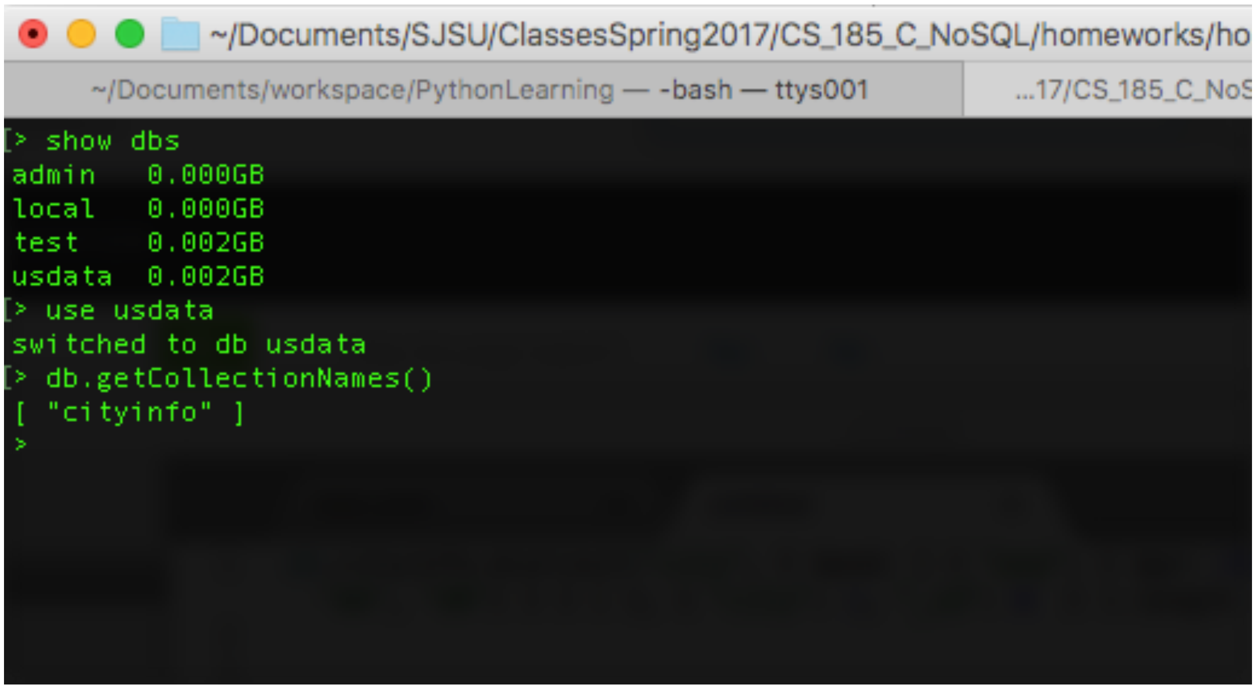
```
/*
* @Author: Sidharth Mishra
* @Date:   2017-02-24 13:21:30
* @Last Modified by:   Sidharth Mishra
* @Last Modified time: 2017-02-25 00:25:07
*/
```

```
// 1. Download the zips.json file to your VM.

wget http://media.mongodb.org/zips.json
```

```
// 2. Import zips.json into MongoDB using mongoimport command.
// Import the data into a collection called cityinfo in a database called usdata.

mongoimport --db usdata --collection cityinfo --file zips.json
```

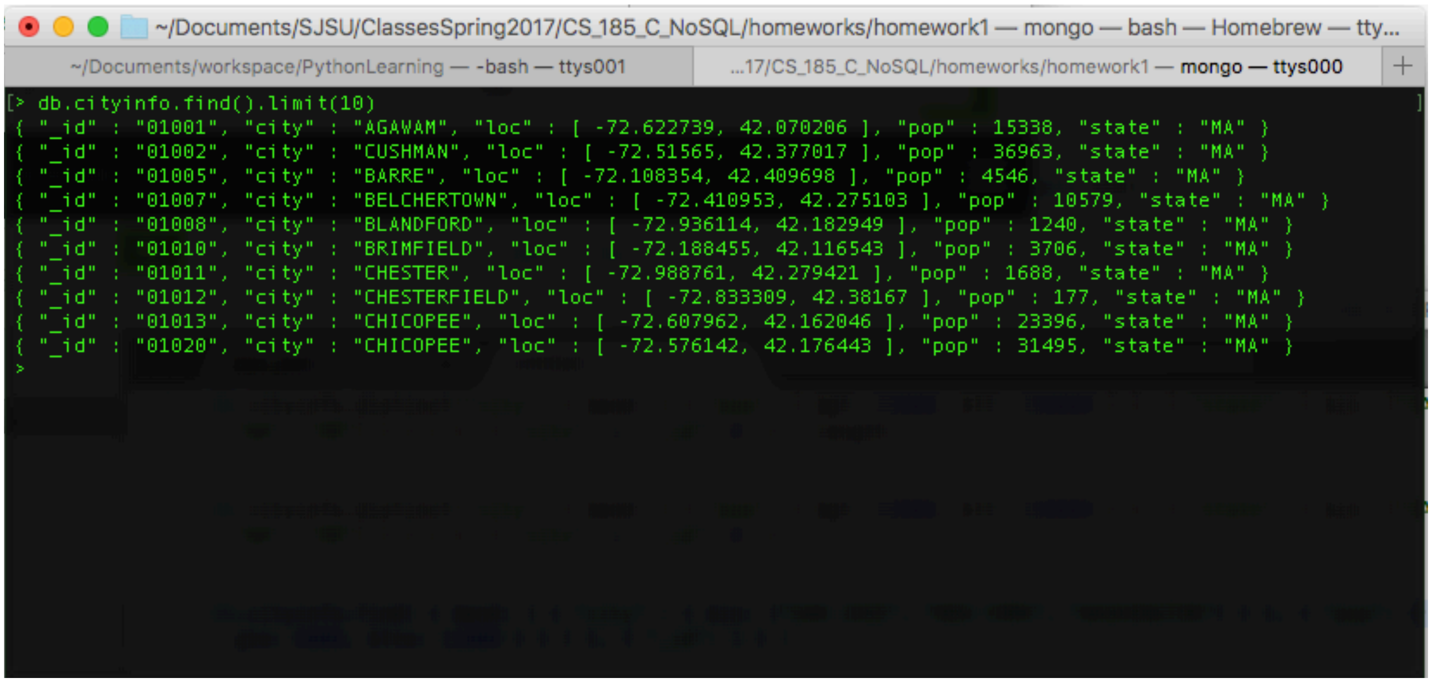
```
// 3. Get the screenshot (screen 1) that shows all collections of the database usdata.

show dbs
use usdata
db.getCollectionNames()
```


~/Documents/SJSU/ClassesSpring2017/CS_185_C_NoSQL/homeworks/ho
~/Documents/workspace/PythonLearning — -bash — ttys001
...17/CS_185_C_NoS

```
> show dbs
admin   0.000GB
local   0.000GB
test    0.002GB
usdata  0.002GB
> use usdata
switched to db usdata
> db.getCollectionNames()
[ "cityinfo" ]
>
```

// 4. Find all documents of cityinfo collection. (screen 2)

db.cityinfo.find().limit(10)



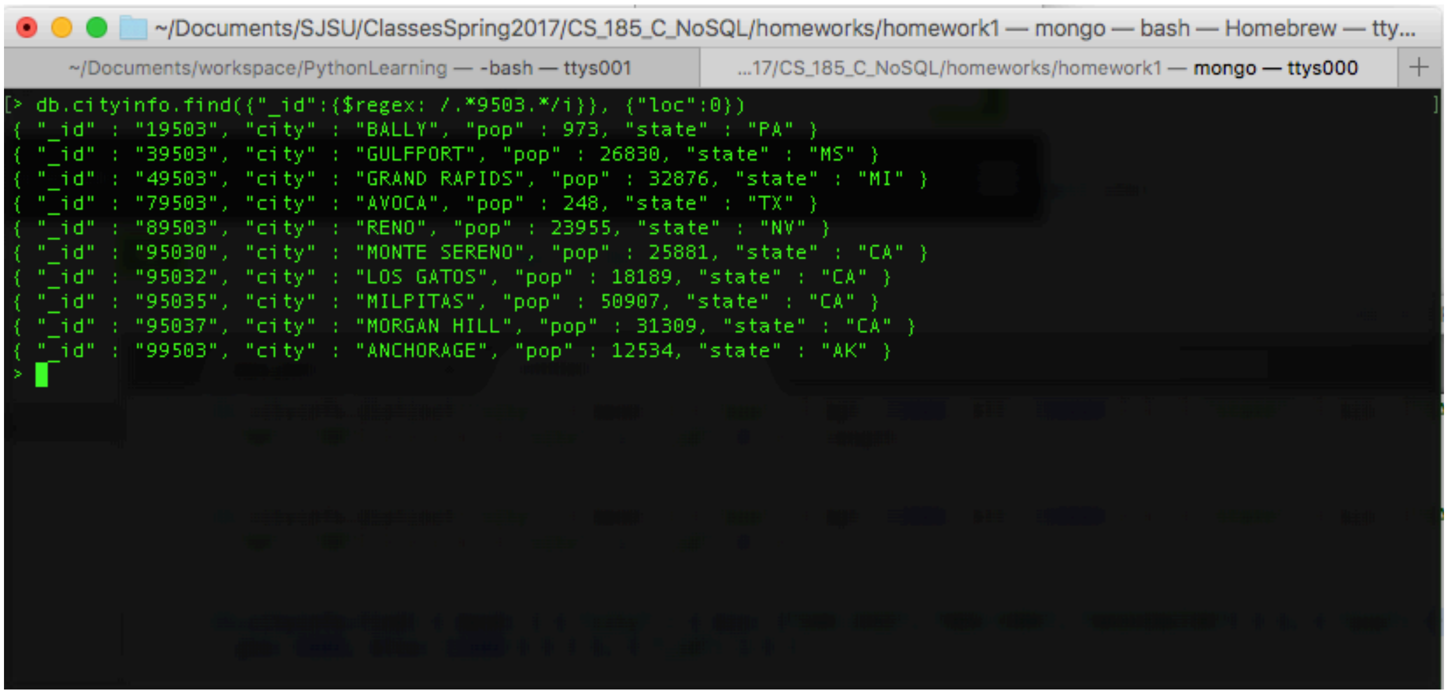
~/Documents/SJSU/ClassesSpring2017/CS_185_C_NoSQL/homeworks/homework1 — mongo — bash — Homebrew — tty...

