Assignment 3 (15% of total marks)

Due date: Thursday, 25 November 2021 by 9:00 pm Singapore time.

Scope:
This assignment includes the tasks in implementation of hierarchical data structures as BSON documents, implementation of simple queries in a query language of MongoDB database systems, implementation of aggregations and cursors, and implementation of data manipulations on BSON documents.

Assessment criteria:

Marks will be awarded for:

- Correct,
- Comprehensive, and
- Appropriate

application of the materials covered in this subject.

Please read carefully information listed below.

This assignment contributes to 15% of the total assessment mark for the subject CSCI235.

A submission procedure is explained at the end of specification.

This assignment consists of 2 tasks and specification of each task starts from a new page.

A policy regarding late submissions is included in the subject outline.

Assignment Specification:

Preliminary actions

The Assignment 3 folder contains a java scripts (customerShoppingcartV2.js) that creates a sample MongoDb database for task 1 of Assignment 3. Connect to MongoDb and execute the script customerShoppingcartV2.js. The database contains information about shoppingcarts created by customers in the recent 11.11 online sales. It is strongly recommended that you discover the conceptual schema (UML diagram) of the database. However, there will be no mark awarded for producing the conceptual schema.

Task 1 (15.0 marks)

Applying find, update, or aggregation framework to complete the following specified tasks.

If you have not done yet, start Mongo client and connect to the MongoDB database server. Next, process the script file *customerShoppingcartV2.js* to create the BSON documents into a collection *shoppingCart*. Each of the following questions worth 1.5 marks. Make yourself familiar with the contents of the collections.

1. List the customer name, address and the created shopping cart who purchased product P1001.

2. List the customer name, address, and the created shopping cart of the customer who created a shopping cart on 11 Nov 2021 (ISODate('2021-11-11T00:00:00Z')). Please do not show the customer's id.

3. Find the total number of shopping cart created by each customer. For each customer, list his/her email address and the total number of shopping cart created.

4. Find the products that have been included in at least 2 or 3 shopping carts.

5. For each price base, list the price base and the total number of each price base.

6. Find the customers who have purchased both the products 'P1002' and 'P1003'.

7. Find the products that have not been included in any of the shopping cart.

8. Find the total number of customers who do not provide his/her telephone number.

9. Update the closing date (dateClosed) of the cart ‘cart001’ of the customer ‘C12345’ to 15 November 2021. (Hint. You can use the function new Date(“2021-11-15” to set the date.)

10. Delete from the collection a shoppingcart (cart005) created by the customer C12347.

Process each query implemented and **save each query together with its results** in a file *solution1.pdf*. You can process the queries one by one and later on *copy* the content of Terminal window and *paste* it one by one into a file and save it as *solution1.pdf*. The results of query processing must be included into the file *solution1.pdf* in the same orders as the queries listed above.

Alternatively, you can create a Java script file (solution1.js) that contains all your solutions to the questions. When ready, open a Terminal window and process your script at command shell prompt in the following way.

```
mongo -port 4000 databaseName < solution1.js > solution1.lst
```

Note, that there is no need to connect to MongoDB command line interface. ‘databaseName’ is the databaseName you created the collections.

