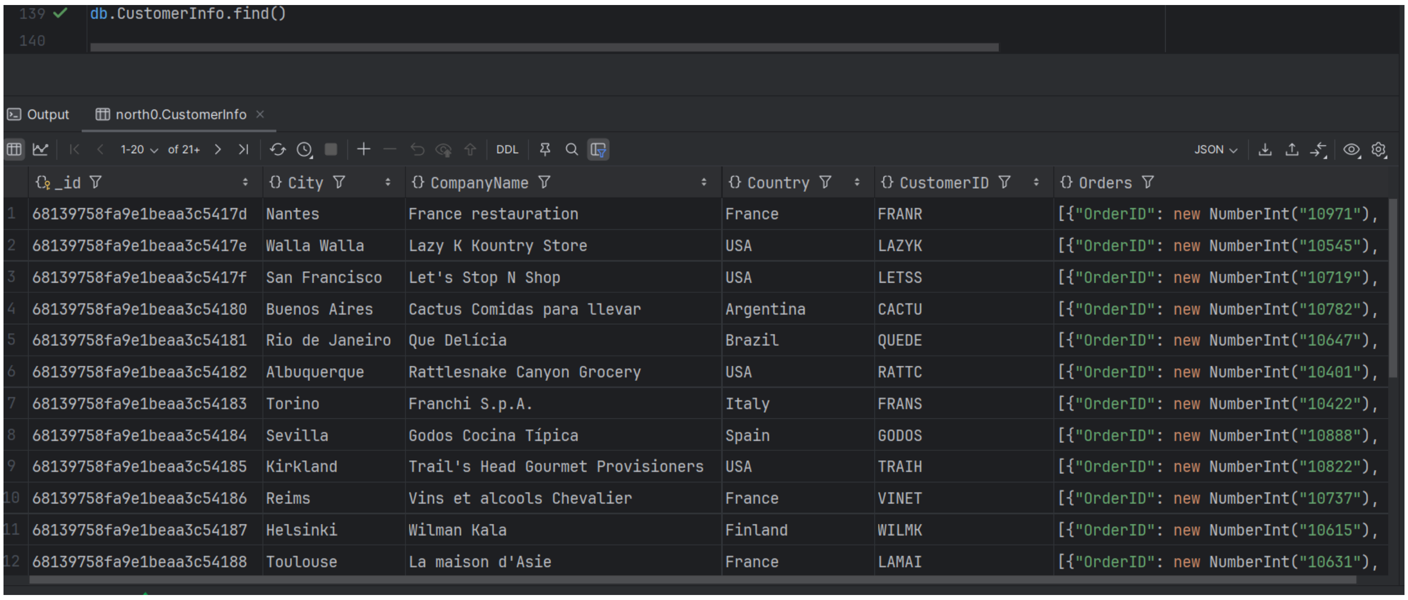
b)

```
db.createCollection("CustomerInfo", {
  validator: {
    $jsonSchema: {
      bsonType: "object",
      required: ["CustomerID", "CompanyName", "City", "Country", "Orders"],
      properties: {
        CustomerID: {
          bsonType: "string",
          description: "string required",
        },
        CompanyName: {
          bsonType: "string",
          description: "string required",
        },
        City: {
          bsonType: "string",
          description: "string required",
        },
        Country: {
          bsonType: "string",
          description: "string required",
        },
        Orders: {
          bsonType: "array",
          description: "array required",
          items: {
            bsonType: "object",
            properties: {
              OrderID: {
                bsonType: "int",
                description: "int required",
              },
              Employee: {
                bsonType: "object",
                properties: {
                  EmployeeID: {
                    bsonType: "int",
                    description: "int required",
                  },
                  FirstName: {
                    bsonType: "string",
                    description: "string required",
                  },
                  LastName: {
                    bsonType: "string",
                    description: "string required",
                  },
                  Title: {
                    bsonType: "string",
                    description: "string required",
                  },
                },
              },
              Dates: {
                bsonType: "object",
                properties: {
                  OrderDate: {
                    bsonType: "date",
                    description: "date required",
                  },
                  RequiredDate: {
                    bsonType: "date",
                    description: "date required",
                  },
                },
              },
              Orderdetails: {
                bsonType: "array",
                items: {
                  bsonType: "object",
                  properties: {
                    UnitPrice: {
                      bsonType: "double",
                      description: "double required",
                    },
                    Quantity: {
                      bsonType: "int",
                      description: "int required",
                    },
                    Discount: {
                      bsonType: "double",
                      description: "double required",
                    },
                    Value: {
                      bsonType: "double",
                      description: "double required",
                    },
                    product: {
                      bsonType: "object",
                      properties: {
                        ProductID: {
                          bsonType: "int",
                          description: "int required",
                        },
                        ProductName: {
                          bsonType: "string",
                          description: "string required",
                        },
                        QuantityPerUnit: {
                          bsonType: "string",
                          description: "string required",
                        },
                        CategoryID: {
                          bsonType: "int",
                          description: "int required",
                        },
                        CategoryName: {
                          bsonType: "string",
                          description: "string required",
                        },
                      },
                    },
                  },
                },
              },
              Freight: {
                bsonType: "double",
                description: "double required",
              },
              OrderTotal: {
                bsonType: "double",
                description: "double required",
              },
              Shipment: {
                bsonType: "object",
                properties: {
                  Shipper: {
                    bsonType: "object",
                    properties: {
                      ShipperID: {
                        bsonType: "int",
                        description: "int required",
                      },
                      CompanyName: {
                        bsonType: "string",
                        description: "string required",
                      },
                    },
                  },
                  ShipName: {
                    bsonType: "string",
                    description: "string required",
                  },
                  ShipAddress: {
                    bsonType: "string",
                    description: "string required",
                  },
                  ShipCity: {
                    bsonType: "string",
                    description: "string required",
                  },
                  ShipCountry: {
                    bsonType: "string",
                    description: "string required",
                  },
                },
              },
            },
          },
        },
      },
    },
  },
});

db.customers.aggregate([
  {
    $lookup: {
      from: "OrdersInfo",
      localField: "CustomerID",
      foreignField: "Customer.CustomerID",
      as: "OrdersInfo",
    },
  },
  { $unwind: "$OrdersInfo" },

  {
    $group: {
      _id: "$CustomerID",
      CustomerID: { $first: "$CustomerID" },
      CompanyName: { $first: "$CompanyName" },
      City: { $first: "$City" },
      Country: { $first: "$Country" },
      Orders: {
        $push: {
          OrderID: "$OrdersInfo.OrderID",
          Dates: "$OrdersInfo.Dates",
          Employee: "$OrdersInfo.Employee",
          Freight: "$OrdersInfo.Freight",
          OrderTotal: "$OrdersInfo.OrderTotal",
          Shipment: "$OrdersInfo.Shipment",
          Orderdetails: "$OrdersInfo.Orderdetails",
        },
      },
    },
  },
  {
    $project: {
      _id: 0,
      CustomerID: 1,
      CompanyName: 1,
      City: 1,
      Country: 1,
      Orders: 1,
    },
  },

  {
    $merge: {
      into: "CustomerInfo",
    },
  },
]);
```