~/Documents/workspace/PythonLearning — -bash — ttys001 | ...17/CS_185_C_NoSQL/homeworks/homework1 — mongo — ttys000

```
> db.cityinfo.find().limit(10)
{ "_id" : "01001", "city" : "AGAWAM", "loc" : [ -72.622739, 42.070206 ], "pop" : 15338, "state" : "MA" }
{ "_id" : "01002", "city" : "CUSHMAN", "loc" : [ -72.51565, 42.377017 ], "pop" : 36963, "state" : "MA" }
{ "_id" : "01005", "city" : "BARRE", "loc" : [ -72.108354, 42.409698 ], "pop" : 4546, "state" : "MA" }
{ "_id" : "01007", "city" : "BELCHERTOWN", "loc" : [ -72.410953, 42.275103 ], "pop" : 10579, "state" : "MA" }
{ "_id" : "01008", "city" : "BLANDFORD", "loc" : [ -72.936114, 42.182949 ], "pop" : 1240, "state" : "MA" }
{ "_id" : "01010", "city" : "BRIMFIELD", "loc" : [ -72.188455, 42.116543 ], "pop" : 3706, "state" : "MA" }
{ "_id" : "01011", "city" : "CHESTER", "loc" : [ -72.988761, 42.279421 ], "pop" : 1688, "state" : "MA" }
{ "_id" : "01012", "city" : "CHESTERFIELD", "loc" : [ -72.833309, 42.38167 ], "pop" : 177, "state" : "MA" }
{ "_id" : "01013", "city" : "CHICOPEE", "loc" : [ -72.607962, 42.162046 ], "pop" : 23396, "state" : "MA" }
{ "_id" : "01020", "city" : "CHICOPEE", "loc" : [ -72.576142, 42.176443 ], "pop" : 31495, "state" : "MA" }
>
```

// 5. Find all documents with _id that contains 9503 in it. Do not include "loc" in the output.
// For example, expected documents in the output may include a document with "_id":"19503" and a document with "_id":"95037". (screen 3)

```
db.cityinfo.find( {
   "_id": {
     $regex: /.*9503.*/i
   }
 },
 {
   "loc": 0
 }
)
```

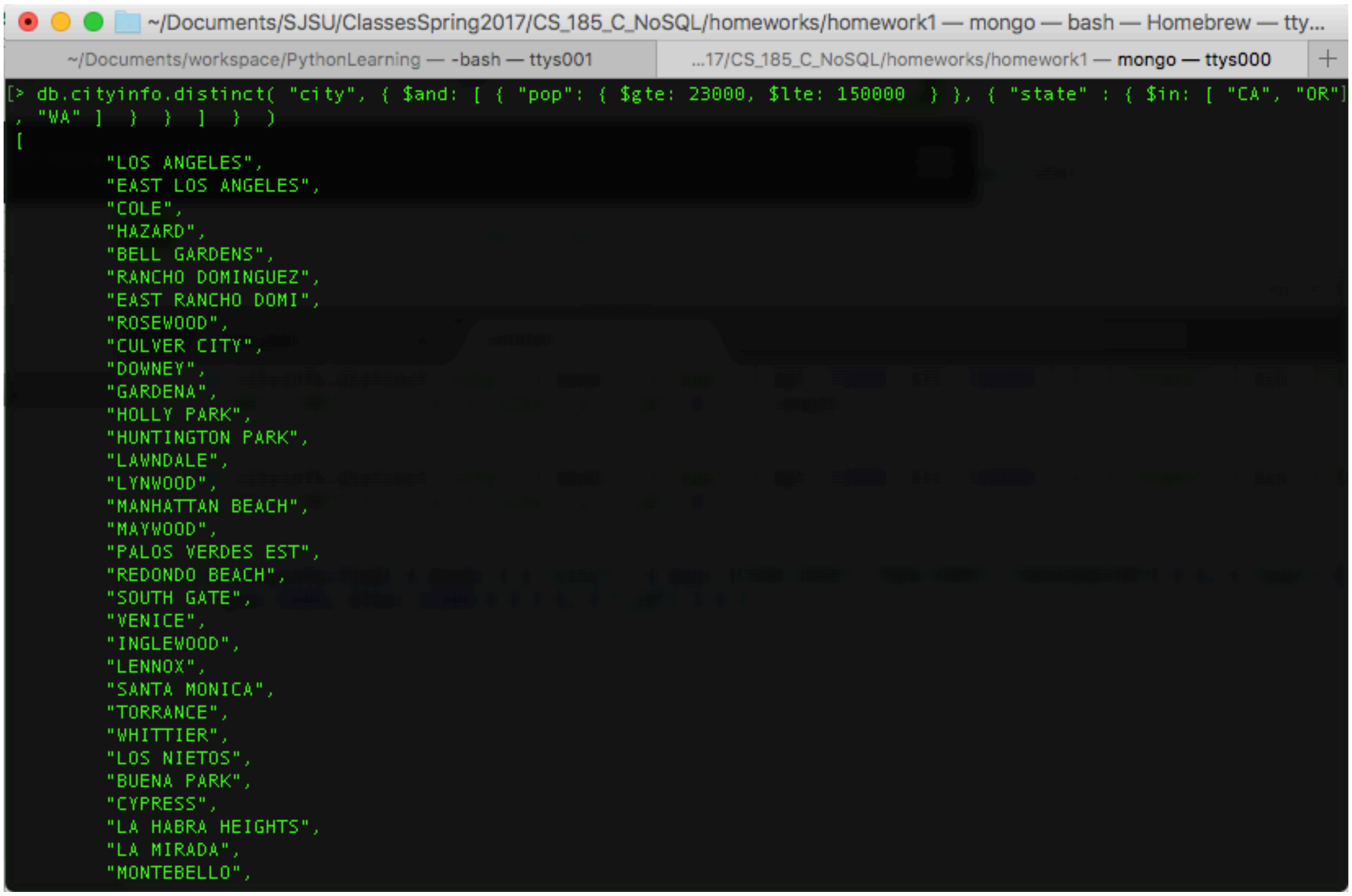

~/Documents/SJSU/ClassesSpring2017/CS_185_C_NoSQL/homeworks/homework1 — mongo — bash — Homebrew — tty...
~/Documents/workspace/PythonLearning — -bash — ttys001
...17/CS_185_C_NoSQL/homeworks/homework1 — mongo — ttys000

```
> db.cityinfo.find({"_id":{$regex: /.*9503.*/i}}, {"loc":0})
{ "_id" : "19503", "city" : "BALLY", "pop" : 973, "state" : "PA" }
{ "_id" : "39503", "city" : "GULFPORT", "pop" : 26830, "state" : "MS" }
{ "_id" : "49503", "city" : "GRAND RAPIDS", "pop" : 32876, "state" : "MI" }
{ "_id" : "79503", "city" : "AVOCA", "pop" : 248, "state" : "TX" }
{ "_id" : "89503", "city" : "RENO", "pop" : 23955, "state" : "NV" }
{ "_id" : "95030", "city" : "MONTE SERENO", "pop" : 25881, "state" : "CA" }
{ "_id" : "95032", "city" : "LOS GATOS", "pop" : 18189, "state" : "CA" }
{ "_id" : "95035", "city" : "MILPITAS", "pop" : 50907, "state" : "CA" }
{ "_id" : "95037", "city" : "MORGAN HILL", "pop" : 31309, "state" : "CA" }
{ "_id" : "99503", "city" : "ANCHORAGE", "pop" : 12534, "state" : "AK" }
>
```

// 6. Find all cities with populations between 23,000 and 150,000 where the state they are in borders the pacific ocean. (screen 4)

```
db.cityinfo.distinct(
 "city",
 {
  $and: [
   {
    "pop": {
     $gte: 23000,
     $lte: 150000
    }
   },
   {
    "state": {
     $in: [
      "CA",
      "OR",
      "WA"
     ]
    }
```

```
        }
      ]
    }
  )
```

