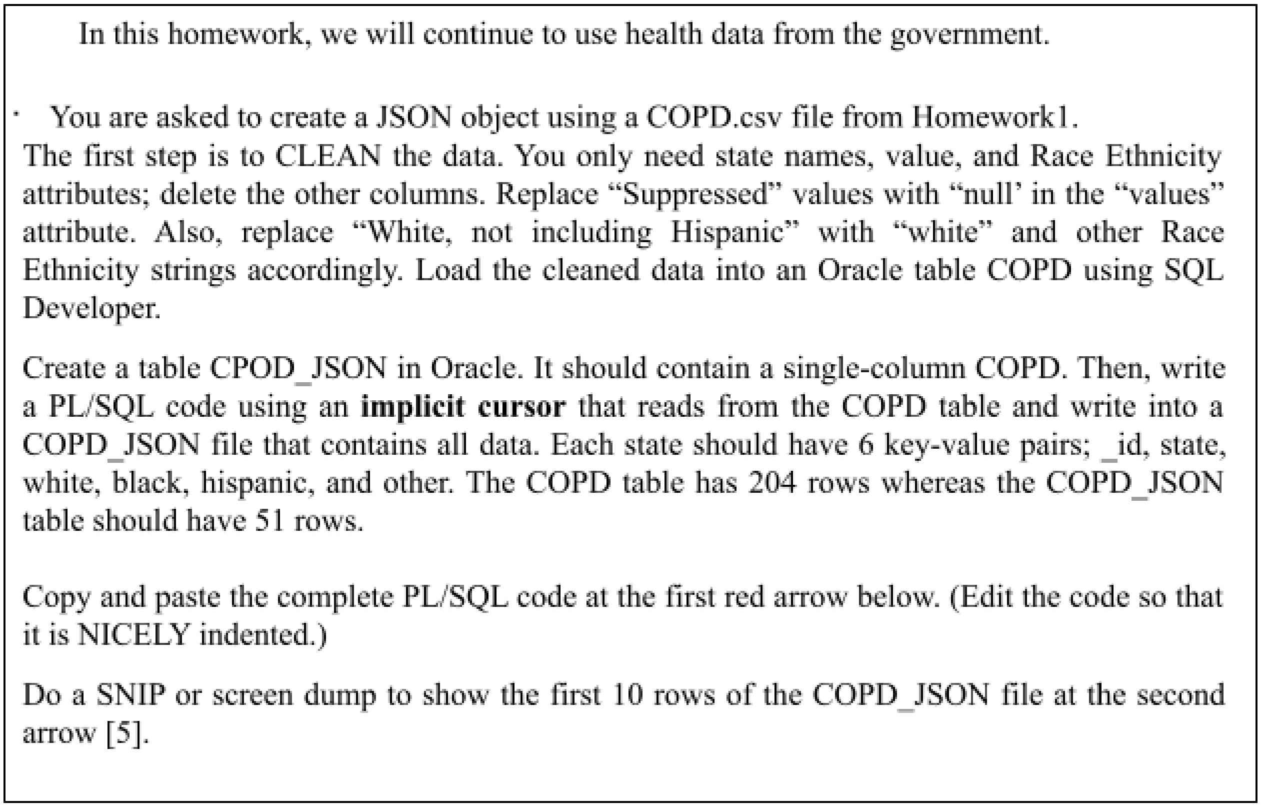


In this homework, we will continue to use health data from the government.

- You are asked to create a JSON object using a COPD.csv file from Homework1.

The first step is to CLEAN the data. You only need state names, value, and Race Ethnicity attributes; delete the other columns. Replace "Suppressed" values with "null' in the "values" attribute. Also, replace "White, not including Hispanic" with "white" and other Race Ethnicity strings accordingly. Load the cleaned data into an Oracle table COPD using SQL Developer.

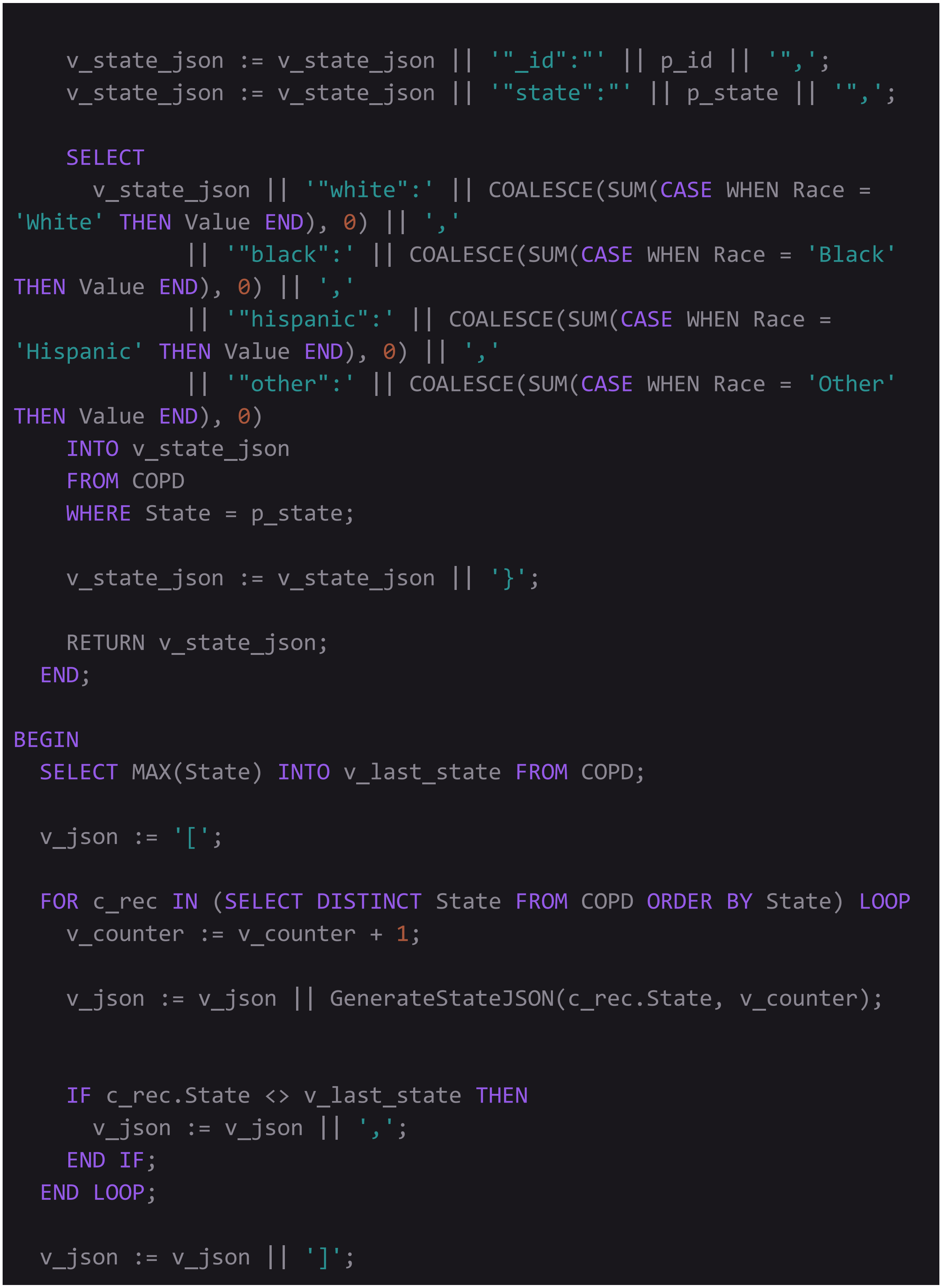
Create a table CPOD_JSON in Oracle. It should contain a single-column COPD. Then, write a PL/SQL code using an **implicit cursor** that reads from the COPD table and write into a COPD_JSON file that contains all data. Each state should have 6 key-value pairs; _id, state, white, black, hispanic, and other. The COPD table has 204 rows whereas the COPD_JSON table should have 51 rows.