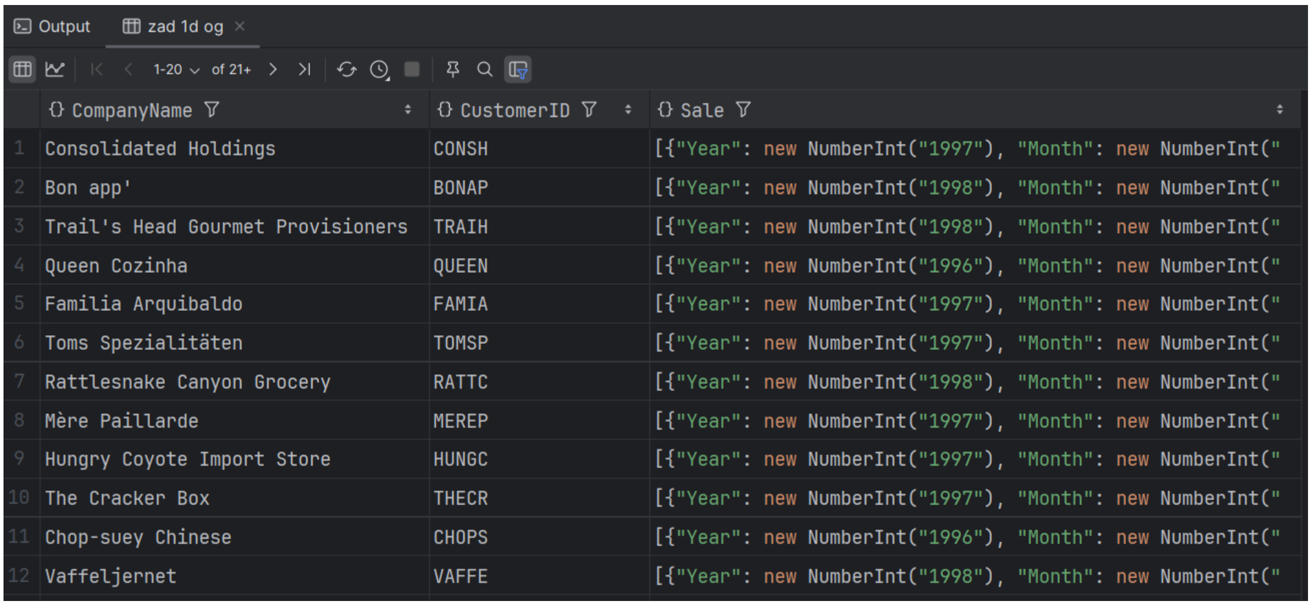


```
db.CustomerInfo.find()
```

_id	City	CompanyName	Country	CustomerID	Orders
68139758fa9e1beaa3c5417d	Nantes	France restauration	France	FRANR	[{"OrderID": new NumberInt("10971"),
68139758fa9e1beaa3c5417e	Walla Walla	Lazy K Kountry Store	USA	LAZYK	[{"OrderID": new NumberInt("10545"),
68139758fa9e1beaa3c5417f	San Francisco	Let's Stop N Shop	USA	LETSS	[{"OrderID": new NumberInt("10719"),
68139758fa9e1beaa3c54180	Buenos Aires	Cactus Comidas para llevar	Argentina	CACTU	[{"OrderID": new NumberInt("10782"),
68139758fa9e1beaa3c54181	Rio de Janeiro	Que Delícia	Brazil	QUEDE	[{"OrderID": new NumberInt("10647"),
68139758fa9e1beaa3c54182	Albuquerque	Rattlesnake Canyon Grocery	USA	RATTC	[{"OrderID": new NumberInt("10401"),
68139758fa9e1beaa3c54183	Torino	Franchi S.p.A.	Italy	FRANS	[{"OrderID": new NumberInt("10422"),
68139758fa9e1beaa3c54184	Sevilla	Godos Cocina Típica	Spain	GODOS	[{"OrderID": new NumberInt("10888"),
68139758fa9e1beaa3c54185	Kirkland	Trail's Head Gourmet Provisioners	USA	TRAIH	[{"OrderID": new NumberInt("10822"),
68139758fa9e1beaa3c54186	Reims	Vins et alcools Chevalier	France	VINET	[{"OrderID": new NumberInt("10737"),
68139758fa9e1beaa3c54187	Helsinki	Wilman Kala	Finland	WILMK	[{"OrderID": new NumberInt("10615"),
68139758fa9e1beaa3c54188	Toulouse	La maison d'Asie	France	LAMAI	[{"OrderID": new NumberInt("10631"),

d)

```
// zad 1d original
db.customers.aggregate([
  {
    $lookup: {
      from: "orders",
      localField: "CustomerID",
      foreignField: "CustomerID",
      as: "Orders",
    },
  },
  { $unwind: "$Orders" },
  {
    $lookup: {
      from: "orderdetails",
      localField: "Orders.OrderID",
      foreignField: "OrderID",
      as: "Orderdetails",
    },
  },
  { $unwind: "$Orderdetails" },
  {
    $group: {
      _id: {
        CustomerID: "$CustomerID",
        CompanyName: "$CompanyName",
        Year: { $year: "$Orders.OrderDate" },
        Month: { $month: "$Orders.OrderDate" },
      },
      Total: {
        $sum: {
          $multiply: [
            "$Orderdetails.UnitPrice",
            "$Orderdetails.Quantity",
            { $subtract: [1, "$Orderdetails.Discount"] },
          ],
        },
      },
    },
  },
  {
    $group: {
      _id: "$_id.CustomerID",
      CompanyName: { $first: "$_id.CompanyName" },
      Sale: {
        $push: {
          Year: "$_id.Year",
          Month: "$_id.Month",
          Total: "$Total",
        },
      },
    },
  },
  {
    $project: {
      _id: 0,
      CustomerID: "$_id",
      CompanyName: 1,
      Sale: 1,
    },
  },
]);
```



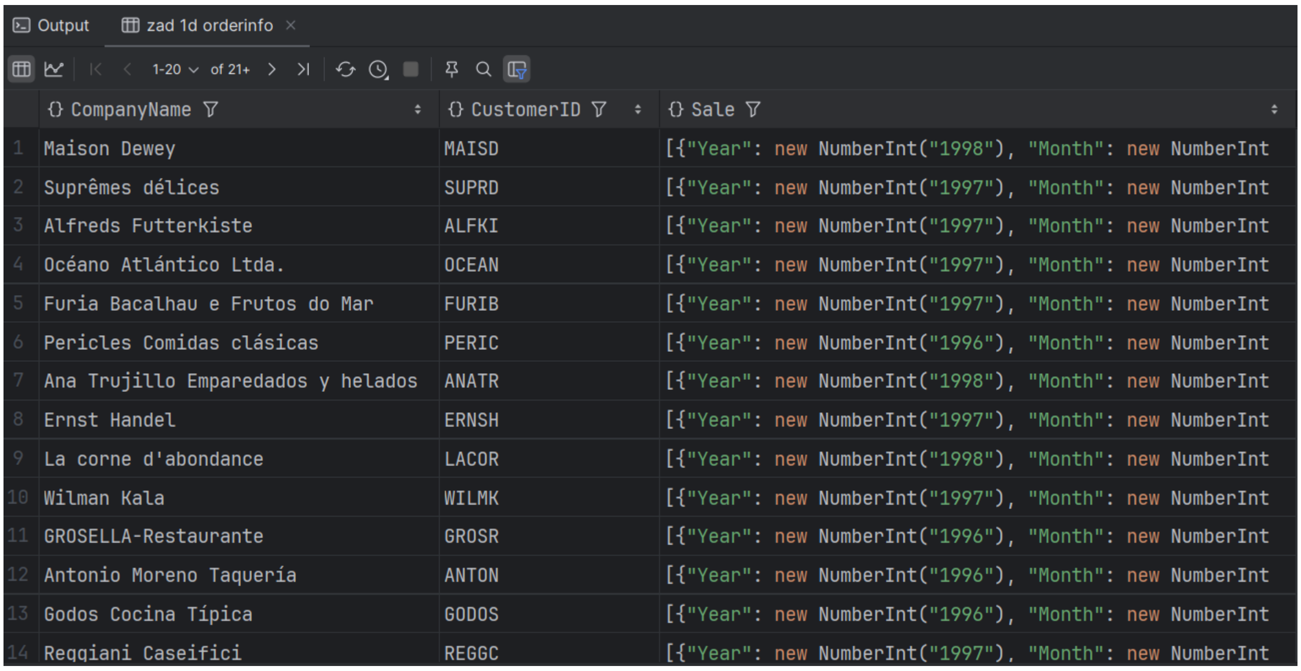
	CompanyName	CustomerID	Sale
1	Consolidated Holdings	CONSH	[{"Year": new NumberInt("1997"), "Month": new NumberInt("
2	Bon app'	BONAP	[{"Year": new NumberInt("1998"), "Month": new NumberInt("
3	Trail's Head Gourmet Provisioners	TRAIH	[{"Year": new NumberInt("1998"), "Month": new NumberInt("
4	Queen Cozinha	QUEEN	[{"Year": new NumberInt("1996"), "Month": new NumberInt("
5	Familia Arquibaldo	FAMIA	[{"Year": new NumberInt("1997"), "Month": new NumberInt("
6	Toms Spezialitäten	TOMSP	[{"Year": new NumberInt("1997"), "Month": new NumberInt("
7	Rattlesnake Canyon Grocery	RATTC	[{"Year": new NumberInt("1998"), "Month": new NumberInt("
8	Mère Paillarde	MEREP	[{"Year": new NumberInt("1997"), "Month": new NumberInt("
9	Hungry Coyote Import Store	HUNGC	[{"Year": new NumberInt("1997"), "Month": new NumberInt("
10	The Cracker Box	THECR	[{"Year": new NumberInt("1997"), "Month": new NumberInt("
11	Chop-suey Chinese	CHOPS	[{"Year": new NumberInt("1996"), "Month": new NumberInt("
12	Vaffeljernet	VAFFE	[{"Year": new NumberInt("1998"), "Month": new NumberInt("

```
//zad 1d orderinfo
db.OrdersInfo.aggregate([
  { $unwind: "$Orderdetails" },

  {
    $group: {
      _id: {
        CustomerID: "$Customer.CustomerID",
        CompanyName: "$Customer.CompanyName",
        Year: { $year: "$Dates.OrderDate" },
        Month: { $month: "$Dates.OrderDate" },
      },
      Total: { $sum: "$Orderdetails.Value" },
    },
  },

  {
    $group: {
      _id: "$_id.CustomerID",
      CompanyName: { $first: "$_id.CompanyName" },
      Sale: {
        $push: {
          Year: "$_id.Year",
          Month: "$_id.Month",
          Total: "$Total",
        },
      },
    },
  },

  {
    $project: {
      _id: 0,
      CustomerID: "$_id",
      CompanyName: 1,
      Sale: 1,
    },
  },
]);
```