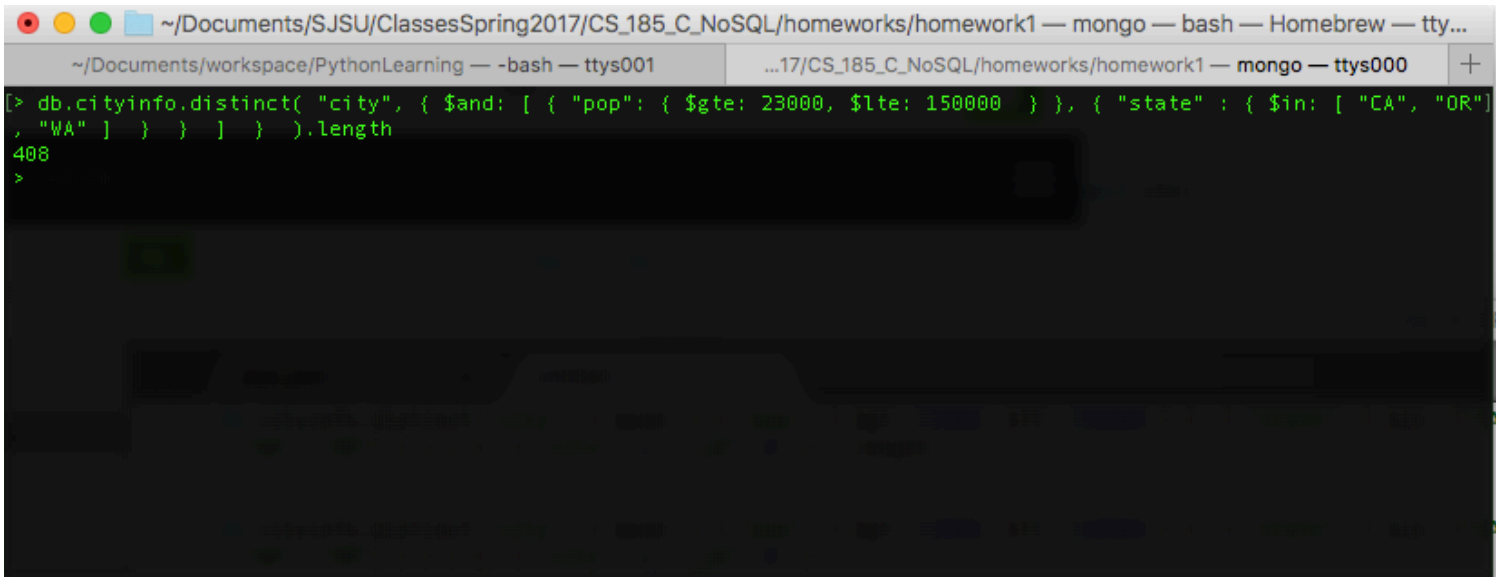


~/Documents/SJSU/ClassesSpring2017/CS_185_C_NoSQL/homeworks/homework1 — mongo — bash — Homebrew — tty...

~/Documents/workspace/PythonLearning — -bash — ttys001 | ...17/CS_185_C_NoSQL/homeworks/homework1 — mongo — ttys000

```
> db.cityinfo.distinct( "city", { $and: [ { "pop": { $gte: 23000, $lte: 150000  } }, { "state" : { $in: [ "CA", "OR"]
, "WA" ]  }  }  ]  }  )
[
        "LOS ANGELES",
        "EAST LOS ANGELES",
        "COLE",
        "HAZARD",
        "BELL GARDENS",
        "RANCHO DOMINGUEZ",
        "EAST RANCHO DOMI",
        "ROSEWOOD",
        "CULVER CITY",
        "DOWNEY",
        "GARDENA",
        "HOLLY PARK",
        "HUNTINGTON PARK",
        "LAWNDALE",
        "LYNWOOD",
        "MANHATTAN BEACH",
        "MAYWOOD",
        "PALOS VERDES EST",
        "REDONDO BEACH",
        "SOUTH GATE",
        "VENICE",
        "INGLEWOOD",
        "LENNOX",
        "SANTA MONICA",
        "TORRANCE",
        "WHITTIER",
        "LOS NIETOS",
        "BUENA PARK",
        "CYPRESS",
        "LA HABRA HEIGHTS",
        "LA MIRADA",
        "MONTEBELLO",
```

```
// get the length of the array returned by distinct()
db.cityinfo.distinct(
  "city",
  {
    $and: [
      {
        "pop": {
          $gte: 23000,
          $lte: 150000
        }
      },
      {
        "state": {
          $in: [
            "CA",
            "OR",
            "WA"
          ]
        }
      }
    ]
  }
).length
```

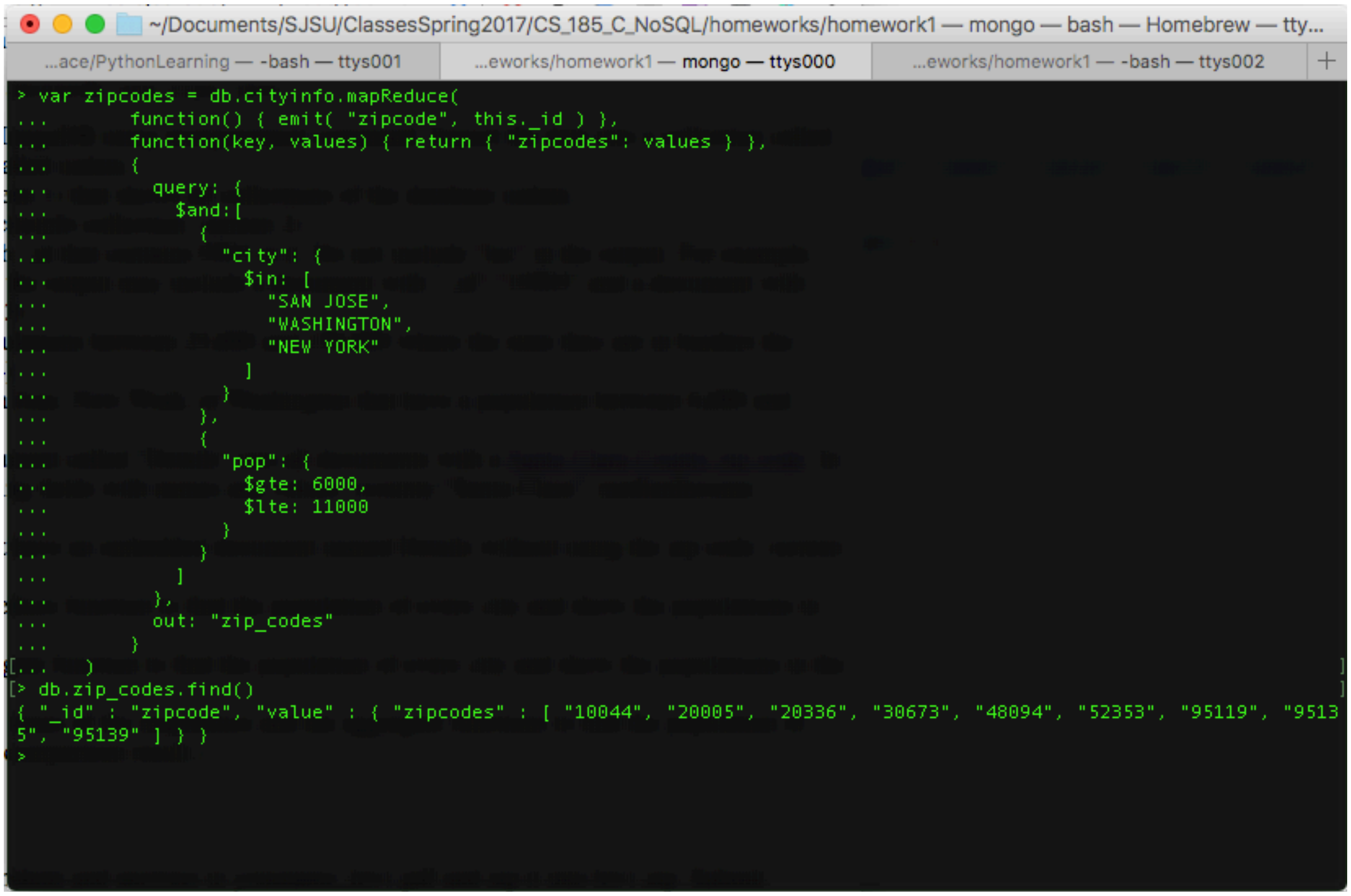


~/Documents/SJSU/ClassesSpring2017/CS_185_C_NoSQL/homeworks/homework1 — mongo — bash — Homebrew — tty...
~/Documents/workspace/PythonLearning — -bash — ttys001
...17/CS_185_C_NoSQL/homeworks/homework1 — mongo — ttys000

```
> db.cityinfo.distinct( "city", { $and: [ { "pop": { $gte: 23000, $lte: 150000  } }, { "state" : { $in: [ "CA", "OR"]
, "WA" ]  }  }  ]  }  ).length
408
>
```

// 7. Find all zip code in San Jose, New Work, or Washington that have a population between 6,000 and 11,000. (screen 5)
// question 7 - find zipcodes
// this output is not that great
// > db.getCollectionNames()