Sample solution included but not limited to the following:

```
print('');
print('==============================');
print('= Student number: 12345678 =');
print('= Name: Sionggo Japit      =');
print('= Assignment 3             =');
print('==============================');

// List the customer name, address and the created shopping cart who purchased
product P1001.
print('');
print('Question 1:');
db.shoppingCart.aggregate([
{$unwind: "$CUSTOMER.creates.SHOPPINGCART"},
{$match: {$and:
[{"CUSTOMER.creates.SHOPPINGCART.containsProdList.productId": "P1001"},
                {"CUSTOMER.creates.SHOPPINGCART.dateClosed": {$ne: null} }] }
},
{$project: {"CUSTOMER.customerName":1, "CUSTOMER.customerAddress":1,
"CUSTOMER.creates":1} }
]).pretty()


// List the customer name, address and the created shopping cart who created a
shopping cart
// on 11 Nov 2021 (ISODate('2021-11-11T00:00:00Z')). Please do not show the
customer's id.
print('');
print('Question 2:');
db.shoppingCart.aggregate([
{$unwind: "$CUSTOMER.creates.SHOPPINGCART"},
{$match: {$and: [{"CUSTOMER.creates.SHOPPINGCART.dateCreated": {$gte:
ISODate('2021-11-11T00:00:00Z') }},
                {"CUSTOMER.creates.SHOPPINGCART.dateCreated": {$lte:
ISODate('2021-11-11T23:59:00Z') }}] } },
{$project: {"CUSTOMER.customerName":1, "CUSTOMER.customerAddress":1,
"CUSTOMER.creates":1, "_id":0} }
]).pretty()


// Find the total number of shopping cart created by each customer. For each
customer, list
// his/her email address and the total number of shopping cart created.
print('');
print('Question 3:');
db.shoppingCart.aggregate([
{$unwind: "$CUSTOMER.creates.SHOPPINGCART"},
{$group: {"_id": "$CUSTOMER.customerEmail",
         "Total shopping cart": {$sum: 1} } }
]).pretty()


// Find the products that have been included in at least 2 or 3 shopping carts.
print('');
print('Question 4:');
db.shoppingCart.aggregate([
{$match: {$or: [{"PRODUCT.includedIn": {$size:2}}, {"PRODUCT.includedIn":
{$size:3}}] } }
]).pretty()


// For each price base, list the price base and the total number of each price base.
print('');
print('Question 5:');
db.shoppingCart.aggregate([
{$match: {"PRODUCT": {$ne: null} } },
{$group: {"_id": "$PRODUCT.price.base", count: {$sum: 1} } },
{$project: {count:1, "Price base":"$_id", "_id":0}}
]).pretty()


// Find the customers who have purchased both the products 'P1002' and 'P1003'.
print('');
print('Question 6:');
db.shoppingCart.aggregate([
{$match: {$and:
[{"CUSTOMER.creates.SHOPPINGCART.containsProdList.productId": "P1002"},
                {"CUSTOMER.creates.SHOPPINGCART.containsProdList.productId":
"P1003"}] } }
]).pretty()


// Find the products that have not been included in any of the shopping cart.
print('');
print('Question 7:');
db.shoppingCart.aggregate([
{$match: {$and: [{"PRODUCT": {$ne: null}}, {"PRODUCT.includedIn": {$eq:
null}}] } }
]).pretty()


// Find the total number of customers who do not provide his/her telephone
number.
print('');
print('Question 8:');
db.shoppingCart.aggregate([
{$match: {"CUSTOMER": {$ne: null} } },
{$group: {"_id": "$CUSTOMER.customerPhone",
          "Total number of customers do not have telephone number": {$sum:1}}},
{$match: {"_id": null} },
{$project: {"_id":0} }
]).pretty()

// Update the closing date (dateClosed) of the cart 'cart001' of the customer
'C12345'
// to 15 November 2021. (Hint. You can use the function new Date("2021-11-15"
to
// set the date.)
print('');
print('Question 9:');
print('Customer C12345 record before the deletion.');
db.shoppingCart.update(
{"CUSTOMER.creates.SHOPPINGCART.cartId" : "cart001"},
{$set: {"CUSTOMER.creates.SHOPPINGCART.$.dateClosed": new Date("2021-11-
15")} })
print('');
print('Customer C12345 record after the deletion.');
db.shoppingCart.find({"CUSTOMER.customerId" : "C12345"}).pretty()

// Delete from the collection a shoppingcart (cart005) created by the customer
C12347.
print('');
print('Question 10:');
print('Customer C12347 record before the deletion.');
db.shoppingCart.find({"CUSTOMER.customerId" : "C12347"}).pretty()
db.shoppingCart.update(
{"CUSTOMER.creates.SHOPPINGCART.cartId" : "cart005"},
{$pull: {"CUSTOMER.creates.SHOPPINGCART": {"cartId":"cart005"} } }
)
print('Customer C12347 record after the deletion.');
print('');
db.shoppingCart.find({"CUSTOMER.customerId" : "C12347"}).pretty()
```

The output:

```
MongoDB shell version v4.0.27
connecting to: mongodb://127.0.0.1:4000/csci235?gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("3d1f99c5-7679-4651-a45d-f9b37d4ca854")
}
MongoDB server version: 4.0.27

==============================
= Student number: 12345678 =
= Name: Sionggo Japit      =
= Assignment 3             =
==============================

Question 1:
{
        "_id" : "C12345",
        "CUSTOMER" : {
                "customerName" : "Daniel Martin",
                "customerAddress" : {
                        "street" : "718 Main Street",
                        "building" : "Idea Tower 1",
                        "postalCode" : "468419",
                        "country" : "Singapore"
                },
                "creates" : {
                        "SHOPPINGCART" : {
                                "cartId" : "cart002",
                                "dateCreated" : ISODate("2021-11-12T00:00:00Z"),
                                "dateClosed" : ISODate("2021-11-19T00:00:00Z"),
                                "containsProdList" : [
                                        {
                                                "prodListId" : 1,
                                                "productId" : "P1001",
                                                "quantity" : 3
                                        }
                                ]
                        }
                }
        }
}

Question 2:
{
        "CUSTOMER" : {
                "customerName" : "Andrew Smith",
                "customerAddress" : {
                        "street" : "18 Bukit Timah",
                        "building" : "Rose",
                        "postalCode" : "589616",
                        "country" : "Singapore"
                },
                "creates" : {
                        "SHOPPINGCART" : {
                                "cartId" : "cart003",
                                "dateCreated" : ISODate("2021-11-11T00:00:00Z"),
                                "dateClosed" : ISODate("2021-11-11T00:00:00Z"),
                                "containsProdList" : [
                                        {
                                                "prodListId" : 1,
                                                "productId" : "P1002",
                                                "quantity" : 2
                                        },
                                        {
                                                "prodListId" : 2,
                                                "productId" : "P1003",
                                                "quantity" : 1
                                        }
                                ]
                        }
                }
        }
}
```