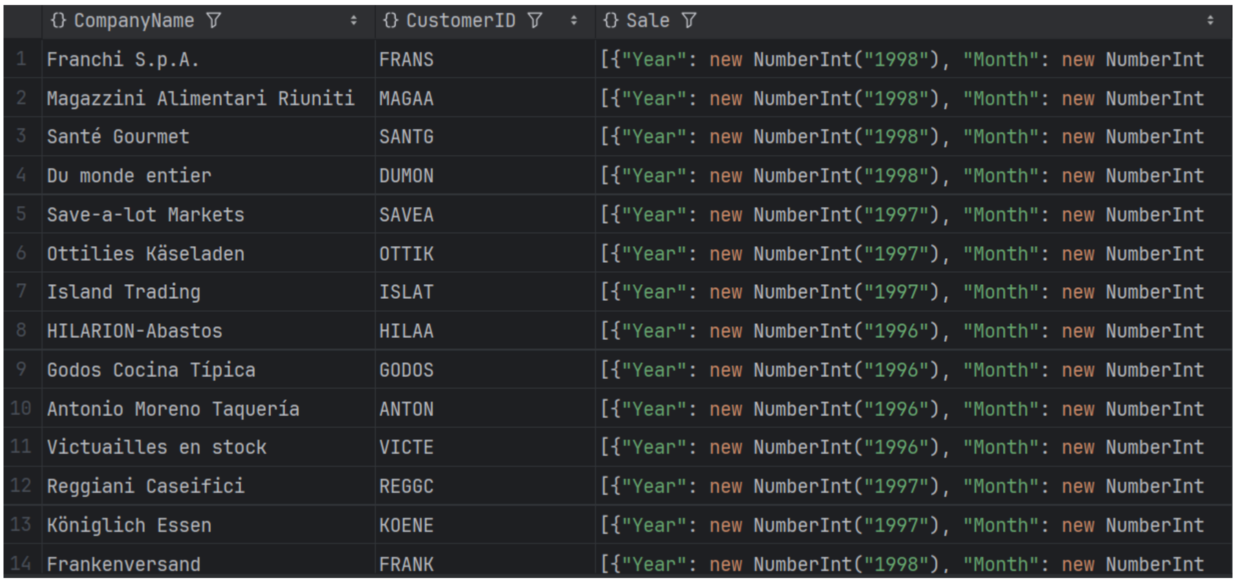


	CompanyName	CustomerID	Sale
1	Maison Dewey	MAISD	[{"Year": new NumberInt("1998"), "Month": new NumberInt
2	Suprêmes délices	SUPRD	[{"Year": new NumberInt("1997"), "Month": new NumberInt
3	Alfreds Futterkiste	ALFKI	[{"Year": new NumberInt("1997"), "Month": new NumberInt
4	Océano Atlántico Ltda.	OCEAN	[{"Year": new NumberInt("1997"), "Month": new NumberInt
5	Furia Bacalhau e Frutos do Mar	FURIB	[{"Year": new NumberInt("1997"), "Month": new NumberInt
6	Pericles Comidas clásicas	PERIC	[{"Year": new NumberInt("1996"), "Month": new NumberInt
7	Ana Trujillo Emparedados y helados	ANATR	[{"Year": new NumberInt("1998"), "Month": new NumberInt
8	Ernst Handel	ERNSH	[{"Year": new NumberInt("1997"), "Month": new NumberInt
9	La corne d'abondance	LACOR	[{"Year": new NumberInt("1998"), "Month": new NumberInt
10	Wilman Kala	WILMK	[{"Year": new NumberInt("1997"), "Month": new NumberInt
11	GROSELLA-Restaurante	GROSR	[{"Year": new NumberInt("1996"), "Month": new NumberInt
12	Antonio Moreno Taquería	ANTON	[{"Year": new NumberInt("1996"), "Month": new NumberInt
13	Godos Cocina Típica	GODOS	[{"Year": new NumberInt("1996"), "Month": new NumberInt
14	Reggiani Caseifici	REGGC	[{"Year": new NumberInt("1997"), "Month": new NumberInt

```
//zad1d customerinfo
db.CustomerInfo.aggregate([
  { $unwind: "$Orders" },
  { $unwind: "$Orders.Orderdetails" },
  {
    $group: {
      _id: {
        CustomerID: "$CustomerID",
        CompanyName: "$CompanyName",
        Year: { $year: "$Orders.Dates.OrderDate" },
        Month: { $month: "$Orders.Dates.OrderDate" },
      },
      Total: { $sum: "$Orders.Orderdetails.Value" },
    },
  },

  {
    $group: {
      _id: "$_id.CustomerID",
      CompanyName: { $first: "$_id.CompanyName" },
      Sale: {
        $push: {
          Year: "$_id.Year",
          Month: "$_id.Month",
          Total: "$Total",
        },
      },
    },
  },

  {
    $project: {
      _id: 0,
      CustomerID: "$_id",
      CompanyName: 1,
      Sale: 1,
    },
  },
]);
```



	{} CompanyName	{} CustomerID	{} Sale
1	Franchi S.p.A.	FRANS	[{"Year": new NumberInt("1998"), "Month": new NumberInt
2	Magazzini Alimentari Riuniti	MAGAA	[{"Year": new NumberInt("1998"), "Month": new NumberInt
3	Santé Gourmet	SANTG	[{"Year": new NumberInt("1998"), "Month": new NumberInt
4	Du monde entier	DUMON	[{"Year": new NumberInt("1998"), "Month": new NumberInt
5	Save-a-lot Markets	SAVEA	[{"Year": new NumberInt("1997"), "Month": new NumberInt
6	Ottilies Käseladen	OTTIK	[{"Year": new NumberInt("1997"), "Month": new NumberInt
7	Island Trading	ISLAT	[{"Year": new NumberInt("1997"), "Month": new NumberInt
8	HILARION-Abastos	HILAA	[{"Year": new NumberInt("1996"), "Month": new NumberInt
9	Godos Cocina Típica	GODOS	[{"Year": new NumberInt("1996"), "Month": new NumberInt
10	Antonio Moreno Taquería	ANTON	[{"Year": new NumberInt("1996"), "Month": new NumberInt
11	Victuailles en stock	VICTE	[{"Year": new NumberInt("1996"), "Month": new NumberInt
12	Reggiani Caseifici	REGGC	[{"Year": new NumberInt("1997"), "Month": new NumberInt
13	Königlich Essen	KOENE	[{"Year": new NumberInt("1997"), "Month": new NumberInt
14	Frankenversand	FRANK	[{"Year": new NumberInt("1998"), "Month": new NumberInt