Copy and paste the complete PL/SQL code at the first red arrow below. (Edit the code so that it is NICELY indented.)

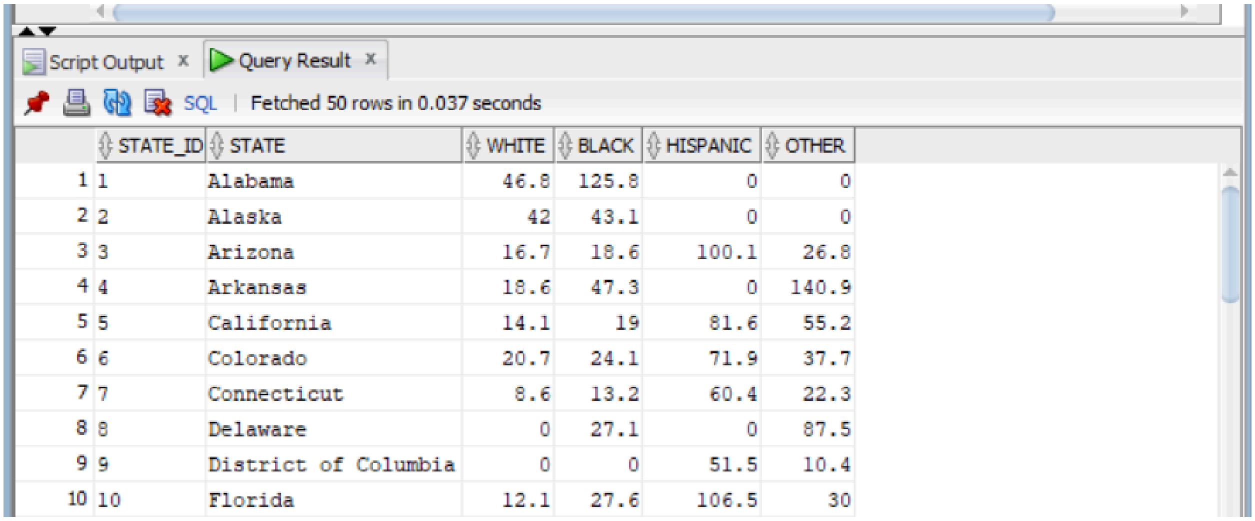
Do a SNIP or screen dump to show the first 10 rows of the COPD_JSON file at the second arrow [5].

▶

```
 set serveroutput on;
CREATE TABLE COPD_JSON (
  COPD CLOB
);



DECLARE
  v_json CLOB;
  v_last_state VARCHAR2(100);
  v_counter NUMBER := 0;

  FUNCTION GenerateStateJSON(p_state VARCHAR2, p_id NUMBER) RETURN
CLOB IS
    v_state_json CLOB;
  BEGIN
    v_state_json := '{';
```



```
    v_state_json := v_state_json || '"_id":"' || p_id || '",';
    v_state_json := v_state_json || '"state":"' || p_state || '",';

    SELECT
      v_state_json || '"white":' || COALESCE(SUM(CASE WHEN Race = 'White' THEN Value END), 0) || ','
             || '"black":' || COALESCE(SUM(CASE WHEN Race = 'Black' THEN Value END), 0) || ','
             || '"hispanic":' || COALESCE(SUM(CASE WHEN Race = 'Hispanic' THEN Value END), 0) || ','
             || '"other":' || COALESCE(SUM(CASE WHEN Race = 'Other' THEN Value END), 0)
    INTO v_state_json
    FROM COPD
    WHERE State = p_state;

    v_state_json := v_state_json || '}';

    RETURN v_state_json;
  END;

BEGIN
  SELECT MAX(State) INTO v_last_state FROM COPD;

  v_json := '[';

  FOR c_rec IN (SELECT DISTINCT State FROM COPD ORDER BY State) LOOP
    v_counter := v_counter + 1;

    v_json := v_json || GenerateStateJSON(c_rec.State, v_counter);


    IF c_rec.State <> v_last_state THEN
      v_json := v_json || ',';
    END IF;
  END LOOP;

  v_json := v_json || ']';
  INSERT INTO COPD_JSON (COPD) VALUES (v_json);

  COMMIT;
END;
/
```



Fetched 50 rows in 0.037 seconds

	STATE_ID	STATE	WHITE	BLACK	HISPANIC	OTHER
1	1	Alabama	46.8	125.8	0	0
2	2	Alaska	42	43.1	0	0
3	3	Arizona	16.7	18.6	100.1	26.8
4	4	Arkansas	18.6	47.3	0	140.9
5	5	California	14.1	19	81.6	55.2
6	6	Colorado	20.7	24.1	71.9	37.7
7	7	Connecticut	8.6	13.2	60.4	22.3
8	8	Delaware	0	27.1	0	87.5
9	9	District of Columbia	0	0	51.5	10.4
10	10	Florida	12.1	27.6	106.5	30

2-a) Create a MongoDB collection COPD that contains exactly the same information as the COPD_JSON objects.

Show the insertMany operation (10 lines) after the first red arrow.
Show the result of "the MongoDB version" of a **Select * from COPD** at the second red arrow [5].

Write a MongoDB query for the following (use the COPD collection).
Use "table view" in Studio3T to display the first 10 documents for each query.

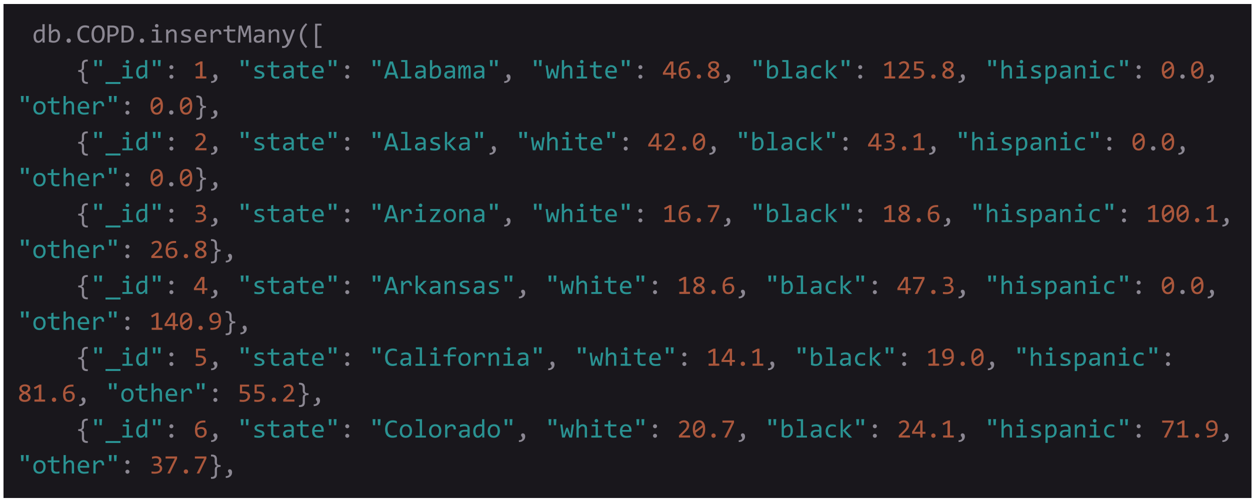
2-b) Write a MongoDB query to display state, white, and hispanic fields if the hispanic is more than or equal to 10 and the white is less than 75. Copy-paste the query, and show the result at the third red arrow [3].

2-c) Write a MongoDB query to display state, white, and hispanic fields if the hispanic is more than or equal to 10 or the white is less than 75. Copy-paste the query, and show the result at the fourth red arrow [3].

2-d) Write a MongoDB query to sort CPOD collection by the number of white COPD cases in ascending order for state names starting with A, C, M, W. Copy-paste the query, and show the result at the fifth red arrow [3].