Question 3:

```
{ "_id" : "c12347@gmail.com", "Total shopping cart" : 3 }
{ "_id" : "c12345@gmail.com", "Total shopping cart" : 2 }
```

Question 4:

```
{
        "_id" : "P1001",
        "PRODUCT" : {
                "productId" : "P1001",
                "productName" : "HD Scanner",
                "price" : {
                        "unit" : "Dollar",
                        "base" : "Australian",
                        "value" : 800
                },
                "includedIn" : [
                        "cart001",
                        "cart002",
                        "cart004"
                ]
        }
}
{
    "_id" : "P1002",
    "PRODUCT" : {
        "productId" : "P1002",
        "productName" : "Red Toner",
        "price" : {
            "unit" : "Dollar",
            "base" : "Singapore",
            "value" : 90
        },
        "includedIn" : [
            "cart001",
            "cart003"
        ]
    }
}
```

Question 5:

```
{ "count" : 2, "Price base" : "Singapore" }
{ "count" : 1, "Price base" : "US" }
{ "count" : 1, "Price base" : "Australian" }
```

Question 6:

```
{
    "_id" : "C12347",
    "CUSTOMER" : {
        "customerId" : "C12347",
        "customerName" : "Andrew Smith",
        "customerAddress" : {
            "street" : "18 Bukit Timah",
            "building" : "Rose",
            "postalCode" : "589616",
            "country" : "Singapore"
        },
        "customerEmail" : "c12347@gmail.com",
        "creates" : {
            "SHOPPINGCART" : [
                {
                    "cartId" : "cart003",
                    "dateCreated" : ISODate("2021-11-
11T00:00:00Z"),
                    "dateClosed" : ISODate("2021-11-
11T00:00:00Z"),
                    "containsProdList" : [
                        {
                            "prodListId" : 1,
                            "productId" : "P1002",
                            "quantity" : 2
                        },
                        {
                            "prodListId" : 2,
                            "productId" : "P1003",
                            "quantity" : 1
                        }
                    ]
                },
                {
                    "cartId" : "cart004",
                    "dateCreated" : ISODate("2021-11-
14T00:00:00Z"),
                    "dateClosed" : null,
                    "containsProdList" : [
                        {
                            "prodListId" : 1,
                            "productId" : "P1001",
                            "quantity" : 3
                        }
                    ]
                },
                {
                    "cartId" : "cart005",
                    "dateCreated" : ISODate("2021-11-
15T00:00:00Z"),
                    "dateClosed" : null,
                    "containsProdList" : [
                        {
                            "prodListId" : 1,
                            "productId" : "P1002",
                            "quantity" : 1
                        }
                    ]
                }
            ]
        }
    }
}
```

Question 7:

```
{
    "_id" : "P1004",
    "PRODUCT" : {
        "productId" : "P1004",
        "productName" : "Huion Tablet",
        "price" : {
            "unit" : "Dollar",
            "base" : "Singapore",
            "value" : 360
        },
        "includedIn" : [
                        null
                ]
        }
}
```

Question 8:

```
{ "Total number of customers do not have telephone number" : 1 }
```

Question 9:

Customer C12345 record before the deletion.

```
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
```

Customer C12345 record after the deletion.

```
{
        "_id" : "C12345",
        "CUSTOMER" : {
                "customerId" : "C12345",
                "customerName" : "Daniel Martin",
                "customerAddress" : {
                        "street" : "718 Main Street",
                        "building" : "Idea Tower 1",
                        "postalCode" : "468419",
                        "country" : "Singapore"
                },
                "customerEmail" : "c12345@gmail.com",
                "customerPhone" : "92378888",
                "creates" : {
                        "SHOPPINGCART" : [
                                {
                                        "cartId" : "cart001",
                                        "dateCreated" : ISODate("2021-11-
19T00:00:00Z"),
                                        "dateClosed" : ISODate("2021-11-
15T00:00:00Z"),
                                        "containsProdList" : [
                                                {
                                                        "prodListId" : 1,
                                                        "productId" : "P1002",
                                                        "quantity" : 2
                                                },
                                                {
                                                        "prodListId" : 2,
                                                        "productId" : "P1001",
                                                        "quantity" : 1
                                                }
                                        ]
                                },
                                {
                                        "cartId" : "cart002",
                    "dateCreated" : ISODate("2021-11-12T00:00:00Z"),
                    "dateClosed" : ISODate("2021-11-19T00:00:00Z"),
                    "containsProdList" : [
                        {
                            "prodListId" : 1,
                            "productId" : "P1001",
                            "quantity" : 3
                        }
                    ]
                }
            ]
        }
    }
}
```