e)

```
const newOrderId = 12345;

db.orders.insertOne({
  OrderID: newOrderId,
  CustomerID: "ALFKI",
  EmployeeID: 5,
  OrderDate: ISODate("2025-04-16T00:00:00Z"),
  RequiredDate: ISODate("2025-05-16T00:00:00Z"),
  ShipVia: 3,
  Freight: 15.0,
  ShipName: "Alfreds Futterkiste",
  ShipAddress: "Obere Str. 57",
  ShipCity: "Berlin",
  ShipCountry: "Germany",
});

db.orderdetails.insertMany([
  {
    OrderID: newOrderId,
    ProductID: 1,
    UnitPrice: 18.0,
    Quantity: 10,
    Discount: 0,
  },
  {
    OrderID: newOrderId,
    ProductID: 31,
    UnitPrice: 62.5,
    Quantity: 5,
    Discount: 0.05,
  },
]);

db.OrdersInfo.insertOne({
  OrderID: newOrderId,
  Customer: {
    CustomerID: "ALFKI",
    CompanyName: "Alfreds Futterkiste",
    City: "Berlin",
    Country: "Germany",
  },
  Employee: {
    EmployeeID: 5,
    FirstName: "Steven",
    LastName: "Buchanan",
    Title: "Sales Manager",
  },
  Dates: {
    OrderDate: ISODate("2025-04-16T00:00:00Z"),
    RequiredDate: ISODate("2025-05-16T00:00:00Z"),
  },
  Orderdetails: [
    {
      UnitPrice: 18.0,
      Quantity: 10,
      Discount: 0,
      Value: 180.0,
      product: {
        ProductID: 1,
        ProductName: "Chai",
        QuantityPerUnit: "10 boxes x 20 bags",
        CategoryID: 1,
        CategoryName: "Beverages",
      },
    },
    {
      UnitPrice: 62.5,
      Quantity: 5,
      Discount: 0.05,
      Value: 296.875,
      product: {
        ProductID: 31,
        ProductName: "Ikura",
        QuantityPerUnit: "12 - 200 g jars",
        CategoryID: 8,
        CategoryName: "Seafood",
      },
    },
  ],
  Freight: 15.0,
  OrderTotal: 476.875,
  Shipment: {
    Shipper: { ShipperID: 3, CompanyName: "Federal Shipping" },
    ShipName: "Alfreds Futterkiste",
    ShipAddress: "Obere Str. 57",
    ShipCity: "Berlin",
    ShipCountry: "Germany",
  },
});

db.CustomerInfo.updateOne(
  { CustomerID: "ALFKI" },
  {
    $push: {
      Orders: {
        OrderID: newOrderId,
        Dates: {
          OrderDate: ISODate("2025-04-16T00:00:00Z"),
          RequiredDate: ISODate("2025-05-16T00:00:00Z"),
        },
        Employee: {
          EmployeeID: 5,
          FirstName: "Steven",
          LastName: "Buchanan",
          Title: "Sales Manager",
        },
        Freight: 15.0,
        OrderTotal: 476.875,
        Shipment: {
          Shipper: { ShipperID: 3, CompanyName: "Federal Shipping" },
          ShipName: "Alfreds Futterkiste",
          ShipAddress: "Obere Str. 57",
          ShipCity: "Berlin",
          ShipCountry: "Germany",
        },
        Orderdetails: [
          {
            UnitPrice: 18.0,
            Quantity: 10,
            Discount: 0,
            Value: 180.0,
            product: {
              ProductID: 1,
              ProductName: "Chai",
              QuantityPerUnit: "10 boxes x 20 bags",
              CategoryID: 1,
              CategoryName: "Beverages",
            },
          },
          {
            UnitPrice: 62.5,
            Quantity: 5,
            Discount: 0.05,
            Value: 296.875,
            product: {
              ProductID: 31,
              ProductName: "Ikura",
              QuantityPerUnit: "12 - 200 g jars",
              CategoryID: 8,
              CategoryName: "Seafood",
            },
          },
        ],
      },
    },
  }
);
```

f)

```
const newOrderId = 12345;
//1
db.orderdetails
  .find({
    OrderID: newOrderId,
  })
  .limit(2);
db.orderdetails.updateOne(
  {
    OrderID: newOrderId,
    ProductID: 1,
  },
  {
    $inc: { Discount: 0.05 },
  }
);
db.orderdetails.updateOne(
  {
    OrderID: newOrderId,
    ProductID: 31,
  },
  {
    $inc: { Discount: 0.05 },
  }
);
db.orderdetails
  .find({
    OrderID: newOrderId,
  })
  .limit(2);
//2
```

```
db.OrdersInfo.find({
  OrderID: newOrderId,
}).limit(2);
db.OrdersInfo.updateOne(
  {
    OrderID: newOrderId,
  },
  [
    {
      $set: {
        Orderdetails: {
          $map: {
            input: "$Orderdetails",
            as: "detail",
            in: {
              $mergeObjects: [
                "$$detail",
                {
                  Discount: { $add: ["$$detail.Discount", 0.05] },
                  Value: {
                    $multiply: [
                      "$$detail.UnitPrice",
                      "$$detail.Quantity",
                      { $subtract: [1, { $add: ["$$detail.Discount", 0.05] }] },
                    ],
                  },
                },
              ],
            },
          },
        },
      },
    },
    {
      $set: {
        Ordertotal: {
          $sum: "$Orderdetails.Value",
        },
      },
    },
  ]
);
db.OrdersInfo.find({
  OrderID: newOrderId,
}).limit(2);
//3
db.CustomerInfo.find({ CustomerID: "ALFKI" });
db.CustomerInfo.updateOne(
  {
    CustomerID: "ALFKI",
  },
  [
    {
      $set: {
        Orders: {
          $map: {
            input: "$Orders",
            as: "order",
            in: {
              $cond: {
                if: { $eq: ["$$order.OrderID", newOrderId] },
                then: {
                  $mergeObjects: [
                    "$$order",
                    {
                      Orderdetails: {
                        $map: {
                          input: "$$order.Orderdetails",
                          as: "detail",
                          in: {
                            $mergeObjects: [
                              "$$detail",
                              {
                                Discount: { $add: ["$$detail.Discount", 0.05] },
                                Value: {
                                  $multiply: [
                                    "$$detail.UnitPrice",
                                    "$$detail.Quantity",
                                    {
                                      $subtract: [
                                        1,
                                        { $add: ["$$detail.Discount", 0.05] },
                                      ],
                                    },
                                  ],
                                },
                              },
                            ],
                          },
                        },
                      },
                    },
                  ],
                },
                else: "$$order",
              },
            },
          },
        },
      },
    },
    {
      $set: {
        Orders: {
          $map: {
            input: "$Orders",
            as: "order",
            in: {
                $cond: {
                  if: { $eq: ["$$order.OrderID", newOrderId] },
                  then: {
                    $mergeObjects: [
                      "$$order",
                      {
                        OrderTotal: { $sum: "$$order.Orderdetails.Value" },
                      },
                    ],
                  },
                  else: "$$order",
                },
              },
            },
          },
        },
      },
    ]
);
db.CustomerInfo.find({
  CustomerID: "ALFKI",
}).limit(2);
```

....

Zadanie 2 - modelowanie danych

Zaproponuj strukturę bazy danych dla wybranego/przykładowego zagadnienia/problemu

Należy wybrać jedno zagadnienie/problem (A lub B lub C)

Przykład A

- Wykładowcy, przedmioty, studenci, oceny
  - Wykładowcy prowadzą zajęcia z poszczególnych przedmiotów
  - Studenci uczęszczają na zajęcia
  - Wykładowcy wystawiają oceny studentom
  - Studenci oceniają zajęcia

Przykład B

- Firmy, wycieczki, osoby
  - Firmy organizują wycieczki
  - Osoby rezerwują miejsca/wykupują bilety
  - Osoby oceniają wycieczki

Przykład C

- Własny przykład o podobnym stopniu złożoności

a) Zaproponuj różne warianty struktury bazy danych i dokumentów w poszczególnych kolekcjach oraz przeprowadzić dyskusję każdego wariantu (wskazać wady i zalety każdego z wariantów)

- zdefiniuj schemat/reguły walidacji danych
- wykorzystaj referencje
- dokumenty zagnieżdżone
- tablice

b) Kolekcje należy wypełnić przykładowymi danymi

c) W kontekście zaprezentowania wad/zalet należy zaprezentować kilka przykładów/zapytań/operacji oraz dla których dedykowany jest dany wariant

W sprawozdaniu należy zamieścić przykładowe dokumenty w formacie JSON (pkt a) i b)), oraz kod zapytań/operacji (pkt c)), wraz z odpowiednim komentarzem opisującym strukturę dokumentów oraz polecenia ilustrujące wykonanie przykładowych operacji na danych

Do sprawozdania należy kompletny zrzut wykonanych/przygotowanych baz danych (taki zrzut można wykonać np. za pomocą poleceń `mongoexport`, `mongdump` …) oraz plik z kodem operacji/zapytań w wersji źródłowej (np. plik .js, np. plik .md), załącznik powinien mieć format zip

Zadanie 2 - rozwiązanie

> Wyniki:
>
> przykłady, kod, zrzuty ekranów, komentarz ...

Postanowiliśmy przeanalizować 3 modele bazy danych.

