SSD Monsoon 2024

Lab 8 (11th Oct) - aggregate, count, distinct, mapReduce

Syntax

map,JavaScript function to map the data

reduce,JavaScript function to reduce the mapped data

out:Output collection or "inline" for results in-memory

query: Optional filter to select documents to process

sort: Optional sorting of documents before applying mapReduce

limit: Optional limit on the number of input documents

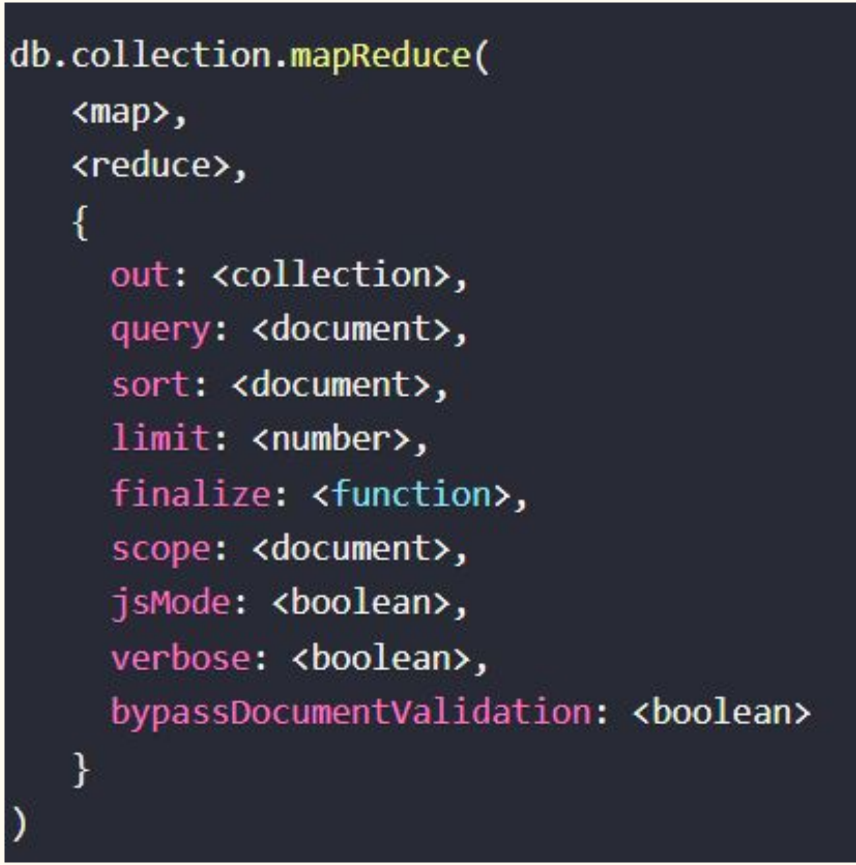
finalize: Optional function to modify the final output