Question 10:
Customer C12347 record before the deletion.

```
{
    "_id" : "C12347",
    "CUSTOMER" : {
        "customerId" : "C12347",
        "customerName" : "Andrew Smith",
        "customerAddress" : {
            "street" : "18 Bukit Timah",
            "building" : "Rose",
            "postalCode" : "589616",
            "country" : "Singapore"
        },
        "customerEmail" : "c12347@gmail.com",
        "creates" : {
            "SHOPPINGCART" : [
                {
                    "cartId" : "cart003",
                    "dateCreated" : ISODate("2021-11-11T00:00:00Z"),
                    "dateClosed" : ISODate("2021-11-11T00:00:00Z"),
                    "containsProdList" : [
                        {
                            "prodListId" : 1,
                            "productId" : "P1002",
                            "quantity" : 2
                        },
                        {
                            "prodListId" : 2,
                            "productId" : "P1003",
                            "quantity" : 1
```

```
						}
					]
				},
				{
					"cartId" : "cart004",
					"dateCreated" : ISODate("2021-11-
14T00:00:00Z"),
					"dateClosed" : null,
					"containsProdList" : [
						{
							"prodListId" : 1,
							"productId" : "P1001",
							"quantity" : 3
						}
					]
				},
				{
					"cartId" : "cart005",
					"dateCreated" : ISODate("2021-11-
15T00:00:00Z"),
					"dateClosed" : null,
					"containsProdList" : [
						{
							"prodListId" : 1,
							"productId" : "P1002",
							"quantity" : 1
						}
					]
				}
			]
		}
	}
}
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
```

Customer C12347 record after the deletion.

```
{
	"_id" : "C12347",
	"CUSTOMER" : {
		"customerId" : "C12347",
		"customerName" : "Andrew Smith",
		"customerAddress" : {
			"street" : "18 Bukit Timah",
			"building" : "Rose",
			"postalCode" : "589616",
			"country" : "Singapore"
		},
		"customerEmail" : "c12347@gmail.com",
		"creates" : {
```

```
            "SHOPPINGCART" : [
                {
                    "cartId" : "cart003",
                    "dateCreated" : ISODate("2021-11-11T00:00:00Z"),
                    "dateClosed" : ISODate("2021-11-11T00:00:00Z"),
                    "containsProdList" : [
                        {
                            "prodListId" : 1,
                            "productId" : "P1002",
                            "quantity" : 2
                        },
                        {
                            "prodListId" : 2,
                            "productId" : "P1003",
                            "quantity" : 1
                        }
                    ]
                },
                {
                    "cartId" : "cart004",
                    "dateCreated" : ISODate("2021-11-14T00:00:00Z"),
                    "dateClosed" : null,
                    "containsProdList" : [
                        {
                            "prodListId" : 1,
                            "productId" : "P1001",
                            "quantity" : 3
                        }
                    ]
                }
            ]
        }
    }
}
bye
```

Submissions

This assignment is due by 9:00 pm (Singapore time) on Thursday, 25 November 2021.

Zip all your solutions (Solution1.js and Solution1.pdf) into a zipped file with a name <YourStudentNumber_A3.zip>. Submit the zipped file through Moodle in the following way:

1) Access Moodle at http://moodle.uowplatform.edu.au/
2) To login use a Login link located in the right upper corner the Web page or in the middle of the bottom of the Web page
3) When successfully logged in, select a site CSCI235 (SP421) Database Systems
4) Scroll down to a section Submissions of Assignments
5) Click at Submit your Assignment 3 here link.
6) Click at a button Add Submission
7) Move a file, for example, YourName_A3.zip into an area provided for your submission.
8) Click at a button Save changes
9) Click at a button Submit assignment
10) Click at the checkbox with a text attached: By checking this box, I confirm that this submission is my own work, … in order to confirm authorship of your submission.
11) Click at a button Continue.

A policy regarding late submissions is included in the subject outline.

Only one submission per student is accepted.

Assignment 3 is an individual assignment and it is expected that all its tasks will be solved individually without any cooperation with the other students. Plagiarism is treated seriously. Students involved will likely receive zero. If you have any doubts, questions, etc. please consult your lecturer or tutor during lab classes or over e-mail.

End of specification