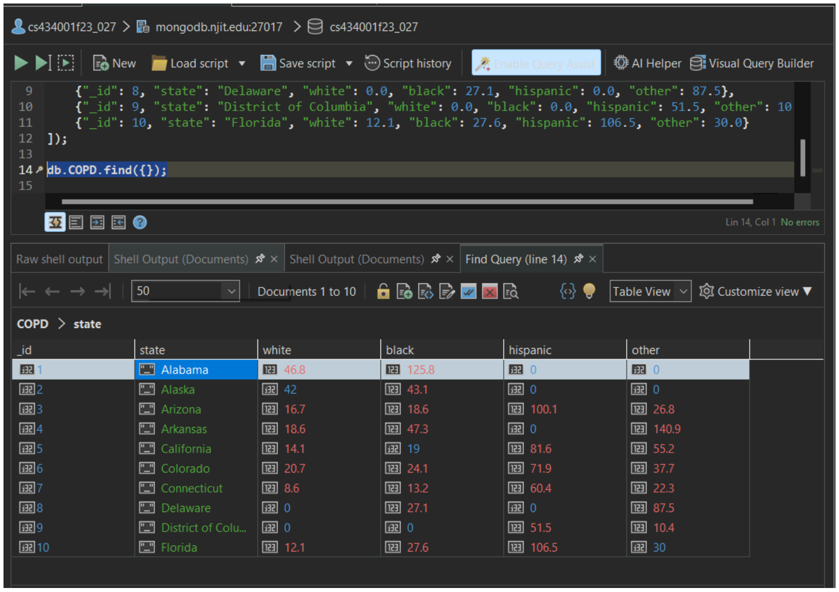
2-e) Define a variable "**healtyStates**" in which hispanic, black, and other COPD values are null. Use the variable **healtyStates** to list all healthy states. Copy-paste the queries, and show the result at the sixth red arrow [3].

2-f) Insert a new field "**HealthInsurance**" and set it to "lower" for all **healtyStates**. Copy-paste the query, and show the result at the seventh red arrow. [3].



```
 db.COPD.insertMany([
    {"_id": 1, "state": "Alabama", "white": 46.8, "black": 125.8, "hispanic": 0.0,
"other": 0.0},
    {"_id": 2, "state": "Alaska", "white": 42.0, "black": 43.1, "hispanic": 0.0,
"other": 0.0},
    {"_id": 3, "state": "Arizona", "white": 16.7, "black": 18.6, "hispanic": 100.1,
"other": 26.8},
    {"_id": 4, "state": "Arkansas", "white": 18.6, "black": 47.3, "hispanic": 0.0,
"other": 140.9},
    {"_id": 5, "state": "California", "white": 14.1, "black": 19.0, "hispanic":
81.6, "other": 55.2},
    {"_id": 6, "state": "Colorado", "white": 20.7, "black": 24.1, "hispanic": 71.9,
"other": 37.7},
    {"_id": 7, "state": "Connecticut", "white": 8.6, "black": 13.2, "hispanic": 60.4, "other": 22.3},
    {"_id": 8, "state": "Delaware", "white": 0.0, "black": 27.1, "hispanic": 0.0, "other": 87.5},
    {"_id": 9, "state": "District of Columbia", "white": 0.0, "black": 0.0, "hispanic": 51.5, "other": 10.4},
    {"_id": 10, "state": "Florida", "white": 12.1, "black": 27.6, "hispanic": 106.5, "other": 30.0}
]);
```

▶
```
db.COPD.find({});
```



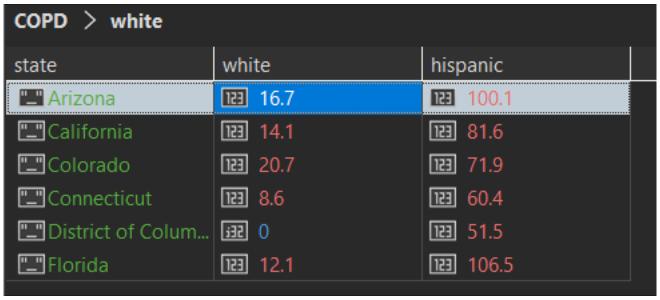
```
    {"_id": 8, "state": "Delaware", "white": 0.0, "black": 27.1, "hispanic": 0.0, "other": 87.5},
    {"_id": 9, "state": "District of Columbia", "white": 0.0, "black": 0.0, "hispanic": 51.5, "other": 10
    {"_id": 10, "state": "Florida", "white": 12.1, "black": 27.6, "hispanic": 106.5, "other": 30.0}
]);

db.COPD.find({});
```

COPD > state

_id	state	white	black	hispanic	other
1	Alabama	46.8	125.8	0	0
2	Alaska	42	43.1	0	0
3	Arizona	16.7	18.6	100.1	26.8
4	Arkansas	18.6	47.3	0	140.9
5	California	14.1	19	81.6	55.2
6	Colorado	20.7	24.1	71.9	37.7
7	Connecticut	8.6	13.2	60.4	22.3
8	Delaware	0	27.1	0	87.5
9	District of Colu...	0	0	51.5	10.4
10	Florida	12.1	27.6	106.5	30

2-b ▶

```
db.COPD.find(
    {
        "hispanic": { "$gte": 10 },  // hispanic >= 10
        "white": { "$lt": 75 }       // white < 75
    },
    {
        "state": 1, "white": 1, "hispanic": 1, "_id": 0
    }
);
```

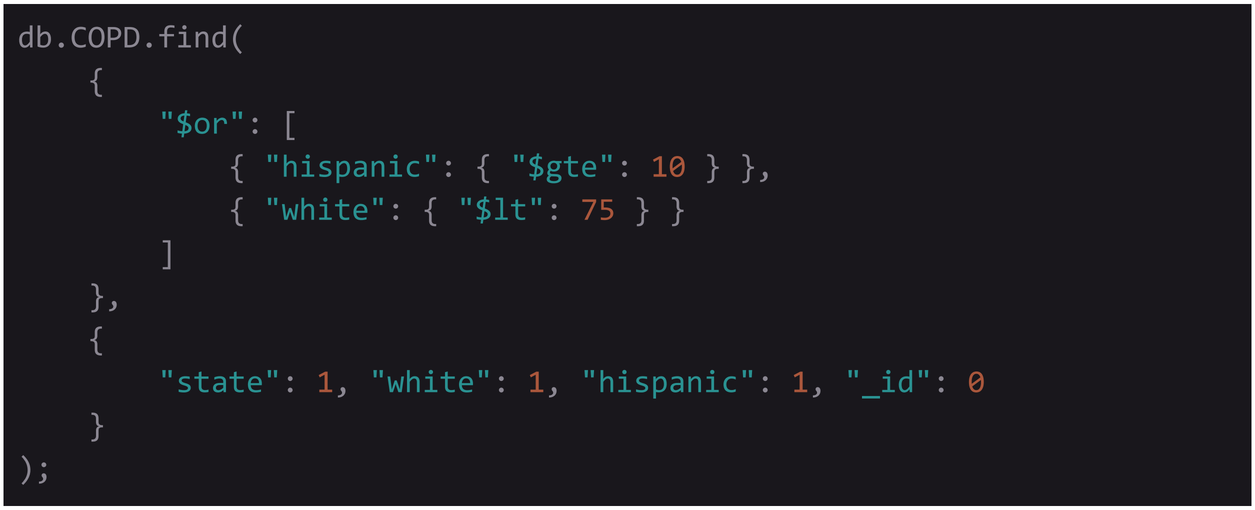


COPD > white

state	white	hispanic
Arizona	16.7	100.1
California	14.1	81.6
Colorado	20.7	71.9
Connecticut	8.6	60.4
District of Colum...	0	51.5
Florida	12.1	106.5