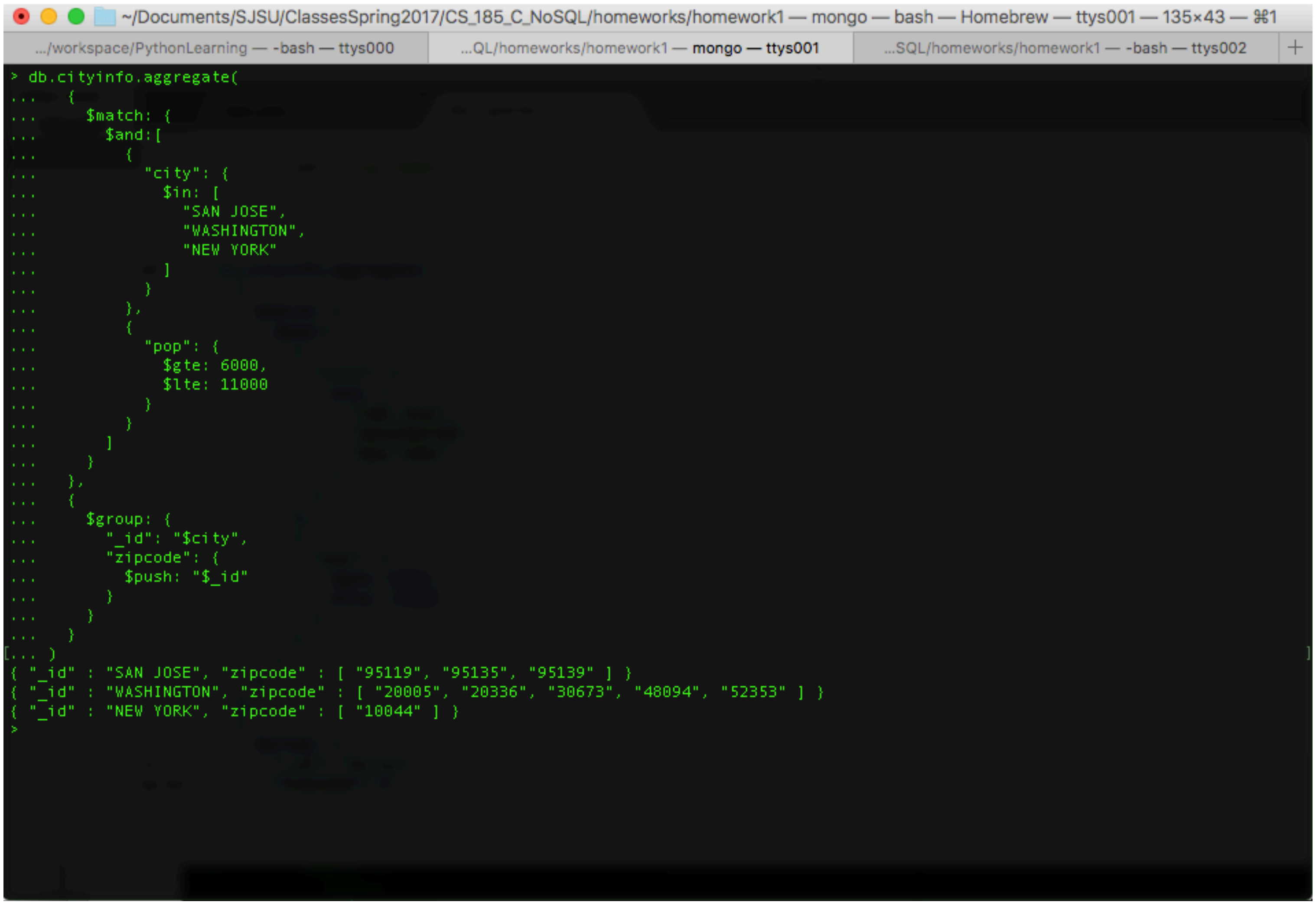
```
// [ "cityinfo", "zip_codes" ]
// > db.zip_codes.find()
// { "_id" : "10044", "value" : "10044" }
// { "_id" : "20005", "value" : "20005" }
// { "_id" : "20336", "value" : "20336" }
// { "_id" : "30673", "value" : "30673" }
// { "_id" : "48094", "value" : "48094" }
// { "_id" : "52353", "value" : "52353" }
// { "_id" : "95119", "value" : "95119" }
// { "_id" : "95135", "value" : "95135" }
// { "_id" : "95139", "value" : "95139" }

var zipcodes = db.cityinfo.mapReduce(
    function() { emit( this._id, this._id ) },
    function(key, values) { return { "zipcode": key } },
    {
      query: {
        $and:[
          {
            "city": {
              $in: [
                "SAN JOSE",
                "WASHINGTON",
                "NEW YORK"
              ]
            }
          },
          {
            "pop": {
              $gte: 6000,
              $lte: 11000
            }
          }
        ]
      },
      out: "zip_codes"
    }
  )



// 7. Find all zip code in San Jose, New Work, or Washington that have a population between
6,000 and 11,000. (screen 5)
// question 7 - find zipcodes
// > db.zip_codes.find()
// { "_id" : "zipcode", "value" : { "zipcodes" : [ "10044", "20005", "20336", "30673", "48094",
"52353", "95119", "95135", "95139" ] } }

var zipcodes = db.cityinfo.mapReduce(
  function() { emit( "zipcode", this._id ) },
  function(key, values) { return { "zipcodes": values } },
  {
   query: {
    $and:[
     {
      "city": {
       $in: [
        "SAN JOSE",
        "WASHINGTON",
        "NEW YORK"
       ]
      }
     },
     {
      "pop": {
       $gte: 6000,
       $lte: 11000
      }
     }
    ]
   },
   out: "zip_codes"
  }
)
```



~/Documents/SJSU/ClassesSpring2017/CS_185_C_NoSQL/homeworks/homework1 — mongo — bash — Homebrew — tty...

```
> var zipcodes = db.cityinfo.mapReduce(
...       function() { emit( "zipcode", this._id ) },
...       function(key, values) { return { "zipcodes": values } },
...       {
...         query: {
...           $and:[
...             {
...               "city": {
...                 $in: [
...                   "SAN JOSE",
...                   "WASHINGTON",
...                   "NEW YORK"
...                 ]
...               }
...             },
...             {
...               "pop": {
...                 $gte: 6000,
...                 $lte: 11000
...               }
...             }
...           ]
...         },
...         out: "zip_codes"
...       }
... )
> db.zip_codes.find()
{ "_id" : "zipcode", "value" : { "zipcodes" : [ "10044", "20005", "20336", "30673", "48094", "52353", "95119", "9513
5", "95139" ] } }
>
```

```
// using the aggregation pipeline gives a better output
// so I'm thinking of keeping this

db.cityinfo.aggregate(
  {
    $match: {
      $and:[
        {
          "city": {
            $in: [
              "SAN JOSE",
              "WASHINGTON",
              "NEW YORK"
            ]
          }
        },
        {
          "pop": {
            $gte: 6000,
            $lte: 11000
          }
        }
      ]
    }
  },
  {
    $group: {
      "_id": "$city",
      "zipcode": {
        $push: "$_id"
      }
    }
  }
)
```


~/Documents/SJSU/ClassesSpring2017/CS_185_C_NoSQL/homeworks/homework1 — mongo — bash — Homebrew — ttys001 — 135×43 — ⌘1
.../workspace/PythonLearning — -bash — ttys000
...QL/homeworks/homework1 — mongo — ttys001
...SQL/homeworks/homework1 — -bash — ttys002

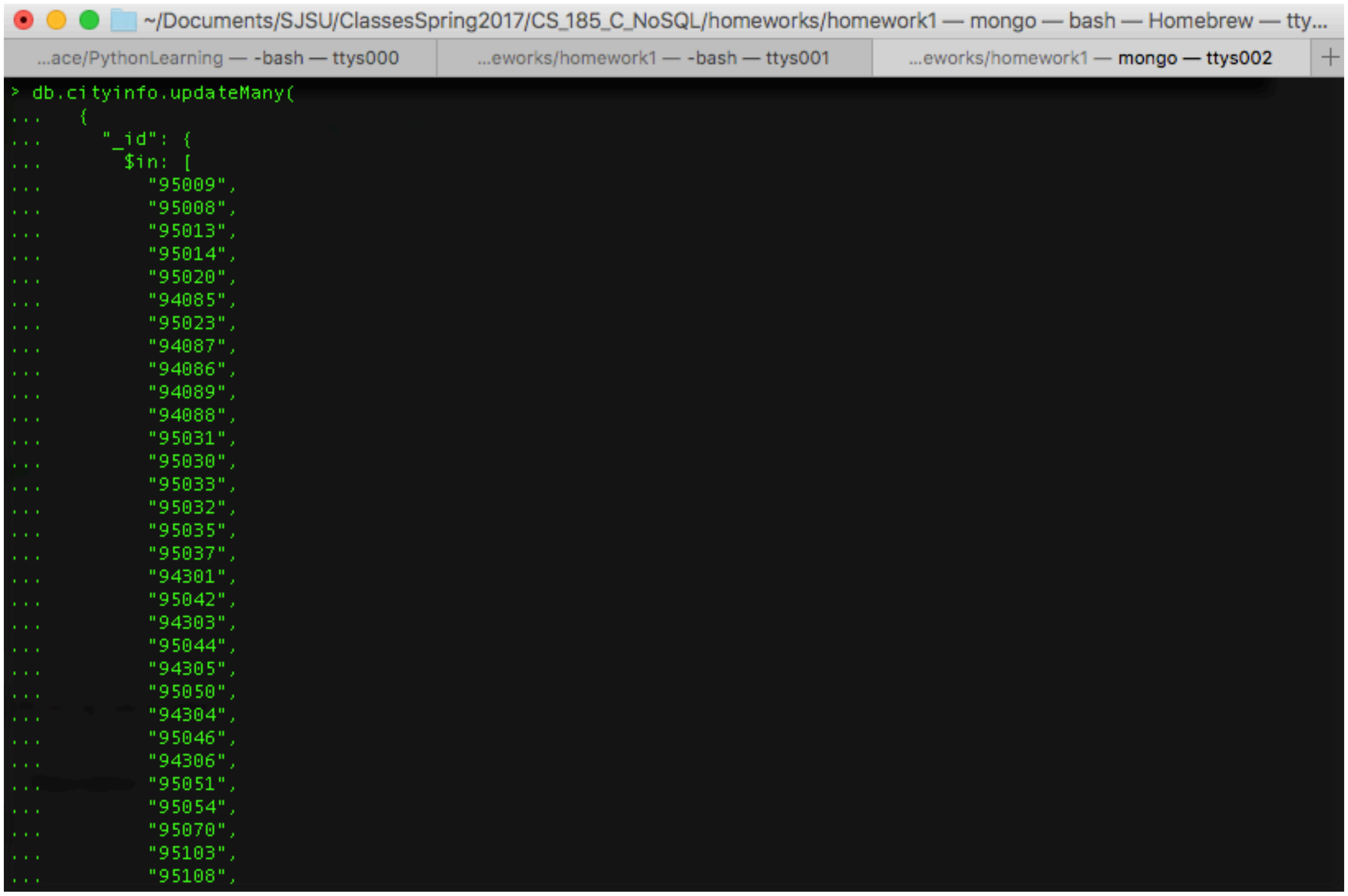
```
> db.cityinfo.aggregate(
...     {
...       $match: {
...         $and:[
...           {
...             "city": {
...               $in: [
...                 "SAN JOSE",
...                 "WASHINGTON",
...                 "NEW YORK"
...               ]
...             }
...           },
...           {
...             "pop": {
...               $gte: 6000,
...               $lte: 11000
...             }
...           }
...         ]
...       }
...     },
...     {
...       $group: {
...         "_id": "$city",
...         "zipcode": {
...           $push: "$_id"
...         }
...       }
...     }
... )
{ "_id" : "SAN JOSE", "zipcode" : [ "95119", "95135", "95139" ] }
{ "_id" : "WASHINGTON", "zipcode" : [ "20005", "20336", "30673", "48094", "52353" ] }
{ "_id" : "NEW YORK", "zipcode" : [ "10044" ] }
>
```