Model 1
Znormalizowane kolekcje bez redundancji danych i zagnieżdżeń

```
// Company1
db.createCollection("Company1", {
  validator: {
    $jsonSchema: {
      bsonType: "object",
      required: ["name", "address"],
      properties: {
        _id: { bsonType: "objectId" },
        name: { bsonType: "string", description: "string required" },
        address: { bsonType: "string", description: "string required" },
      },
    },
  },
});

// Person1
db.createCollection("Person1", {
  validator: {
    $jsonSchema: {
      bsonType: "object",
      required: ["firstname", "lastname"],
      properties: {
        _id: { bsonType: "objectId" },
        firstname: { bsonType: "string", description: "string required" },
        lastname: { bsonType: "string", description: "string required" },
      },
    },
  },
});

// Trip1
db.createCollection("Trip1", {
  validator: {
    $jsonSchema: {
      bsonType: "object",
      required: ["name", "destination", "date", "max_places", "companyId"],
      properties: {
        _id: { bsonType: "objectId" },
        name: { bsonType: "string", description: "string required" },
        destination: { bsonType: "string", description: "string required" },
        date: { bsonType: "date", description: "date required" },
        max_places: {
          bsonType: "int",
          minimum: 1,
          description: "int>=1 required",
        },
        companyId: {
          bsonType: "objectId",
          description: "fkey to Company1._id",
        },
      },
    },
  },
});

// Rating1
db.createCollection("Rating1", {
  validator: {
    $jsonSchema: {
      bsonType: "object",
      required: ["tripId", "personId", "rating"],
      properties: {
        _id: { bsonType: "objectId" },
        tripId: { bsonType: "objectId", description: "fkey to Trip1._id" },
        personId: { bsonType: "objectId", description: "fkey to Person1._id" },
        rating: { bsonType: "int", minimum: 1, maximum: 5 },
      },
    },
  },
});

// Reservation1
db.createCollection("Reservation1", {
  validator: {
    $jsonSchema: {
      bsonType: "object",
      required: ["tripId", "personId", "no_tickets"],
      properties: {
        _id: { bsonType: "objectId" },
        tripId: { bsonType: "objectId", description: "fkey to Trip1._id" },
        personId: { bsonType: "objectId", description: "fkey to Person1._id" },
        no_tickets: { bsonType: "int", minimum: 1 },
      },
    },
  },
});
```

Wpisanie danych do modelu 1:

```
  // 2a) Firmy – każda pojedynczo, z odczytem insertedId
  var resTravelCo  = db.Company1.insertOne({ name: "TravelCo",      address: "ul. Podróżnicza 10, Warszawa" });
  var resAdventure = db.Company1.insertOne({ name: "AdventureTime", address: "ul. Wyprawowa 5, Kraków" });
  var compTravelCoId  = resTravelCo.insertedId;
  var compAdventureId = resAdventure.insertedId;


  // 2b) Wycieczki – każda pojedynczo, z odczytem insertedId
  var resMazury = db.Trip1.insertOne({
    name:        "Mazury Tour",
    destination: "Mazury",
    date:        ISODate("2025-03-10"),
    max_places:  20,
    companyId:   compTravelCoId
  });
  var resTatry = db.Trip1.insertOne({
    name:        "Tatry Hike",
    destination: "Tatry",
    date:        ISODate("2025-07-15"),
    max_places:  15,
    companyId:   compTravelCoId
  });
  var resCity = db.Trip1.insertOne({
    name:        "City Break",
    destination: "Wrocław",
    date:        ISODate("2025-05-20"),
    max_places:  25,
    companyId:   compAdventureId
  });
  var tripMazuryId = resMazury.insertedId;
  var tripTatryId  = resTatry.insertedId;
  var tripCityId   = resCity.insertedId;


  // 2c) Osoby – każda pojedynczo lub grupowo, ale potem rozbijamy wyniki
  // Tu możemy użyć insertMany, ale i tak zrobimy extract na każdy index
  vvar resAnna  = db.Person1.insertOne({ firstname: "Anna",  lastname: "Kowalska" });
  var resPiotr = db.Person1.insertOne({ firstname: "Piotr", lastname: "Nowak" });
  var resEwa   = db.Person1.insertOne({ firstname: "Ewa",   lastname: "Wiśniewska" });
  var resJan   = db.Person1.insertOne({ firstname: "Jan",   lastname: "Kowalczyk" });
  var resMaria = db.Person1.insertOne({ firstname: "Maria", lastname: "Lewandowska" });
  var resTomasz = db.Person1.insertOne({ firstname: "Tomasz", lastname: "Lis" });
```

```
var persAnnaId  = resAnna.insertedId;
var persPiotrId = resPiotr.insertedId;
var persEwaId   = resEwa.insertedId;
var persJanId    = resJan.insertedId;
var persMariaId  = resMaria.insertedId;
var persTomaszId = resTomasz.insertedId;


// 2d) Oceny
db.Rating1.insertMany([
  { tripId: tripMazuryId, personId: persAnnaId,  rating: 5 },
  { tripId: tripTatryId, personId: persAnnaId,  rating: 2 },
  { tripId: tripMazuryId, personId: persPiotrId, rating: 4 },
  { tripId: tripTatryId,  personId: persJanId,   rating: 3 },
  { tripId: tripCityId,   personId: persMariaId, rating: 5 },
  { tripId: tripCityId,   personId: persTomaszId, rating: 2 }
]);


// 2e) Rezerwacje
db.Reservation1.insertMany([
  { tripId: tripMazuryId, personId: persAnnaId,   no_tickets: 2 },
  { tripId: tripTatryId, personId: persAnnaId,  no_tickets: 2 },
  { tripId: tripTatryId,  personId: persPiotrId,  no_tickets: 1 },
  { tripId: tripTatryId,  personId: persJanId,    no_tickets: 3 },
  { tripId: tripCityId,   personId: persMariaId,  no_tickets: 4 },
  { tripId: tripCityId,   personId: persTomaszId, no_tickets: 1 },
  { tripId: tripMazuryId, personId: persEwaId,    no_tickets: 2 }
]);
```

Model 2

Wszystkie dane zagnieżdżone w dwóch kolekcjach: **PersonInfo** i **TripInfo**

- a) Tworzenie kolekcji:

```
db.createCollection("TripInfo", {
    validator: {
      $jsonSchema: {
        bsonType: "object",
        required: [
          "name",
          "destination",
          "date",
          "max_places",
          "company",
          "reservations"
        ],
        properties: {
          _id: { bsonType: "objectId" },
          name: { bsonType: "string", description: "string required" },
          destination: { bsonType: "string", description: "string required" },
          date: { bsonType: "date", description: "date required" },
          max_places: {
            bsonType: "int",
            minimum: 1,
            description: "int>=1 required"
          },
          company: {
            bsonType: "object",
            required: ["_id", "name", "address"],
            properties: {
              _id: { bsonType: "objectId", description: "fkey to Company1._id" },
              name: { bsonType: "string", description: "string required" },
              address: { bsonType: "string", description: "string required" }
            }
          },
          reservations: {
            bsonType: "array",
            description: "osoby z ilością miejsc i oceną",
            items: {
              bsonType: "object",
              required: ["personId", "firstname", "lastname", "no_tickets", "rating"],
              properties: {
                personId: { bsonType: "objectId", description: "fkey to Person1._id" },
                firstname: { bsonType: "string", description: "string required" },
                lastname: { bsonType: "string", description: "string required" },
                no_tickets: { bsonType: "int", minimum: 1 },
                rating: { bsonType: ["int", "null"], minimum: 1, maximum: 5 }
              }
            }
          }
        }
      }
    }
  });
// PersonInfo – kolekcja agregująca dane o osobie, jej rezerwacjach (z podstawowymi danymi o wycieczce i firmie) oraz ocenach tej osoby
db.createCollection("PersonInfo", {
    validator: {
      $jsonSchema: {
        bsonType: "object",
        required: [
          "firstname",
          "lastname",
          "reservations"
        ],
        properties: {
          _id: { bsonType: "objectId" },
          firstname: { bsonType: "string", description: "string required" },
          lastname: { bsonType: "string", description: "string required" },
          reservations: {
            bsonType: "array",
            description: "rezerwacje osoby z danymi o wycieczce, firmie i oceną",
            items: {
              bsonType: "object",
              required: [
                "tripId",
                "name",
                "destination",
                "date",
                "company",
                "no_tickets",
                "rating"
              ],
              properties: {
                tripId: { bsonType: "objectId", description: "fkey to Trip1._id" },
                name: { bsonType: "string", description: "string required" },
                destination: { bsonType: "string", description: "string required" },
                date: { bsonType: "date", description: "date required" },
                company: {
                  bsonType: "object",
                  required: ["_id", "name", "address"],
                  properties: {
                    _id: { bsonType: "objectId", description: "fkey to Company1._id" },
                    name: { bsonType: "string", description: "string required" },
                    address: { bsonType: "string", description: "string required" }
                  }
                },
                no_tickets: { bsonType: "int", minimum: 1 },
                rating: { bsonType: ["int", "null"], minimum: 1, maximum: 5 }
              }
            }
          }
        }
      }
    }
  });
```