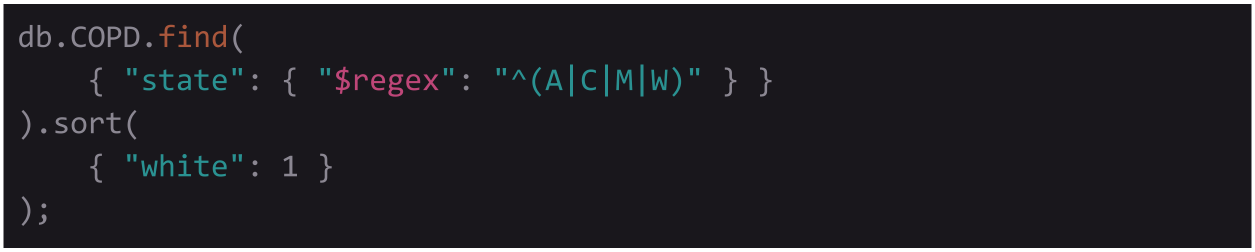
▶

2-c ▶



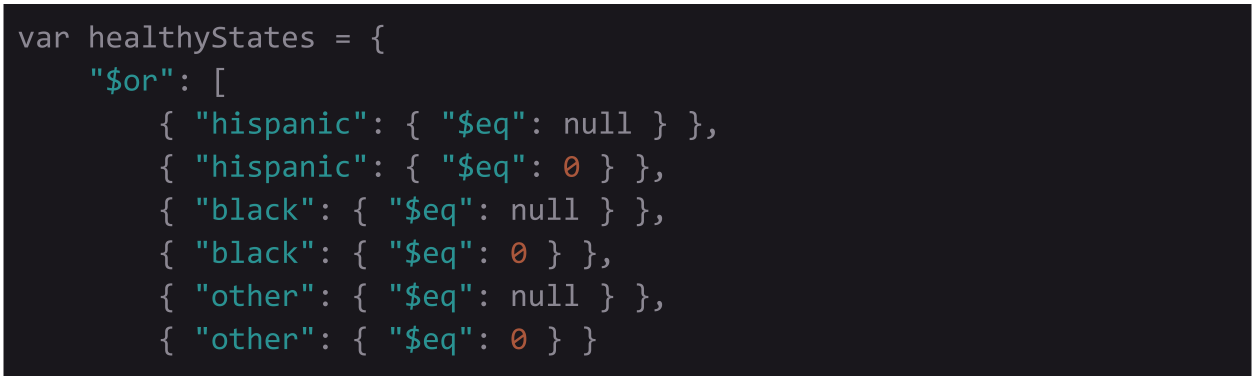
```
db.COPD.find(
    {
        "$or": [
            { "hispanic": { "$gte": 10 } },
            { "white": { "$lt": 75 } }
        ]
    },
    {
        "state": 1, "white": 1, "hispanic": 1, "_id": 0
    }
);
```

▶



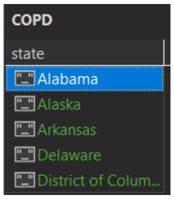
```
db.COPD.find(
    { "state": { "$regex": "^(A|C|M|W)" } }
).sort(
    { "white": 1 }
);
```

▶



```
var healthyStates = {
    "$or": [
        { "hispanic": { "$eq": null } },
        { "hispanic": { "$eq": 0 } },
        { "black": { "$eq": null } },
        { "black": { "$eq": 0 } },
        { "other": { "$eq": null } },
        { "other": { "$eq": 0 } }
    ]
};
db.COPD.find(healthyStates, { "state": 1, "_id": 0 });
```

▶



COPD

state
Alabama
Alaska
Arkansas
Delaware
District of Colum...

▶

```
 db.COPD.updateMany(
    healthyStates,
    { "$set": { "HealthInsurance": "lower" } }
);
```

3- Create a table POPULATION4_JSON in Oracle. It should contain a single-column POPULATION. Then, write a PL/SQL code using an **implicit cursor** that reads from the **COPDobject** (from Homework3, question2a) table and write into a POPULATION4_JSON file that contains all data but each state should be a JSON object as follows.

{"state":"Alabama",
"Year2017":{"white":131, "black":42.2, "multiR":null, "other":null},
"Year2018":{"white":134.6, "black":44.9, "multiR":10.2, "other":null},
"Year2019":{"white":131.2, "black":44.3, "multiR":null, "other":17.3},
"Year2020":{"white":125.8, "black":46.8, "multiR":null, "other":null}}

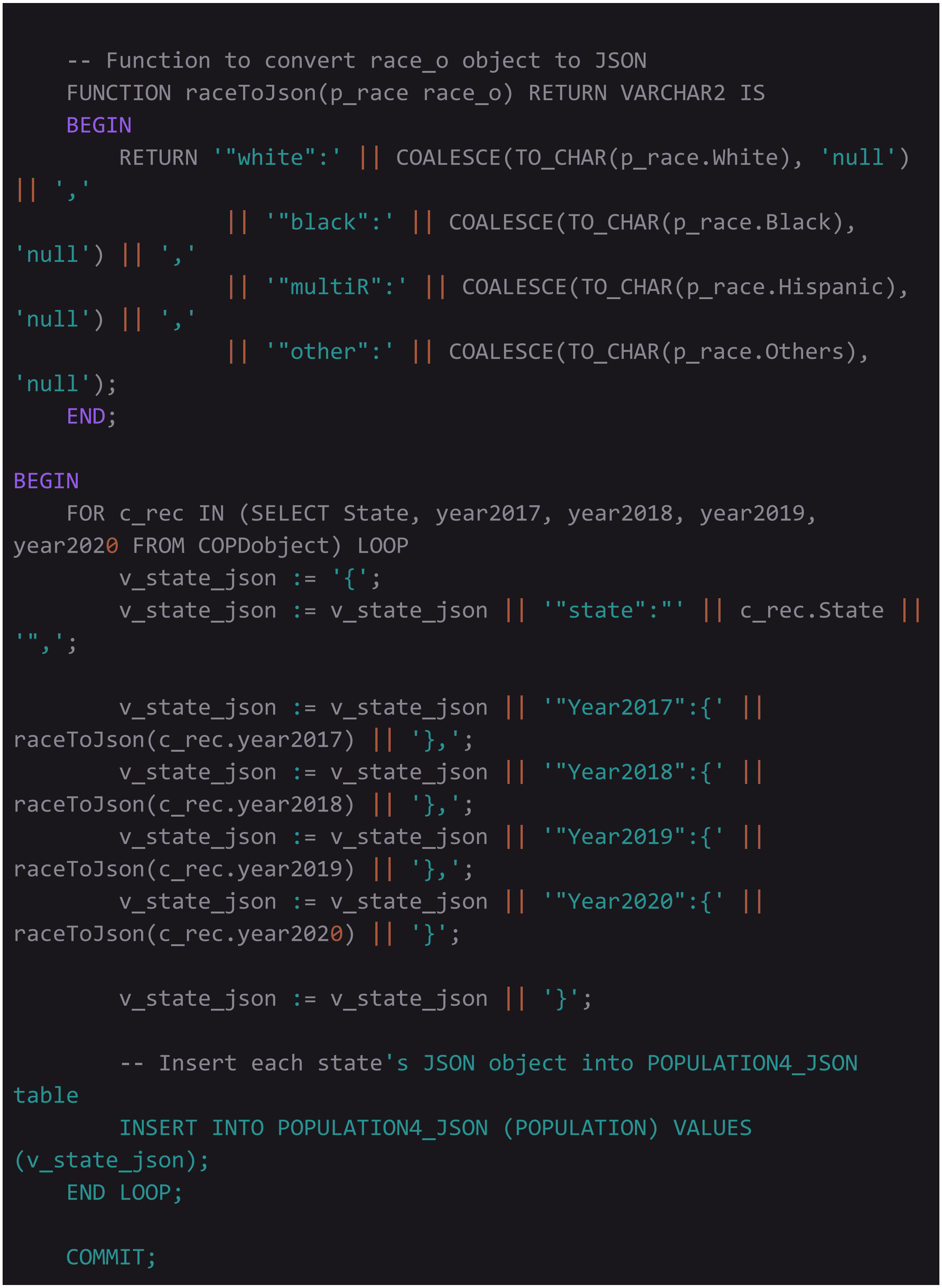
Both the **COPDobject** and POPULATION4_JSON tables have 51 rows. All object values in the **COPDobject** table are stored as a nested JSON object in the POPULATION4_JSON table.