// 8. Add an embedded document called "Details" into all documents with a Santa Clara County zip code.
// In Details, add the following fields with names and values: {county:"Santa Clara", medianIncome: 93500}. (screen 6)

```
db.cityinfo.updateMany(
 {
   "_id": {
     $in: [
       "95009",
       "95008",
       "95013",
       "95014",
       "95020",
```

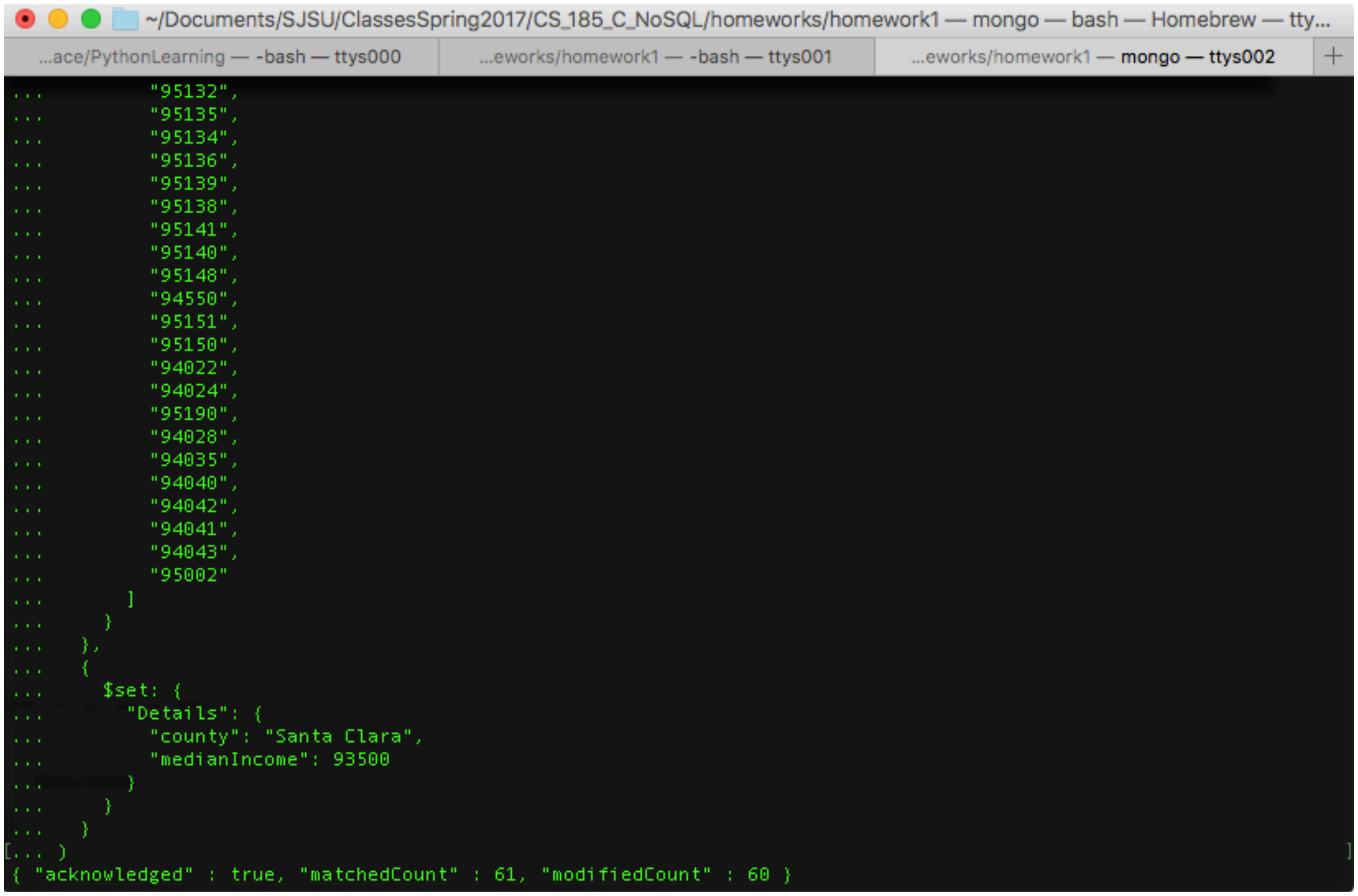
"94085",
"95023",
"94087",
"94086",
"94089",
"94088",
"95031",
"95030",
"95033",
"95032",
"95035",
"95037",
"94301",
"95042",
"94303",
"95044",
"94305",
"95050",
"94304",
"95046",
"94306",
"95051",
"95054",
"95070",
"95103",
"95108",
"95111",
"95110",
"95113",
"95112",
"95117",
"95116",
"95119",
"95118",
"95121",
"95120",
"95123",
"95122",
"95125",
"95124",
"95127",
"95126",
"95129",
"95128",
"95131",
"95130",
"95133",
"95132",
"95135",

```
        "95134",
        "95136",
        "95139",
        "95138",
        "95141",
        "95140",
        "95148",
        "94550",
        "95151",
        "95150",
        "94022",
        "94024",
        "95190",
        "94028",
        "94035",
        "94040",
        "94042",
        "94041",
        "94043",
        "95002"
      ]
    }
  },
  {
    $set: {
      "Details": {
        "county": "Santa Clara",
        "medianIncome": 93500
      }
    }
  },
  {
    upsert: true
  }
)
```


~/Documents/SJSU/ClassesSpring2017/CS_185_C_NoSQL/homeworks/homework1 — mongo — bash — Homebrew — tty...