- b) Wypełnienie kolekcji danymi z modelu 1

```
//Wypełnienie kolekcji PersonInfo
  db.Person1.aggregate([
    {
      $lookup: {
        from: "Reservation1",
        localField: "_id",
        foreignField: "personId",
        as: "reservations"
      }
    },
    {
      $lookup: {
        from: "Trip1",
        localField: "reservations.tripId",
        foreignField: "_id",
        as: "trips"
      }
    },
    {
      $lookup: {
        from: "Company1",
        localField: "trips.companyId",
        foreignField: "_id",
        as: "companies"
      }
    },
    {
      $lookup: {
        from: "Rating1",
        localField: "_id",
        foreignField: "personId",
        as: "ratings"
      }
    },
    {
      $addFields: {
        reservations: {
          $map: {
            input: "$reservations",
            as: "res",
            in: {
              tripId: "$$res.tripId",
              no_tickets: "$$res.no_tickets",
              // Pobierz dane o wycieczce
              name: {
                $arrayElemAt: [
                  "$trips.name",
                  { $indexOfArray: ["$trips._id", "$$res.tripId"] }
                ]
              },
              destination: {
                $arrayElemAt: [
                  "$trips.destination",
                  { $indexOfArray: ["$trips._id", "$$res.tripId"] }
                ]
              },
              date: {
                $arrayElemAt: [
                  "$trips.date",
                  { $indexOfArray: ["$trips._id", "$$res.tripId"] }
                ]
              },
              // Pobierz dane o firmie
              company: {
                _id: {
                  $arrayElemAt: [
                    "$companies._id",
                    { $indexOfArray: ["$companies._id",
                      { $arrayElemAt: [
                        "$trips.companyId",
                        { $indexOfArray: ["$trips._id", "$$res.tripId"] }
                      ]}
                    ]}
                  ]
                },
                name: {
                  $arrayElemAt: [
                    "$companies.name",
                    { $indexOfArray: ["$companies._id",
                      { $arrayElemAt: [
                        "$trips.companyId",
                        { $indexOfArray: ["$trips._id", "$$res.tripId"] }
                      ]}
                    ]}
                  ]
                },
                address: {
                  $arrayElemAt: [
                    "$companies.address",
                    { $indexOfArray: ["$companies._id",
                      { $arrayElemAt: [
                        "$trips.companyId",
                        { $indexOfArray: ["$trips._id", "$$res.tripId"] }
                      ]}
                    ]}
                  ]
                }
              },
              // Pobierz ocenę tej osoby dla tej wycieczki
              rating: {
                $arrayElemAt: [
                  "$ratings.rating",
                  { $indexOfArray: ["$ratings.tripId", "$$res.tripId"] }
                ]
              }
            }
          }
        }
      }
    },
    {
      $project: {
        firstname: 1,
        lastname: 1,
        reservations: 1
      }
    },
    { $merge: { into: "PersonInfo" } }
  ]);
//Wypełnienie kolekcji TripInfo
db.Trip1.aggregate([
    {
      $lookup: {
        from: "Company1",
        localField: "companyId",
        foreignField: "_id",
        as: "company"
      }
    },
    { $unwind: "$company" },
    {
      $lookup: {
        from: "Reservation1",
        localField: "_id",
        foreignField: "tripId",
        as: "reservations"
      }
    },
    {
      $lookup: {
        from: "Person1",
        localField: "reservations.personId",
        foreignField: "_id",
        as: "persons"
      }
    },
    {
      $lookup: {
        from: "Rating1",
        localField: "_id",
        foreignField: "tripId",
        as: "ratings"
      }
    },
    {
      $addFields: {
        reservations: {
          $map: {
            input: "$reservations",
            as: "res",
            in: {
              personId: "$$res.personId",
              no_tickets: "$$res.no_tickets",
              firstname: {
                $arrayElemAt: [
                  "$persons.firstname",
                  { $indexOfArray: ["$persons._id", "$$res.personId"] }
                ]
              },
              lastname: {
                $arrayElemAt: [
                  "$persons.lastname",
                  { $indexOfArray: ["$persons._id", "$$res.personId"] }
                ]
              },
              rating: {
                $ifNull: [
                    {
                      $arrayElemAt: [
                        "$ratings.rating",
                        { $indexOfArray: ["$ratings.tripId", "$$res.tripId"] }
                      ]
                    },
                    null
                  ]
              }
            }
          }
        }
        }
      },
      {
        $project: {
          name: 1,
          destination: 1,
          date: 1,
          max_places: 1,
          company: {
            _id: "$company._id",
            name: "$company.name",
            address: "$company.address"
          },
          reservations: 1
        }
      },
      { $merge: { into: "TripInfo", whenMatched: "replace", whenNotMatched: "insert" } }
    ]);
```

Model 3

Rozwiązanie pośrednie z zagnieżdżonymi tablicami wewnątrz oryginalnych kolekcji oraz częsciowo znormalizowane

- a) Tworzenie kolekcji Company3, Reservation3, Person3 i Trip3

```
// 1. Company3 – firmy z zagnieżdżonymi wycieczkami
db.createCollection("Company3", {
  validator: {
    $jsonSchema: {
      bsonType: "object",
      required: ["name", "address", "trips"],
      properties: {
        _id: { bsonType: "objectId" },
        name: {
          bsonType: "string",
          description: "must be string and is required",
        },
        address: {
          bsonType: "string",
          description: "must be string and is required",
        },
        trips: {
          bsonType: "array",
          items: {
            bsonType: "object",
            required: ["name", "destination", "date", "max_places", "tripId"],
            properties: {
              tripId: {
                bsonType: "objectId",
                description: "fkey to Trip3._id",
              },
              name: { bsonType: "string" },
              destination: { bsonType: "string" },
              date: { bsonType: "date" },
              max_places: { bsonType: "int", minimum: 1 },
            },
          },
        },
      },
    },
  },
});

// 2. Trip3 – wycieczki z zagnieżdżonymi ocenami
db.createCollection("Trip3", {
  validator: {
    $jsonSchema: {
      bsonType: "object",
      required: [
        "name",
        "destination",
        "date",
        "max_places",
        "companyId",
        "ratings",
      ],
      properties: {
        _id: { bsonType: "objectId" },
        name: { bsonType: "string" },
        destination: { bsonType: "string" },
        date: { bsonType: "date" },
        max_places: { bsonType: "int", minimum: 1 },
        companyId: {
          bsonType: "objectId",
          description: "fkey to Company3._id",
        },
        available_places: { bsonType: "int" },
        number_of_ratings: { bsonType: "int" },
        average_rating: { bsonType: "double" },
        ratings: {
          bsonType: "array",
          items: {
            bsonType: "object",
            required: ["personId", "rating", "firstname", "lastname"],
            properties: {
              personId: {
                bsonType: "objectId",
                description: "fkey to Person3._id",
              },
              firstname: { bsonType: "string" },
              lastname: { bsonType: "string" },
              rating: { bsonType: "int", minimum: 1, maximum: 5 },
            },
          },
        },
      },
    },
  },
});

// 3. Person3 – osoby z zagnieżdżonymi rezerwacjami

db.createCollection("Person3", {
  validator: {
    $jsonSchema: {
      bsonType: "object",
      required: ["firstname", "lastname", "reservations"],
      properties: {
        _id: { bsonType: "objectId" },
        firstname: { bsonType: "string" },
        lastname: { bsonType: "string" },
        reservations: {
          bsonType: "array",
          items: {
            bsonType: "object",
            required: [
              "tripId",
              "reservationId",
              "no_tickets",
              "name",
              "destination",
              "date",
              "companyId",
              "companyName",
            ],
            properties: {
              name: { bsonType: "string" },
              destination: { bsonType: "string" },
              date: { bsonType: "date" },
              no_tickets: { bsonType: "int", minimum: 1 },
              rating: { bsonType: ["int", "null"], minimum: 1, maximum: 5 },
              companyName: { bsonType: "string" },
              tripId: {
                bsonType: "objectId",
                description: "fkey to Trip3._id",
              },
              reservationId: {
                bsonType: "objectId",
                description: "fkey to Reservation3._id",
              },
              companyId: {
                bsonType: "objectId",
                description: "fkey to Company3._id",
              },
            },
          },
        },
      },
    },
  },
});

// 4. Reservation3 – osobna kolekcja rezerwacji

db.createCollection("Reservation3", {
  validator: {
    $jsonSchema: {
      bsonType: "object",
      required: ["personId", "tripId", "no_tickets"],
      properties: {
        _id: { bsonType: "objectId" },
        personId: { bsonType: "objectId", description: "fkey to Person3._id" },
        tripId: { bsonType: "objectId", description: "fkey to Trip3._id" },
        no_tickets: { bsonType: "int", minimum: 1 },
      },
    },
  },
});
```