Copy and paste the complete PL/SQL code at the first red arrow below. (Edit the code so that it is NICELY indented.)

Do a SNIP or screen dump to show the first 10 rows of the POPULATION4_JSON file at the second arrow [5].

▶

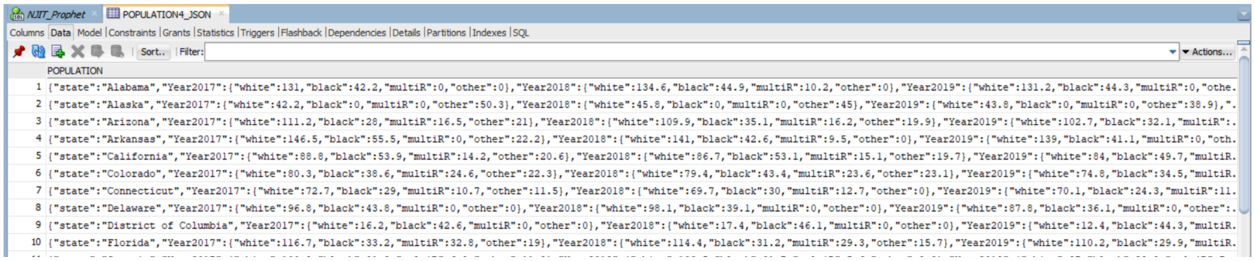
```
DECLARE
    v_state_json CLOB;
```



```
    -- Function to convert race_o object to JSON
    FUNCTION raceToJson(p_race race_o) RETURN VARCHAR2 IS
    BEGIN
        RETURN '"white":' || COALESCE(TO_CHAR(p_race.White), 'null')
|| ','
                || '"black":' || COALESCE(TO_CHAR(p_race.Black),
'null') || ','
                || '"multiR":' || COALESCE(TO_CHAR(p_race.Hispanic),
'null') || ','
                || '"other":' || COALESCE(TO_CHAR(p_race.Others),
'null');
    END;

BEGIN
    FOR c_rec IN (SELECT State, year2017, year2018, year2019,
year2020 FROM COPDobject) LOOP
        v_state_json := '{';
        v_state_json := v_state_json || '"state":"' || c_rec.State ||
'",';

        v_state_json := v_state_json || '"Year2017":{' ||
raceToJson(c_rec.year2017) || '},';
        v_state_json := v_state_json || '"Year2018":{' ||
raceToJson(c_rec.year2018) || '},';
        v_state_json := v_state_json || '"Year2019":{' ||
raceToJson(c_rec.year2019) || '},';
        v_state_json := v_state_json || '"Year2020":{' ||
raceToJson(c_rec.year2020) || '}';

        v_state_json := v_state_json || '}';

        -- Insert each state's JSON object into POPULATION4_JSON
table
        INSERT INTO POPULATION4_JSON (POPULATION) VALUES
(v_state_json);
    END LOOP;

    COMMIT;
```

```
END;
/
```

▶



```
POPULATION
 1 {"state":"Alabama","Year2017":{"white":131,"black":42.2,"multiR":0,"other":0},"Year2018":{"white":134.6,"black":44.9,"multiR":10.2,"other":0},"Year2019":{"white":131.2,"black":44.3,"multiR":0,"othe.
 2 {"state":"Alaska","Year2017":{"white":42.2,"black":0,"multiR":0,"other":50.3},"Year2018":{"white":45.8,"black":0,"multiR":0,"other":45},"Year2019":{"white":43.8,"black":0,"multiR":0,"other":38.9},".
 3 {"state":"Arizona","Year2017":{"white":111.2,"black":28,"multiR":16.5,"other":21},"Year2018":{"white":109.9,"black":35.1,"multiR":16.2,"other":19.9},"Year2019":{"white":102.7,"black":32.1,"multiR":.
 4 {"state":"Arkansas","Year2017":{"white":146.5,"black":55.5,"multiR":0,"other":22.2},"Year2018":{"white":141,"black":42.6,"multiR":9.5,"other":0},"Year2019":{"white":139,"black":41.1,"multiR":0,"oth.
 5 {"state":"California","Year2017":{"white":88.8,"black":53.9,"multiR":14.2,"other":20.6},"Year2018":{"white":86.7,"black":53.1,"multiR":15.1,"other":19.7},"Year2019":{"white":84,"black":49.7,"multiR.
 6 {"state":"Colorado","Year2017":{"white":80.3,"black":38.6,"multiR":24.6,"other":22.3},"Year2018":{"white":79.4,"black":43.4,"multiR":23.6,"other":23.1},"Year2019":{"white":74.8,"black":34.5,"multiR.
 7 {"state":"Connecticut","Year2017":{"white":72.7,"black":29,"multiR":10.7,"other":11.5},"Year2018":{"white":69.7,"black":30,"multiR":12.7,"other":0},"Year2019":{"white":70.1,"black":24.3,"multiR":11.
 8 {"state":"Delaware","Year2017":{"white":96.8,"black":43.8,"multiR":0,"other":0},"Year2018":{"white":98.1,"black":39.1,"multiR":0,"other":0},"Year2019":{"white":87.8,"black":36.1,"multiR":0,"other":.
 9 {"state":"District of Columbia","Year2017":{"white":16.2,"black":42.6,"multiR":0,"other":0},"Year2018":{"white":17.4,"black":46.1,"multiR":0,"other":0},"Year2019":{"white":12.4,"black":44.3,"multiR.
10 {"state":"Florida","Year2017":{"white":116.7,"black":33.2,"multiR":32.8,"other":19},"Year2018":{"white":114.4,"black":31.2,"multiR":29.3,"other":15.7},"Year2019":{"white":110.2,"black":29.9,"multiR.
```

4- a) Create a MongoDB collection **population** that contains exactly the same information as the POPULATION4_JSON objects.

Show the insertMany operation (10 lines) after the first red arrow.
Show the result of "the MongoDB version" of a **Select * from population** at the second red arrow. [5]

*Write a MongoDB query for the following (use the **population** collection).*
Use "table view" in Studio3T to display the first 10 documents for each query.

4-b) Write a MongoDB query to display only the state names and Year2017 nested object if black, multiracial, and other value is null in Year2017 field. How many states did you list? Copy-paste the query, and show the result at the third red arrow [3].