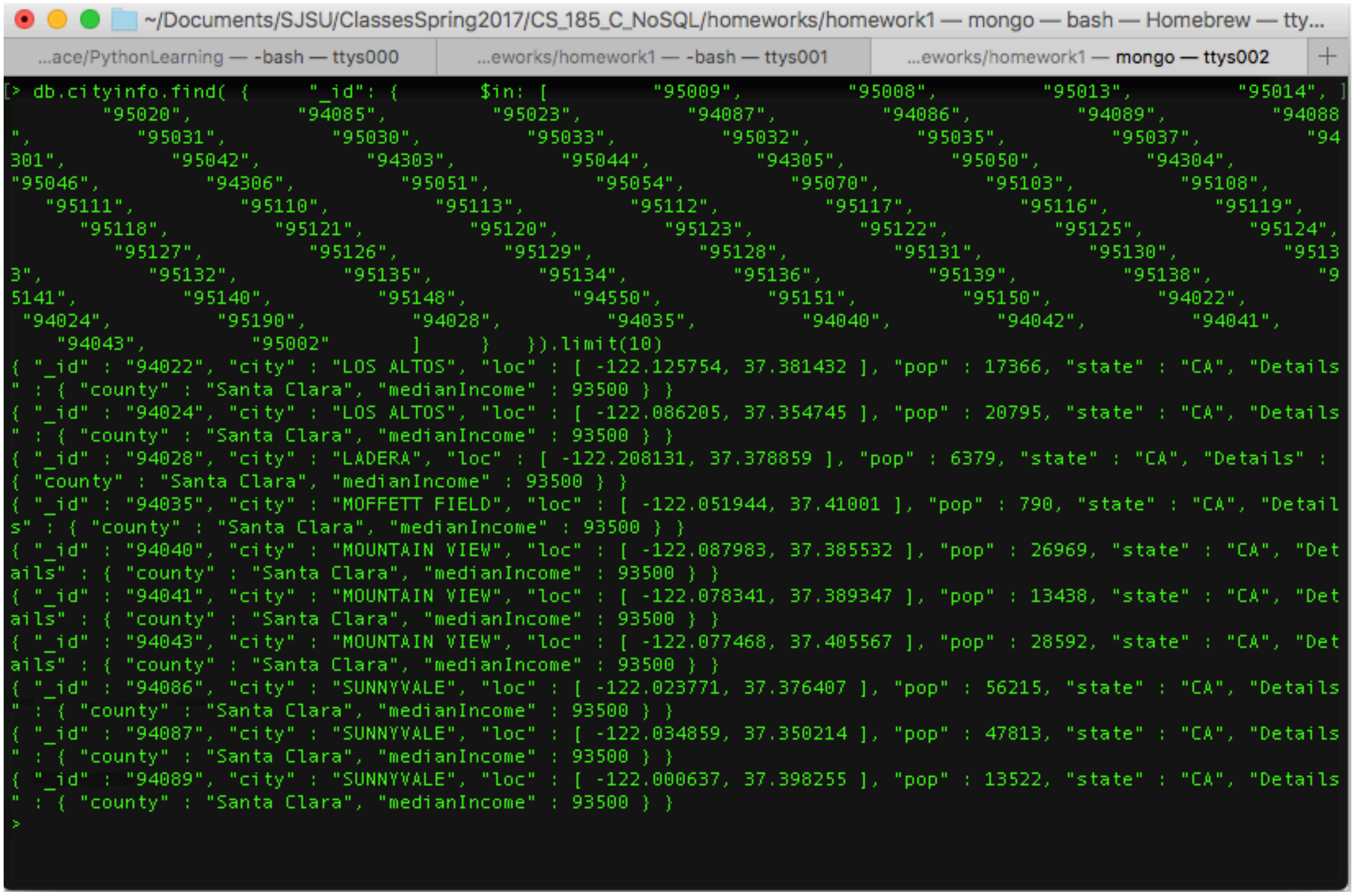
...ace/PythonLearning — -bash — ttys000 | ...eworks/homework1 — -bash — ttys001 | ...eworks/homework1 — mongo — ttys002

```
> db.cityinfo.updateMany(
...    {
...      "_id": {
...        $in: [
...          "95009",
...          "95008",
...          "95013",
...          "95014",
...          "95020",
...          "94085",
...          "95023",
...          "94087",
...          "94086",
...          "94089",
...          "94088",
...          "95031",
...          "95030",
...          "95033",
...          "95032",
...          "95035",
...          "95037",
...          "94301",
...          "95042",
...          "94303",
...          "95044",
...          "94305",
...          "95050",
...          "94304",
...          "95046",
...          "94306",
...          "95051",
...          "95054",
...          "95070",
...          "95103",
...          "95108",
```


~/Documents/SJSU/ClassesSpring2017/CS_185_C_NoSQL/homeworks/homework1 — mongo — bash — Homebrew — tty...

...ace/PythonLearning — -bash — ttys000 | ...eworks/homework1 — -bash — ttys001 | ...eworks/homework1 — mongo — ttys002

```
...          "95132",
...          "95135",
...          "95134",
...          "95136",
...          "95139",
...          "95138",
...          "95141",
...          "95140",
...          "95148",
...          "94550",
...          "95151",
...          "95150",
...          "94022",
...          "94024",
...          "95190",
...          "94028",
...          "94035",
...          "94040",
...          "94042",
...          "94041",
...          "94043",
...          "95002"
...        ]
...      }
...    },
...    {
...      $set: {
...        "Details": {
...          "county": "Santa Clara",
...          "medianIncome": 93500
...        }
...      }
...    }
[... )
{ "acknowledged" : true, "matchedCount" : 61, "modifiedCount" : 60 }
```


~/Documents/SJSU/ClassesSpring2017/CS_185_C_NoSQL/homeworks/homework1 — mongo — bash — Homebrew — tty...
...ace/PythonLearning — -bash — ttys000
...eworks/homework1 — -bash — ttys001
...eworks/homework1 — mongo — ttys002

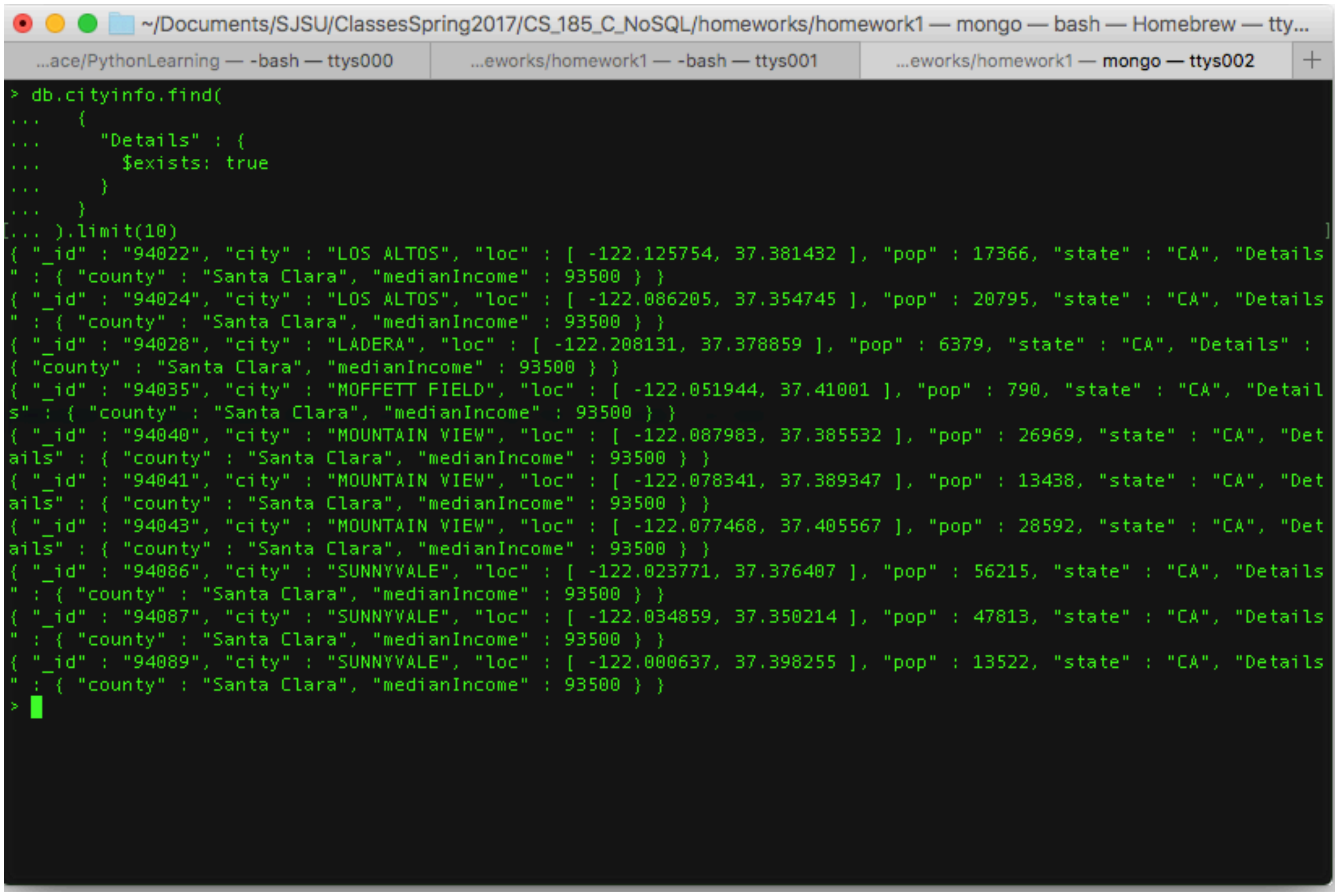
```
> db.cityinfo.find( {      "_id": {        $in: [         "95009",         "95008",         "95013",         "95014",
        "95020",         "94085",         "95023",         "94087",         "94086",         "94089",         "94088
",         "95031",         "95030",         "95033",         "95032",         "95035",         "95037",         "94
301",         "95042",         "94303",         "95044",         "94305",         "95050",         "94304",
"95046",         "94306",         "95051",         "95054",         "95070",         "95103",         "95108",
   "95111",         "95110",         "95113",         "95112",         "95117",         "95116",         "95119",
      "95118",         "95121",         "95120",         "95123",         "95122",         "95125",         "95124",
         "95127",         "95126",         "95129",         "95128",         "95131",         "95130",         "9513
3",         "95132",         "95135",         "95134",         "95136",         "95139",         "95138",         "9
5141",         "95140",         "95148",         "94550",         "95151",         "95150",         "94022",
 "94024",         "95190",         "94028",         "94035",         "94040",         "94042",         "94041",
    "94043",         "95002"         ]       }    }).limit(10)
{ "_id" : "94022", "city" : "LOS ALTOS", "loc" : [ -122.125754, 37.381432 ], "pop" : 17366, "state" : "CA", "Details
" : { "county" : "Santa Clara", "medianIncome" : 93500 } }
{ "_id" : "94024", "city" : "LOS ALTOS", "loc" : [ -122.086205, 37.354745 ], "pop" : 20795, "state" : "CA", "Details
" : { "county" : "Santa Clara", "medianIncome" : 93500 } }
{ "_id" : "94028", "city" : "LADERA", "loc" : [ -122.208131, 37.378859 ], "pop" : 6379, "state" : "CA", "Details" :
{ "county" : "Santa Clara", "medianIncome" : 93500 } }
{ "_id" : "94035", "city" : "MOFFETT FIELD", "loc" : [ -122.051944, 37.41001 ], "pop" : 790, "state" : "CA", "Detail
s" : { "county" : "Santa Clara", "medianIncome" : 93500 } }
{ "_id" : "94040", "city" : "MOUNTAIN VIEW", "loc" : [ -122.087983, 37.385532 ], "pop" : 26969, "state" : "CA", "Det
ails" : { "county" : "Santa Clara", "medianIncome" : 93500 } }
{ "_id" : "94041", "city" : "MOUNTAIN VIEW", "loc" : [ -122.078341, 37.389347 ], "pop" : 13438, "state" : "CA", "Det
ails" : { "county" : "Santa Clara", "medianIncome" : 93500 } }
{ "_id" : "94043", "city" : "MOUNTAIN VIEW", "loc" : [ -122.077468, 37.405567 ], "pop" : 28592, "state" : "CA", "Det
ails" : { "county" : "Santa Clara", "medianIncome" : 93500 } }
{ "_id" : "94086", "city" : "SUNNYVALE", "loc" : [ -122.023771, 37.376407 ], "pop" : 56215, "state" : "CA", "Details
" : { "county" : "Santa Clara", "medianIncome" : 93500 } }
{ "_id" : "94087", "city" : "SUNNYVALE", "loc" : [ -122.034859, 37.350214 ], "pop" : 47813, "state" : "CA", "Details
" : { "county" : "Santa Clara", "medianIncome" : 93500 } }
{ "_id" : "94089", "city" : "SUNNYVALE", "loc" : [ -122.000637, 37.398255 ], "pop" : 13522, "state" : "CA", "Details
" : { "county" : "Santa Clara", "medianIncome" : 93500 } }
>
```