- b) Wypełnienie kolekcji danymi z modelu 1

```
// Wstawiamy firmy

db.Company1.aggregate([
  {
    $lookup: {
      from: "Trip1",
      localField: "_id",
      foreignField: "companyId",
      as: "trips"
    }
  },
  {
    $project: {com.intellij.database.console.JdbcConsoleProvider$MyIntroduceTarget@37510ce4
      name: 1,
      address: 1,
      trips: {
        $map: {
          input: "$trips",
          as: "t",
          in: {
            tripId: "$$t._id",
            name: "$$t.name",
            destination: "$$t.destination",
            date: "$$t.date",
            max_places: "$$t.max_places"
          }
        }
      }
    }
  },
  { $merge: { into: "Company3" } }
]);


// Wstawiamy wycieczki do Trip3

db.Trip1.aggregate([
  {
    $lookup: {
      from: "Rating1",
      localField: "_id",
      foreignField: "tripId",
      as: "ratings"
    }
  },
  {
    $lookup: {
      from: "Person1",
      localField: "ratings.personId",
      foreignField: "_id",
      as: "persons"
    }
  },
  {
    $addFields: {
      ratings: {
        $map: {
          input: "$ratings",
          as: "r",
          in: {
            personId: "$$r.personId",
            rating: "$$r.rating",
            firstname: {
              $arrayElemAt: [
                "$persons.firstname",
                { $indexOfArray: ["$persons._id", "$$r.personId"] }
              ]
            },
            lastname: {
              $arrayElemAt: [
                "$persons.lastname",
                { $indexOfArray: ["$persons._id", "$$r.personId"] }
              ]
            }
          }
        }
      },
      number_of_ratings: { $size: "$ratings" },
      average_rating: { $cond: [
        { $gt: [ { $size: "$ratings" }, 0 ] },
        { $avg: "$ratings.rating" },
        null
      ]}
    }
  },
  {
    $project: {
      name: 1,
      destination: 1,
      date: 1,
      max_places: 1,
      companyId: 1,
      ratings: 1,
      number_of_ratings: 1,
      average_rating: 1
    }
  },
  { $merge: { into: "Trip3" } }
]);

// Wstawiamy osoby

db.Person1.aggregate([
  {
    $lookup: {
      from: "Reservation1",
      localField: "_id",
      foreignField: "personId",
      as: "reservations"
    }
  },
  {
    $lookup: {
      from: "Trip1",
      localField: "reservations.tripId",
      foreignField: "_id",
      as: "trips"
    }
  },
  {
    $lookup: {
      from: "Company1",
      localField: "trips.companyId",
      foreignField: "_id",
      as: "companies"
    }
  },
  {
    $lookup: {
      from: "Rating1",
      localField: "_id",
      foreignField: "personId",
      as: "ratings"
    }
  },
  {
    $addFields: {
      reservations: {
        $map: {
          input: "$reservations",
          as: "res",
          in: {
            reservationId: "$$res._id",
            tripId: "$$res.tripId",
            name: {
              $arrayElemAt: [
                "$trips.name",
                { $indexOfArray: ["$trips._id", "$$res.tripId"] }
              ]
            },
            destination: {
              $arrayElemAt: [
                "$trips.destination",
                { $indexOfArray: ["$trips._id", "$$res.tripId"] }
              ]
            },
            date: {
              $arrayElemAt: [
                "$trips.date",
                { $indexOfArray: ["$trips._id", "$$res.tripId"] }
              ]
            },
            no_tickets: "$$res.no_tickets",
            companyId: {
              $arrayElemAt: [
                "$trips.companyId",
                { $indexOfArray: ["$trips._id", "$$res.tripId"] }
              ]
            },
            companyName: {
              $arrayElemAt: [
                "$companies.name",
                { $indexOfArray: [
                  "$companies._id",
                  { $arrayElemAt: [
                    "$trips.companyId",
                    { $indexOfArray: ["$trips._id", "$$res.tripId"] }
                  ]}
                ]}
              ]
            },
            rating: {
              $ifNull: [
                {
                  $arrayElemAt: [
                    "$ratings.rating",
                    { $indexOfArray: ["$ratings.tripId", "$$res.tripId"] }
                  ]
                },
                null
              ]
            }
          }
        }
      }
    }
  },
  {
    $project: {
      firstname: 1,
      lastname: 1,
      reservations: 1
    }
  },
  { $merge: { into: "Person3" } }
]);
// Wstawiamy rezerwacje

vdb.Reservation1.aggregate([
  {
    $project: {
      personId: 1,
      tripId: 1,
      no_tickets: 1
    }
  },
  { $merge: { into: "Reservation3" } }
]);
```