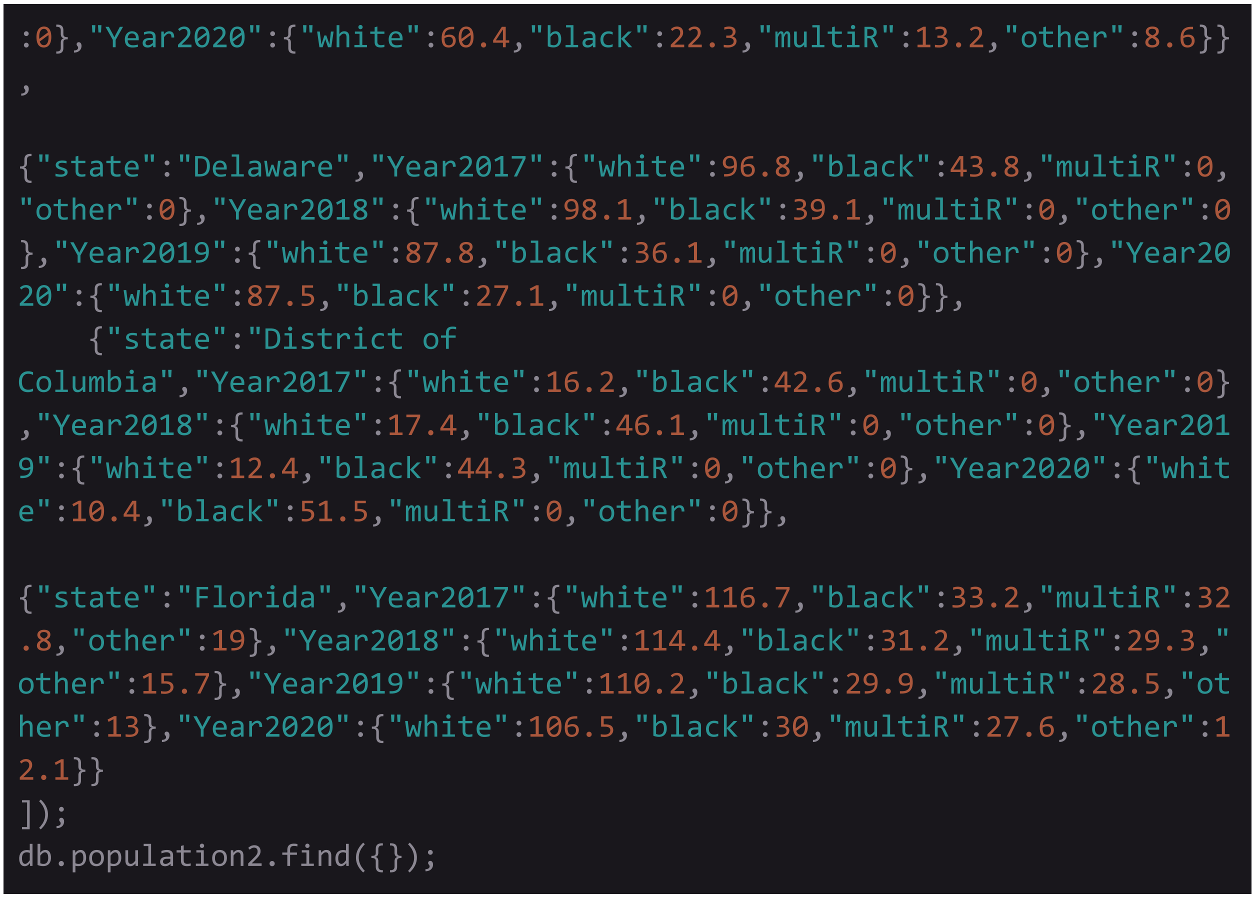
4-c) Write a MongoDB query to find the summation values of all keys in Year2020.
Your query should return 4 sum values for Year2020; namely whiteSum, blackSum, otherSum, and multiSum. Copy-paste the query, and show the result at the forth red arrow [3].

4-d) Write a MongoDB query to find the summation values of all whites in all four years. Your query should return 4 sum values for whites; namely Sum2017, Sum2018, Sum2019, and Sum2020. Copy-paste the query, and show the result at the fifth red arrow [3].

4-e) Write a MongoDB query that has all data of Year2017 key-value pairs from the population collection and writes the result into a new collection named Year2017. The Year2017 collection should have only one document where the value is an array with 51 elements. Copy-paste the query, and show the result at the sixth red arrow [3].

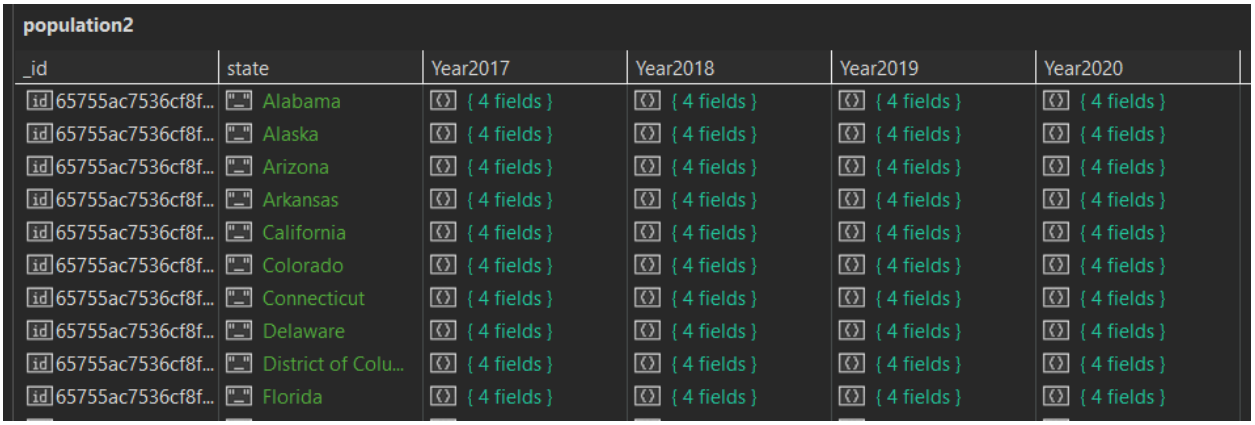
4-f) Write a MongoDB query to display only the black values in Year2017 collection.
Copy-paste the query, and show the result at the seventh red arrow [3].

```
db.population2.insertMany([

{"state":"Alabama","Year2017":{"white":131,"black":42.2,"multiR":0,"other":0},"Year2018":{"white":134.6,"black":44.9,"multiR":10.2,"other":0},"Year2019":{"white":131.2,"black":44.3,"multiR":0,"other":17.3},"Year2020":{"white":125.8,"black":46.8,"multiR":0,"other":0}},

{"state":"Alaska","Year2017":{"white":42.2,"black":0,"multiR":0,"other":50.3},"Year2018":{"white":45.8,"black":0,"multiR":0,"other":45},"Year2019":{"white":43.8,"black":0,"multiR":0,"other":38.9},"Year2020":{"white":42,"black":0,"multiR":0,"other":43.1}},

{"state":"Arizona","Year2017":{"white":111.2,"black":28,"multiR":16.5,"other":21},"Year2018":{"white":109.9,"black":35.1,"multiR":16.2,"other":19.9},"Year2019":{"white":102.7,"black":32.1,"multiR":17.2,"other":14.8},"Year2020":{"white":100.1,"black":26.8,"multiR":18.6,"other":16.7}},

{"state":"Arkansas","Year2017":{"white":146.5,"black":55.5,"multiR":0,"other":22.2},"Year2018":{"white":141,"black":42.6,"multiR":9.5,"other":0},"Year2019":{"white":139,"black":41.1,"multiR":0,"other":0},"Year2020":{"white":140.9,"black":47.3,"multiR":0,"other":18.6}},

{"state":"California","Year2017":{"white":88.8,"black":53.9,"multiR":14.2,"other":20.6},"Year2018":{"white":86.7,"black":53.1,"multiR":15.1,"other":19.7},"Year2019":{"white":84,"black":49.7,"multiR":13.7,"other":19.5},"Year2020":{"white":81.6,"black":55.2,"multiR":14.1,"other":19}},

{"state":"Colorado","Year2017":{"white":80.3,"black":38.6,"multiR":24.6,"other":22.3},"Year2018":{"white":79.4,"black":43.4,"multiR":23.6,"other":23.1},"Year2019":{"white":74.8,"black":34.5,"multiR":25.4,"other":14},"Year2020":{"white":71.9,"black":37.7,"multiR":24.1,"other":20.7}},

{"state":"Connecticut","Year2017":{"white":72.7,"black":29,"multiR":10.7,"other":11.5},"Year2018":{"white":69.7,"black":30,"multiR":12.7,"other":0},"Year2019":{"white":70.1,"black":24.3,"multiR":11.2,"other"
```



```
:0},"Year2020":{"white":60.4,"black":22.3,"multiR":13.2,"other":8.6}}
,

{"state":"Delaware","Year2017":{"white":96.8,"black":43.8,"multiR":0,
"other":0},"Year2018":{"white":98.1,"black":39.1,"multiR":0,"other":0
},"Year2019":{"white":87.8,"black":36.1,"multiR":0,"other":0},"Year20
20":{"white":87.5,"black":27.1,"multiR":0,"other":0}},
    {"state":"District of
Columbia","Year2017":{"white":16.2,"black":42.6,"multiR":0,"other":0}
,"Year2018":{"white":17.4,"black":46.1,"multiR":0,"other":0},"Year201
9":{"white":12.4,"black":44.3,"multiR":0,"other":0},"Year2020":{"whit
e":10.4,"black":51.5,"multiR":0,"other":0}},

{"state":"Florida","Year2017":{"white":116.7,"black":33.2,"multiR":32
.8,"other":19},"Year2018":{"white":114.4,"black":31.2,"multiR":29.3,"
other":15.7},"Year2019":{"white":110.2,"black":29.9,"multiR":28.5,"ot
her":13},"Year2020":{"white":106.5,"black":30,"multiR":27.6,"other":1
2.1}}
]);
db.population2.find({});
```