// 9. Find all documents that have an embedded document named Details without using the zip code. (screen 7)

```
db.cityinfo.find(
 {
   "Details" : {
     $exists: true
   }
 }
)
```

// limiting to 10

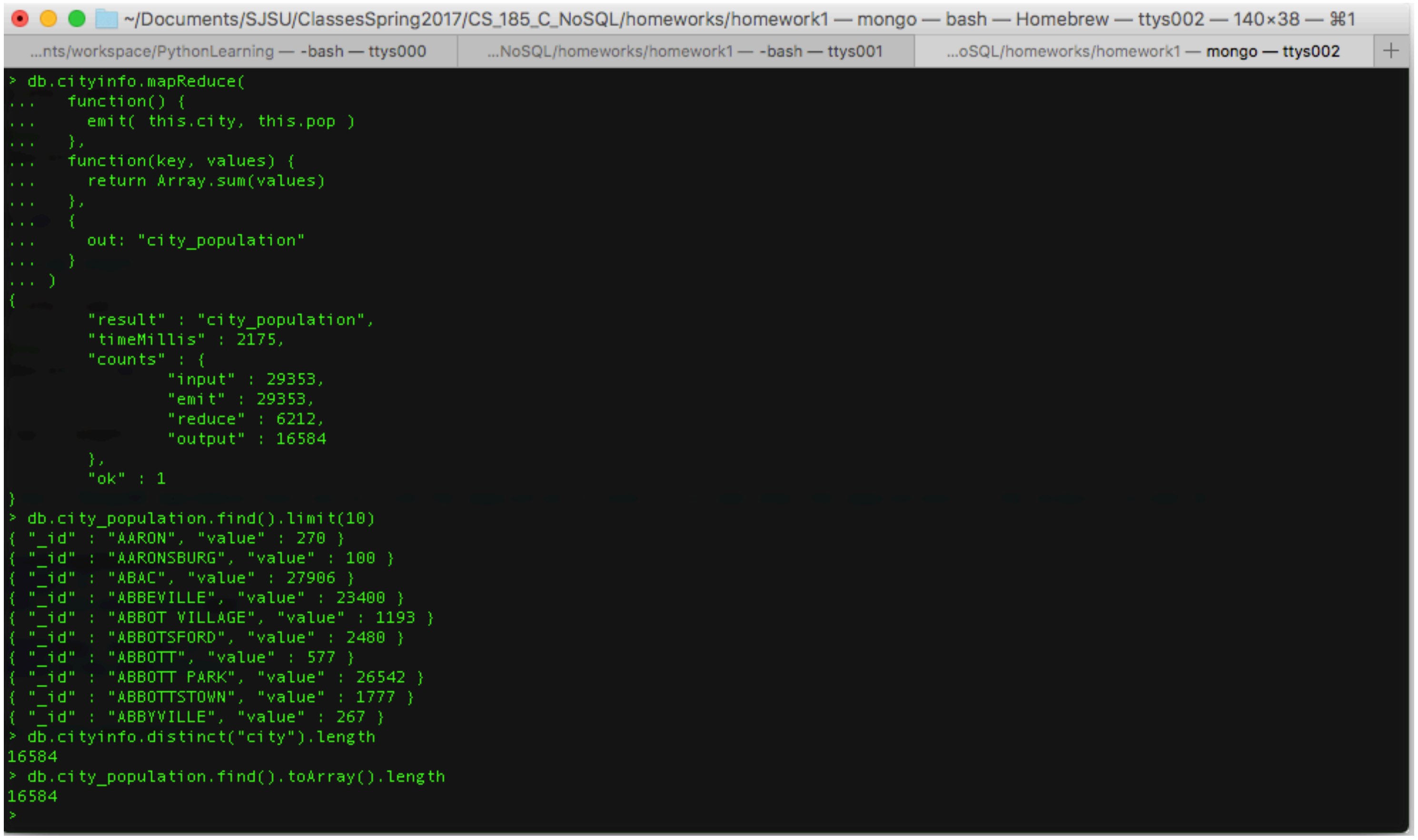
```
db.cityinfo.find(
  {
    "Details" : {
      $exists: true
    }
  }
).limit(10)

// verifying length

db.cityinfo.find(
  {
    "Details" : {
      $exists: true
    }
  }
).toArray().length
```


~/Documents/SJSU/ClassesSpring2017/CS_185_C_NoSQL/homeworks/homework1 — mongo — bash — Homebrew — tty...
...ace/PythonLearning — -bash — ttys000
...eworks/homework1 — -bash — ttys001
...eworks/homework1 — mongo — ttys002

```
> db.cityinfo.find(
...   {
...     "Details" : {
...       $exists: true
...     }
...   }
... ).limit(10)
{ "_id" : "94022", "city" : "LOS ALTOS", "loc" : [ -122.125754, 37.381432 ], "pop" : 17366, "state" : "CA", "Details
" : { "county" : "Santa Clara", "medianIncome" : 93500 } }
{ "_id" : "94024", "city" : "LOS ALTOS", "loc" : [ -122.086205, 37.354745 ], "pop" : 20795, "state" : "CA", "Details
" : { "county" : "Santa Clara", "medianIncome" : 93500 } }
{ "_id" : "94028", "city" : "LADERA", "loc" : [ -122.208131, 37.378859 ], "pop" : 6379, "state" : "CA", "Details" :
{ "county" : "Santa Clara", "medianIncome" : 93500 } }
{ "_id" : "94035", "city" : "MOFFETT FIELD", "loc" : [ -122.051944, 37.41001 ], "pop" : 790, "state" : "CA", "Detail
s" : { "county" : "Santa Clara", "medianIncome" : 93500 } }
{ "_id" : "94040", "city" : "MOUNTAIN VIEW", "loc" : [ -122.087983, 37.385532 ], "pop" : 26969, "state" : "CA", "Det
ails" : { "county" : "Santa Clara", "medianIncome" : 93500 } }
{ "_id" : "94041", "city" : "MOUNTAIN VIEW", "loc" : [ -122.078341, 37.389347 ], "pop" : 13438, "state" : "CA", "Det
ails" : { "county" : "Santa Clara", "medianIncome" : 93500 } }
{ "_id" : "94043", "city" : "MOUNTAIN VIEW", "loc" : [ -122.077468, 37.405567 ], "pop" : 28592, "state" : "CA", "Det
ails" : { "county" : "Santa Clara", "medianIncome" : 93500 } }
{ "_id" : "94086", "city" : "SUNNYVALE", "loc" : [ -122.023771, 37.376407 ], "pop" : 56215, "state" : "CA", "Details
" : { "county" : "Santa Clara", "medianIncome" : 93500 } }
{ "_id" : "94087", "city" : "SUNNYVALE", "loc" : [ -122.034859, 37.350214 ], "pop" : 47813, "state" : "CA", "Details
" : { "county" : "Santa Clara", "medianIncome" : 93500 } }
{ "_id" : "94089", "city" : "SUNNYVALE", "loc" : [ -122.000637, 37.398255 ], "pop" : 13522, "state" : "CA", "Details
" : { "county" : "Santa Clara", "medianIncome" : 93500 } }
>
```

// 10. Use a MongoDB mapreduce function to find the population of every city and show the populations in the output. (screen 8)

```
db.cityinfo.mapReduce(
  function() {
    emit( this.city, this.pop )
  },
  function(key, values) {
    return Array.sum(values)
  },
  {
    out: "city_population"
  }
)
```