Porównanie operacji dla modelu 1, 2 i 3

```
// 1. Pobranie wszystkich wycieczek dla firmy o _id = comp1Id
const comp1Id = db.Company1.findOne()._id;
// Model 1 - znormalizowany
db.Company1.aggregate([
  { $match: { _id: comp1Id } },
  {
    $lookup: {
      from: "Trip1",
      localField: "_id",
      foreignField: "companyId",
      as: "trips",
    },
  },
]);
// Model 2 - zagnieżdżony
```

```
db.TripInfo.find(
  { "company._id": comp1Id },
  { name: 1, destination: 1, date: 1, max_places: 1, _id: 0 }
);
// Model 3 - częsciowo znormalizowany
db.Company3.findOne({ _id: comp1Id }, { _id: 0, name: 1, trips: 1 });

// 2. Pobranie informacji o rezerwacjach osoby (_id = person1Id) wraz z danymi o wycieczkach i ocenach
const person1Id = db.Person1.findOne()._id;
// Model 1
db.Person1.aggregate([
  { $match: { _id: person1Id } },
  {
    $lookup: {
      from: "Reservation1",
      localField: "_id",
      foreignField: "personId",
      as: "reservations",
    },
  },
  { $unwind: "$reservations" },
  {
    $lookup: {
      from: "Trip1",
      localField: "reservations.tripId",
      foreignField: "_id",
      as: "trip",
    },
  },
  { $unwind: "$trip" },
  {
    $lookup: {
      from: "Rating1",
      let: { tid: "$trip._id", pid: "$_id" },
      pipeline: [
        {
          $match: {
            $expr: {
              $and: [
                { $eq: ["$tripId", "$$tid"] },
                { $eq: ["$personId", "$$pid"] },
              ],
            },
          },
        },
      ],
      as: "rating",
    },
  },
  {
    $project: {
      _id: 0,
      firstname: 1,
      lastname: 1,
      trip_details: {
        tripId: "$trip._id",
        name: "$trip.name",
        destination: "$trip.destination",
        date: "$trip.date",
        no_tickets: "$reservations.no_tickets",
        rating: { $arrayElemAt: ["$rating.rating", 0] },
      },
    },
  },
]);
// Model 2
db.PersonInfo.aggregate([
  { $match: { _id: person1Id } },
  { $unwind: "$reservations" },
  {
    $project: {
      _id: 0,
      firstname: 1,
      lastname: 1,
      reservation: "$reservations",
    },
  },
]);
// Model 3
db.Person3.aggregate([
  { $match: { _id: person1Id } },
  { $unwind: "$reservations" },
  {
    $project: {
      _id: 0,
      firstname: 1,
      lastname: 1,
      reservation: "$reservations",
    },
  },
]);

// 3. Dodanie nowej rezerwacji
const person = db.Person1.findOne();
const trip = db.Trip1.findOne();
// Model 1
const newRes = db.Reservation1.insertOne({
  personId: person._id,
  tripId: trip._id,
  no_tickets: 2,
});
// Model 2
const person = db.Person1.findOne();
const trip = db.Trip1.findOne();
const company = db.Company1.findOne({ _id: trip.companyId });
const ratingDoc = db.Rating1.findOne({
  tripId: trip._id,
  personId: person._id,
});

// a) Dodaj do TripInfo
db.TripInfo.updateOne(
  { _id: trip._id },
  {
    $push: {
      reservations: {
        personId: person._id,
        firstname: person.firstname,
        lastname: person.lastname,
        no_tickets: 2,
        rating: ratingDoc ? ratingDoc.rating : null,
      },
    },
  }
);
// b) Dodaj do PersonInfo
db.PersonInfo.updateOne(
  { _id: person._id },
  {
    $push: {
      reservations: {
        tripId: trip._id,
        name: trip.name,
        destination: trip.destination,
        date: trip.date,
        company: {
          _id: company._id,
          name: company.name,
          address: company.address,
        },
        no_tickets: 2,
        rating: ratingDoc ? ratingDoc.rating : null,
      },
    },
  }
);
// Model 3
// a) Dodaj do Reservations
const personId = db.Person3.findOne()._id;
const trip3Id = db.Trip3.findOne()._id;
const res3 = db.Reservation3.insertOne({
  personId: personId,
  tripId: trip3Id,
  no_tickets: 2,
});
// b) aktualizacja Person3.reservations
const tripInfo = db.Trip3.findOne({ _id: trip3Id });
const compInfo = db.Company3.findOne({ _id: tripInfo.companyId });

db.Person3.updateOne(
  { _id: personId },
  {
    $push: {
      reservations: {
        reservationId: res3.insertedId,
        tripId: tripInfo._id,
        name: tripInfo.name,
        destination: tripInfo.destination,
        date: tripInfo.date,
        no_tickets: 2,
        rating: null,
        companyId: tripInfo.companyId,
        companyName: compInfo.name,
      },
    },
  }
);
// c) aktualizacja available_places w Trip3
const allRes = db.Reservation3.find({ tripId: tripInfo._id }).toArray();
let totalTickets = 0;
for (let r of allRes) {
  totalTickets += r.no_tickets;
}

db.Trip3.updateOne(
  { _id: tripInfo._id },
  { $set: { available_places: tripInfo.max_places - totalTickets } }
);

// 4. Zmiana liczby biletów w rezerwacji
// Model 1
db.Reservation1.updateOne(
  { _id: newRes.insertedId },
  { $set: { no_tickets: 3 } }
);
// Model 2
const person = db.Person1.findOne({ firstname: "Anna", lastname: "Kowalska" });
const trip = db.Trip1.findOne({ name: "Mazury Tour" });

// a)
db.PersonInfo.updateOne(
  { _id: person._id, "reservations.tripId": trip._id },
  { $set: { "reservations.$.no_tickets": 3 } }
);

// b)
db.TripInfo.updateOne(
  { _id: trip._id, "reservations.personId": person._id },
  { $set: { "reservations.$.no_tickets": 3 } }
);
// Model 3
db.Reservation3.updateOne(
  { _id: res3.insertedId },
  { $set: { no_tickets: 3 } }
);
// Aktualizacja zagnieżdżonego reservation w Person3:
```

```
db.Person3.updateOne(
  { _id: person1, "reservations.reservationId": res3.insertedId },
  { $set: { "reservations.$.no_tickets": 3 } }
);

// 5. Obliczenie średniej oceny dla wycieczki
// Model 1
db.Rating1.aggregate([
  { $match: { tripId: trip1Id } },
  { $group: { _id: "$tripId", avg_rating: { $avg: "$rating" } } },
]);
// Model 2
const tripId = db.TripInfo.findOne({ name: "Mazury Tour" })._id;

db.TripInfo.aggregate([
  { $match: { _id: tripId } },
  { $unwind: "$reservations" },
  { $match: { "reservations.rating": { $ne: null } } },
  {
    $group: {
      _id: "$_id",
      avg_rating: { $avg: "$reservations.rating" },
    },
  },
]);

// Model 3
db.Trip3.findOne({ _id: trip3Id }, { _id: 0, name: 1, average_rating: 1 });

// 6. Wyszukiwanie wycieczek według kryteriów

// Model 1
db.Trip1.find({ destination: "Mazury", date: { $gte: ISODate("2025-01-01") } });

// Model 2

db.TripInfo.find({
  destination: "Mazury",
  date: { $gte: ISODate("2025-01-01") },
  "company.name": "TravelCo",
  max_places: { $gte: 2 },
});

db.TripInfo.find({
  destination: "Mazury",
  date: { $gte: ISODate("2025-01-01") },
});

// Model 3

db.Trip3.find({ destination: "Mazury", date: { $gte: ISODate("2025-01-01") } });
// lub w Company3:
db.Company3.find({
  "trips.destination": "Mazury",
  "trips.date": { $gte: ISODate("2025-01-01") },
});

// 7. Aktualizacja firmy

// Model 1
db.Company1.updateOne(
  { _id: comp1Id },
  { $set: { address: "ul. Nowa 15, Warszawa" } }
);

// Model 2
const companyId = db.Company1.findOne({ name: "TravelCo" })._id;
//a)
db.TripInfo.updateMany(
  { "company._id": companyId },
  { $set: { "company.address": "ul. Nowa 123, Warszawa" } }
);
//b)
db.PersonInfo.updateMany(
  { "reservations.company._id": companyId },
  {
    $set: { "reservations.$[elem].company.address": "ul. Nowa 123, Warszawa" },
  },
  { arrayFilters: [{ "elem.company._id": companyId }] }
);

// Model 3
db.Company3.updateOne(
  { _id: comp1Id },
  { $set: { address: "ul. Nowa 15, Warszawa" } }
);

// 8. Wyszukiwanie osób, które zarezerwowały wycieczkę

// Model 1
db.Person1.aggregate([
  {
    $lookup: {
      from: "Reservation1",
      localField: "_id",
      foreignField: "personId",
      as: "reservations",
    },
  },
  { $match: { "reservations.tripId": trip1Id } },
  { $project: { _id: 0, firstname: 1, lastname: 1 } },
]);
// Model 2
const trip = db.TripInfo.findOne({ name: "Mazury Tour" });

db.PersonInfo.find(
  { "reservations.tripId": trip._id },
  { firstname: 1, lastname: 1, "reservations.$": 1 }
```

```
);
// Model 3
db.Person3.find(
  { "reservations.tripId": trip3Id },
  { _id: 0, firstname: 1, lastname: 1 }
);
```

Ciekawe zapytania dla modelu 3

```
// Wyświetl wszystkie wycieczki, które dana osoba oceniła na 5
db.PersonInfo.aggregate([
    { $match: { firstname: "Anna", lastname: "Kowalska" } },
    { $unwind: "$reservations" },
    { $match: { "reservations.rating": 5 } },
    { $project: { "reservations.name": 1, "reservations.destination": 1, "reservations.company.name": 1, "reservations.rating": 1, _id: 0 } }
  ])
// Policz ile rezerwacji ma dana osoba
db.PersonInfo.aggregate([
    { $match: { firstname: "Anna", lastname: "Kowalska" } },
    { $project: { liczba_rezerwacji: { $size: "$reservations" } } }
  ])
//Wyszukaj wycieczki, gdzie ktoś zarezerwował więcej niż 1 miejsce
db.TripInfo.find(
    { "reservations.no_tickets": { $gt: 1 } },
    { name: 1, "reservations.$": 1 }
  )
//Wyszukaj wycieczki,które odbyły się w marcu 2025 roku i zostały zorganizowane przez firmę TravelCo
db.TripInfo.find(
    {
      "company.name": "TravelCo",
      date: {
        $gte: ISODate("2025-03-01T00:00:00Z"),
        $lt: ISODate("2025-04-01T00:00:00Z")
      }
    },
    {
      reservations: 0
    }
)
```

Wnioski dla zadania 2

W przypadku modelów baz danych o zagnieżdżonych strukturach lub dodatkowych kolekcjach pomocniczych bardzo często dużo łatwiejsze jest wykonywanie złożonych zapytań. Niestety jest to kosztem aktualizacji i wstawiania nowych danych ponieważ czyni to ten proces bardziej skomplikowanym niż dla znormalizowanej postaci bazy danych. Jest to wymiana rodzaju coś kosztem czegoś. Jednakże 'embedding' jest jedną z cech dokumentowych baz danych i jest szczególnie skuteczny po odpowiedniej analizie tego, jak baza będzie użytkowana i jakie czynności będą się najczęściej powtarzać. Dla przykładu jeśli często odczytujemy dane wycieczki, i wśród nich są opinie, to opłacalnym może być właśnie zagnieżdżenie recenzji wewnątrz wycieczek.

Punktacja:

zadanie	pkt
1	1
2	1
razem	2