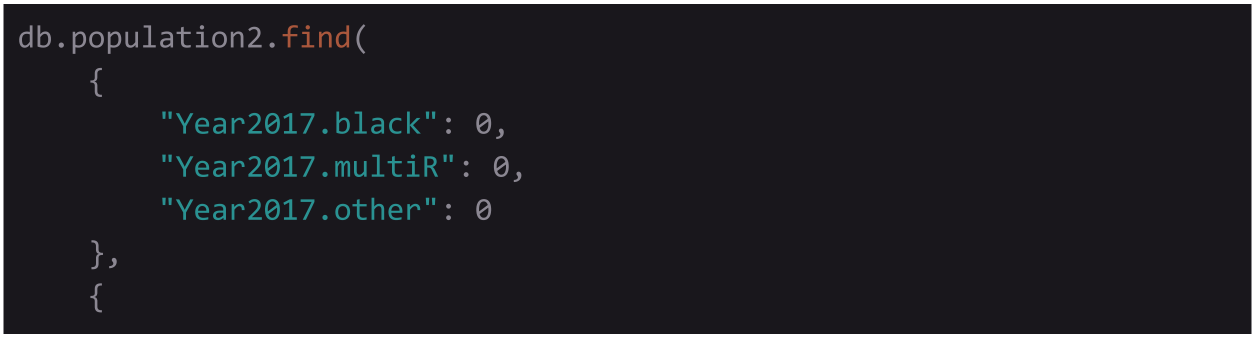
▶



population2

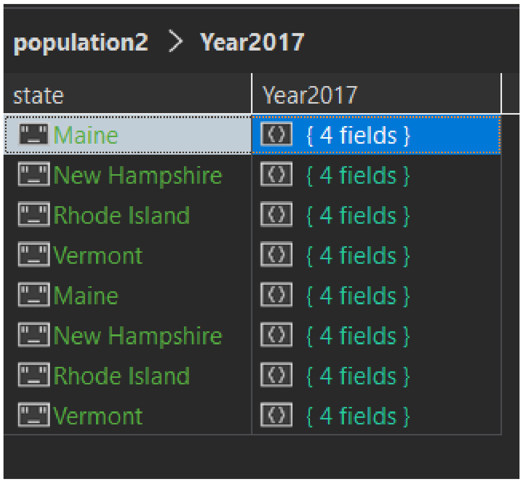
_id	state	Year2017	Year2018	Year2019	Year2020
65755ac7536cf8f...	Alabama	{ 4 fields }	{ 4 fields }	{ 4 fields }	{ 4 fields }
65755ac7536cf8f...	Alaska	{ 4 fields }	{ 4 fields }	{ 4 fields }	{ 4 fields }
65755ac7536cf8f...	Arizona	{ 4 fields }	{ 4 fields }	{ 4 fields }	{ 4 fields }
65755ac7536cf8f...	Arkansas	{ 4 fields }	{ 4 fields }	{ 4 fields }	{ 4 fields }
65755ac7536cf8f...	California	{ 4 fields }	{ 4 fields }	{ 4 fields }	{ 4 fields }
65755ac7536cf8f...	Colorado	{ 4 fields }	{ 4 fields }	{ 4 fields }	{ 4 fields }
65755ac7536cf8f...	Connecticut	{ 4 fields }	{ 4 fields }	{ 4 fields }	{ 4 fields }
65755ac7536cf8f...	Delaware	{ 4 fields }	{ 4 fields }	{ 4 fields }	{ 4 fields }
65755ac7536cf8f...	District of Colu...	{ 4 fields }	{ 4 fields }	{ 4 fields }	{ 4 fields }
65755ac7536cf8f...	Florida	{ 4 fields }	{ 4 fields }	{ 4 fields }	{ 4 fields }

4▶



```
db.population2.find(
    {
        "Year2017.black": 0,
        "Year2017.multiR": 0,
        "Year2017.other": 0
    },
    {
        "state": 1,
        "Year2017": 1,
        "_id": 0
    }
);
```

► 8 states:

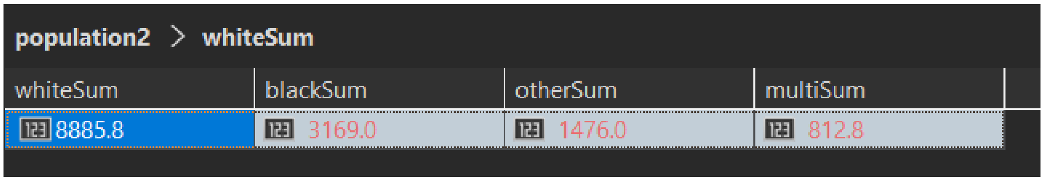


population2 > Year2017

state	Year2017
Maine	{ 4 fields }
New Hampshire	{ 4 fields }
Rhode Island	{ 4 fields }
Vermont	{ 4 fields }
Maine	{ 4 fields }
New Hampshire	{ 4 fields }
Rhode Island	{ 4 fields }
Vermont	{ 4 fields }

►

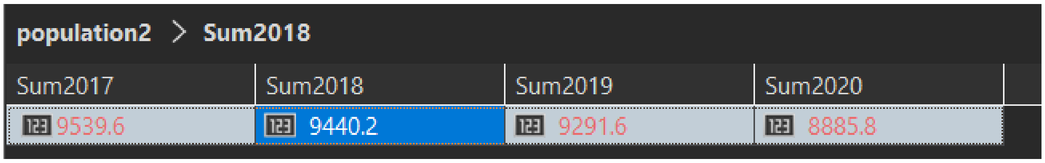
```
db.population2.aggregate([
   {
       $group: {
           _id: null,
           whiteSum: { $sum: "$Year2020.white" },
           blackSum: { $sum: "$Year2020.black" },
           otherSum: { $sum: "$Year2020.other" },
           multiSum: { $sum: "$Year2020.multiR" }
       }
   },
   {
       $project: {
           _id: 0,
           whiteSum: 1,
           blackSum: 1,
           otherSum: 1,
           multiSum: 1
       }
   }
]);
```