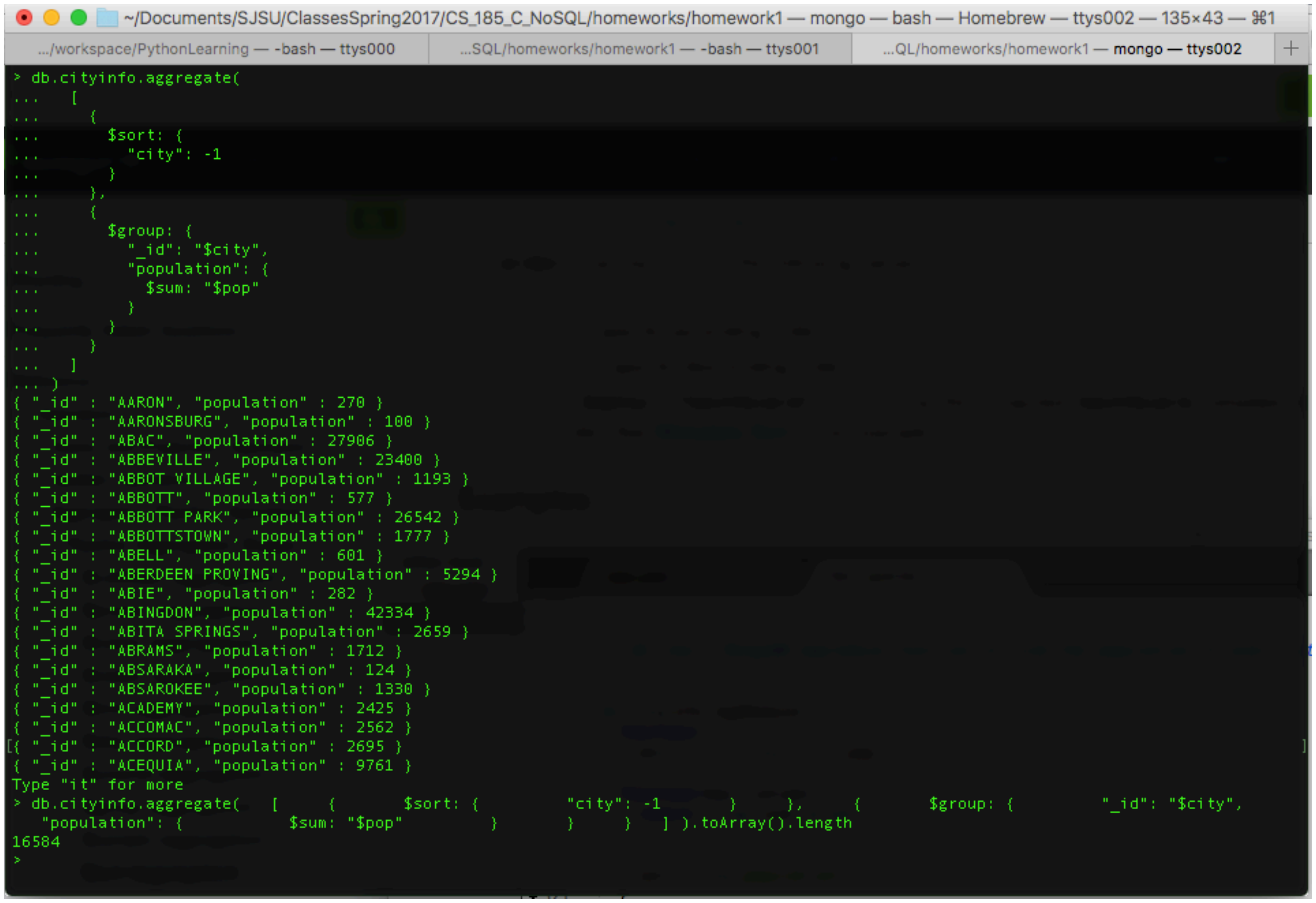
~/Documents/SJSU/ClassesSpring2017/CS_185_C_NoSQL/homeworks/homework1 — mongo — bash — Homebrew — ttys002 — 140×38 — ⌘1

...nts/workspace/PythonLearning — -bash — ttys000 | ...NoSQL/homeworks/homework1 — -bash — ttys001 | ...oSQL/homeworks/homework1 — mongo — ttys002

```
> db.cityinfo.mapReduce(
...   function() {
...     emit( this.city, this.pop )
...   },
...   function(key, values) {
...     return Array.sum(values)
...   },
...   {
...     out: "city_population"
...   }
... )
{
        "result" : "city_population",
        "timeMillis" : 2175,
        "counts" : {
                "input" : 29353,
                "emit" : 29353,
                "reduce" : 6212,
                "output" : 16584
        },
        "ok" : 1
}
> db.city_population.find().limit(10)
{ "_id" : "AARON", "value" : 270 }
{ "_id" : "AARONSBURG", "value" : 100 }
{ "_id" : "ABAC", "value" : 27906 }
{ "_id" : "ABBEVILLE", "value" : 23400 }
{ "_id" : "ABBOT VILLAGE", "value" : 1193 }
{ "_id" : "ABBOTSFORD", "value" : 2480 }
{ "_id" : "ABBOTT", "value" : 577 }
{ "_id" : "ABBOTT PARK", "value" : 26542 }
{ "_id" : "ABBOTTSTOWN", "value" : 1777 }
{ "_id" : "ABBYVILLE", "value" : 267 }
> db.cityinfo.distinct("city").length
16584
> db.city_population.find().toArray().length
16584
>
```

// 11. Use a MongoDB aggregate function to find the population of every city and show the populations in the output. (screen 9)
// used $sort for getting similar output as my mapReduce() query
// to compare
// map reduce had sorted result by default

```
db.cityinfo.aggregate(
  [
    {
      $sort: {
        "city": -1
      }
    },
    {
      $group: {
        "_id": "$city",
        "population": {
          $sum: "$pop"
        }
      }
    }
  ]
)
```



~/Documents/SJSU/ClassesSpring2017/CS_185_C_NoSQL/homeworks/homework1 — mongo — bash — Homebrew — ttys002 — 135×43 — ⌘1

.../workspace/PythonLearning — -bash — ttys000 | ...SQL/homeworks/homework1 — -bash — ttys001 | ...QL/homeworks/homework1 — mongo — ttys002

```
> db.cityinfo.aggregate(
...   [
...     {
...       $sort: {
...         "city": -1
...       }
...     },
...     {
...       $group: {
...         "_id": "$city",
...         "population": {
...           $sum: "$pop"
...         }
...       }
...     }
...   ]
... )
{ "_id" : "AARON", "population" : 270 }
{ "_id" : "AARONSBURG", "population" : 100 }
{ "_id" : "ABAC", "population" : 27906 }
{ "_id" : "ABBEVILLE", "population" : 23400 }
{ "_id" : "ABBOT VILLAGE", "population" : 1193 }
{ "_id" : "ABBOTT", "population" : 577 }
{ "_id" : "ABBOTT PARK", "population" : 26542 }
{ "_id" : "ABBOTTSTOWN", "population" : 1777 }
{ "_id" : "ABELL", "population" : 601 }
{ "_id" : "ABERDEEN PROVING", "population" : 5294 }
{ "_id" : "ABIE", "population" : 282 }
{ "_id" : "ABINGDON", "population" : 42334 }
{ "_id" : "ABITA SPRINGS", "population" : 2659 }
{ "_id" : "ABRAMS", "population" : 1712 }
{ "_id" : "ABSARAKA", "population" : 124 }
{ "_id" : "ABSAROKEE", "population" : 1330 }
{ "_id" : "ACADEMY", "population" : 2425 }
{ "_id" : "ACCOMAC", "population" : 2562 }
{ "_id" : "ACCORD", "population" : 2695 }
{ "_id" : "ACEQUIA", "population" : 9761 }
Type "it" for more
> db.cityinfo.aggregate(   [     {       $sort: {         "city": -1       }     },     {       $group: {         "_id": "$city",
   "population": {          $sum: "$pop"         }       }     }   ] ).toArray().length
16584
>
```

// 12. Compare the execution times of the mapreduce and the aggregate functions to find the population of every city. (Write your comparison result.)

// The mapReduce() took 1633 milliseconds (from the query execution explain document)

```
// {
//   "result" : "city_population",
//   "timeMillis" : 1633,
//   "counts" : {
//     "input" : 29353,
//     "emit" : 29353,
//     "reduce" : 6212,
//     "output" : 16584
//   },
//   "ok" : 1
// }
```

// and the aggregation pipeline or the aggregate() took 70 milliseconds (from the snapshot of the profiler)

```
// > db.system.profile.find().limit(1).pretty()
// {
//   "op" : "command",
//   "ns" : "usdata.cityinfo",
//   "command" : {
//     "aggregate" : "cityinfo",
//     "pipeline" : [
//       {
//         "$sort" : {
//           "city" : -1
//         }
//       },
//       {
//         "$group" : {
//           "_id" : "$city",
//           "population" : {
//             "$sum" : "$pop"
//           }
//         }
//       }
//     ],
//     "cursor" : {

//     }
//   },
//   "cursorid" : 36591943087,
//   "keysExamined" : 0,
//   "docsExamined" : 29353,
//   "hasSortStage" : true,
//   "numYield" : 229,
//   "locks" : {
//     "Global" : {
//       "acquireCount" : {
//         "r" : NumberLong(468)
//       }
//     },
//     "Database" : {
//       "acquireCount" : {
//         "r" : NumberLong(234)
//       }
//     },
//     "Collection" : {
//       "acquireCount" : {
//         "r" : NumberLong(233)
//       }
//     }
//   },
//   "nreturned" : 101,
//   "responseLength" : 4346,
//   "protocol" : "op_command",
//   "millis" : 70,
//   "planSummary" : "COLLSCAN",
//   "ts" : ISODate("2017-02-25T08:04:14.647Z"),
//   "client" : "127.0.0.1",
//   "appName" : "MongoDB Shell",
//   "allUsers" : [ ],
//   "user" : ""
// }

// Looking at the results, aggregation pipeline is definitely faster, considering I even did a sort!
```