population2 > whiteSum

whiteSum	blackSum	otherSum	multiSum
8885.8	3169.0	1476.0	812.8

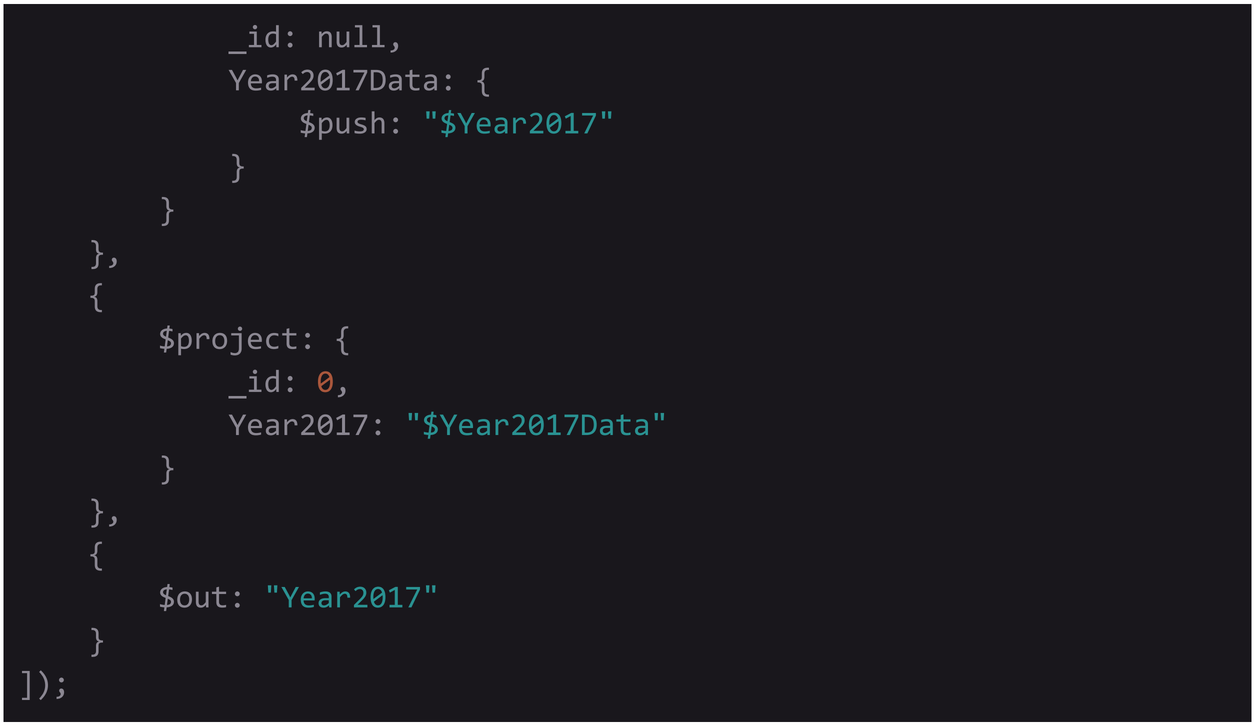
```
 db.population2.aggregate([
    {
        $group: {
            _id: null,
            Sum2017: { $sum: "$Year2017.white" },
            Sum2018: { $sum: "$Year2018.white" },
            Sum2019: { $sum: "$Year2019.white" },
            Sum2020: { $sum: "$Year2020.white" }
        }
    },
    {
        $project: {
            _id: 0,
            Sum2017: 1,
            Sum2018: 1,
            Sum2019: 1,
            Sum2020: 1
        }
    }
]);
```



population2 > Sum2018

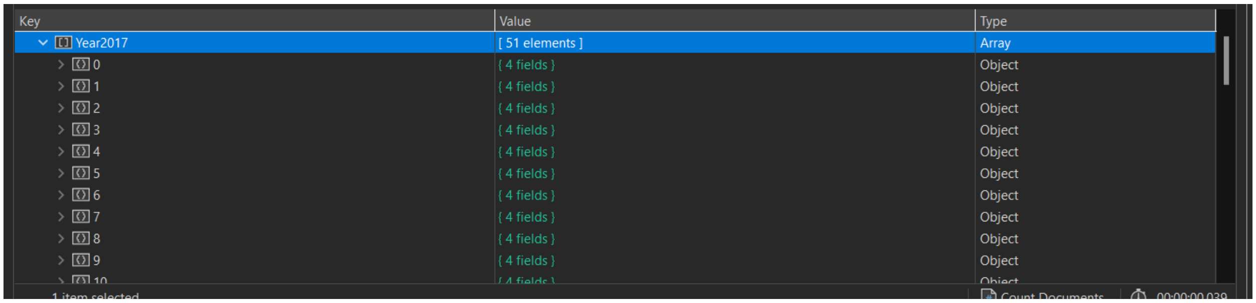
Sum2017	Sum2018	Sum2019	Sum2020
9539.6	9440.2	9291.6	8885.8

```
db.population2.aggregate([
    {
        $group: {
```



```
            _id: null,
            Year2017Data: {
                $push: "$Year2017"
            }
        }
    },
    {
        $project: {
            _id: 0,
            Year2017: "$Year2017Data"
        }
    },
    {
        $out: "Year2017"
    }
]);
```

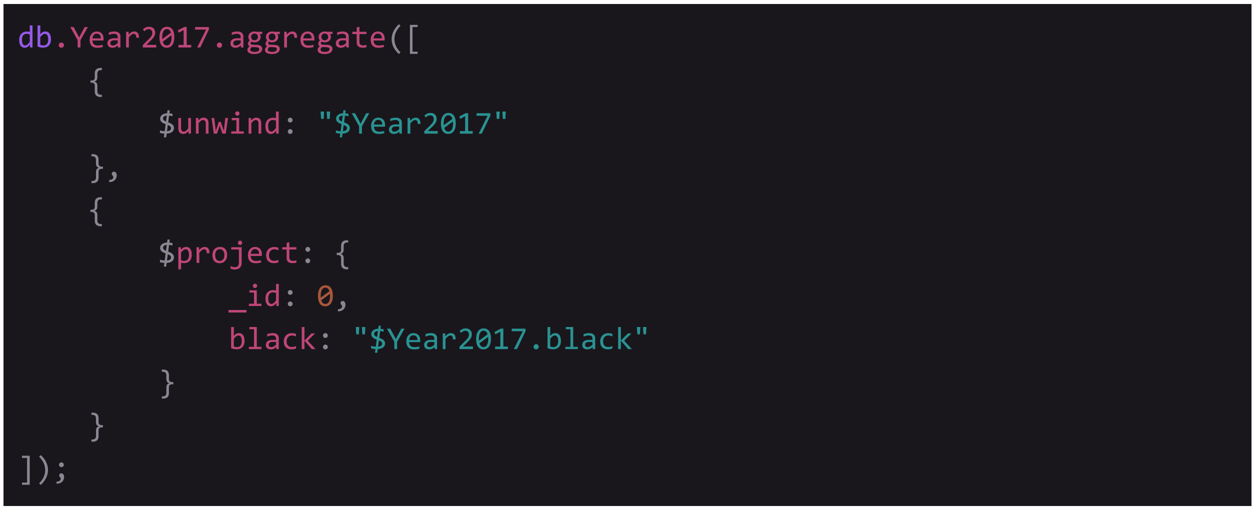
▶



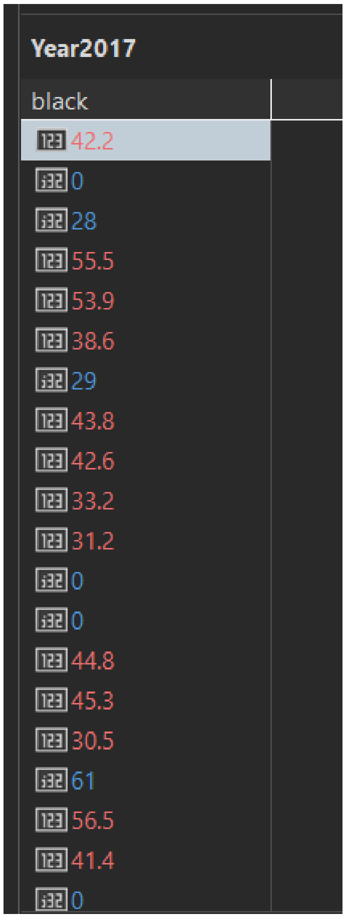
Key	Value	Type
Year2017	[51 elements]	Array
0	{ 4 fields }	Object
1	{ 4 fields }	Object
2	{ 4 fields }	Object
3	{ 4 fields }	Object
4	{ 4 fields }	Object
5	{ 4 fields }	Object
6	{ 4 fields }	Object
7	{ 4 fields }	Object
8	{ 4 fields }	Object
9	{ 4 fields }	Object
10	{ 4 fields }	Object

1 item selected   Count Documents   00:00:00.039

▶



```
db.Year2017.aggregate([
    {
        $unwind: "$Year2017"
    },
    {
        $project: {
            _id: 0,
            black: "$Year2017.black"
        }
    }
]);
```



Year2017

black
123 42.2
i32 0
i32 28
123 55.5
123 53.9
123 38.6
i32 29
123 43.8
123 42.6
123 33.2
123 31.2
i32 0
i32 0
123 44.8
123 45.3
123 30.5
i32 61
123 56.5
123 41.4
i32 0