scope:Optional variables accessible within map and reduce functions

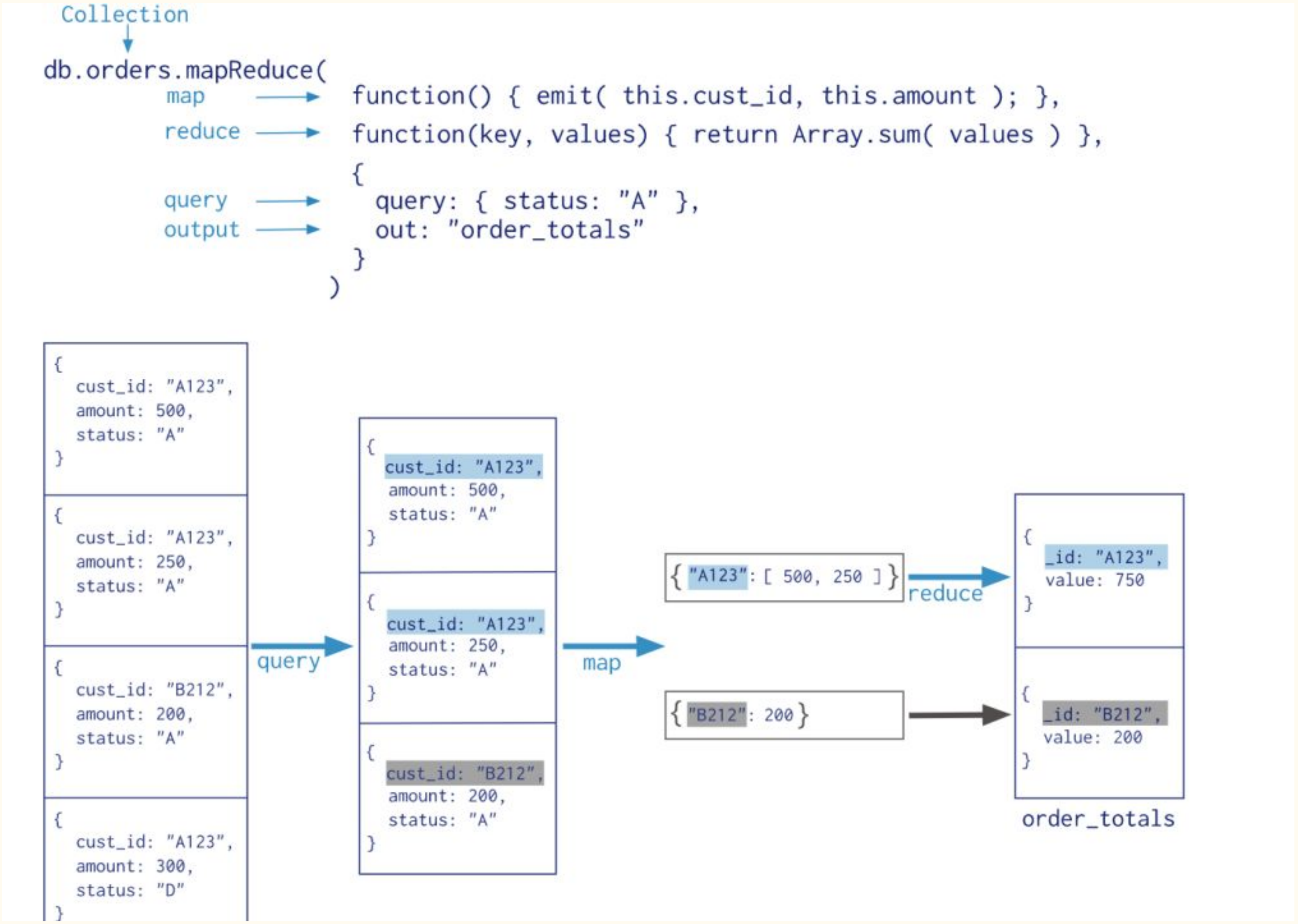
jsMode: Optional. If true, it runs the reduce function in JavaScript mode

verbose: Optional. If true, adds additional statistics to output

bypassDocumentValidation Optional. If true, skips validation for insertion



```
db.collection.mapReduce(
   <map>,
   <reduce>,
   {
     out: <collection>,
     query: <document>,
     sort: <document>,
     limit: <number>,
     finalize: <function>,
     scope: <document>,
     jsMode: <boolean>,
     verbose: <boolean>,
     bypassDocumentValidation: <boolean>
   }
)
```



```
db.orders.mapReduce(
           function() { emit( this.cust_id, this.amount ); },
           function(key, values) { return Array.sum( values ) },
           {
             query: { status: "A" },
             out: "order_totals"
           }
)
```

```
{
  cust_id: "A123",
  amount: 500,
  status: "A"
}
{
  cust_id: "A123",
  amount: 250,
  status: "A"
}
{
  cust_id: "B212",
  amount: 200,
  status: "A"
}
{
  cust_id: "A123",
  amount: 300,
  status: "D"
}
```

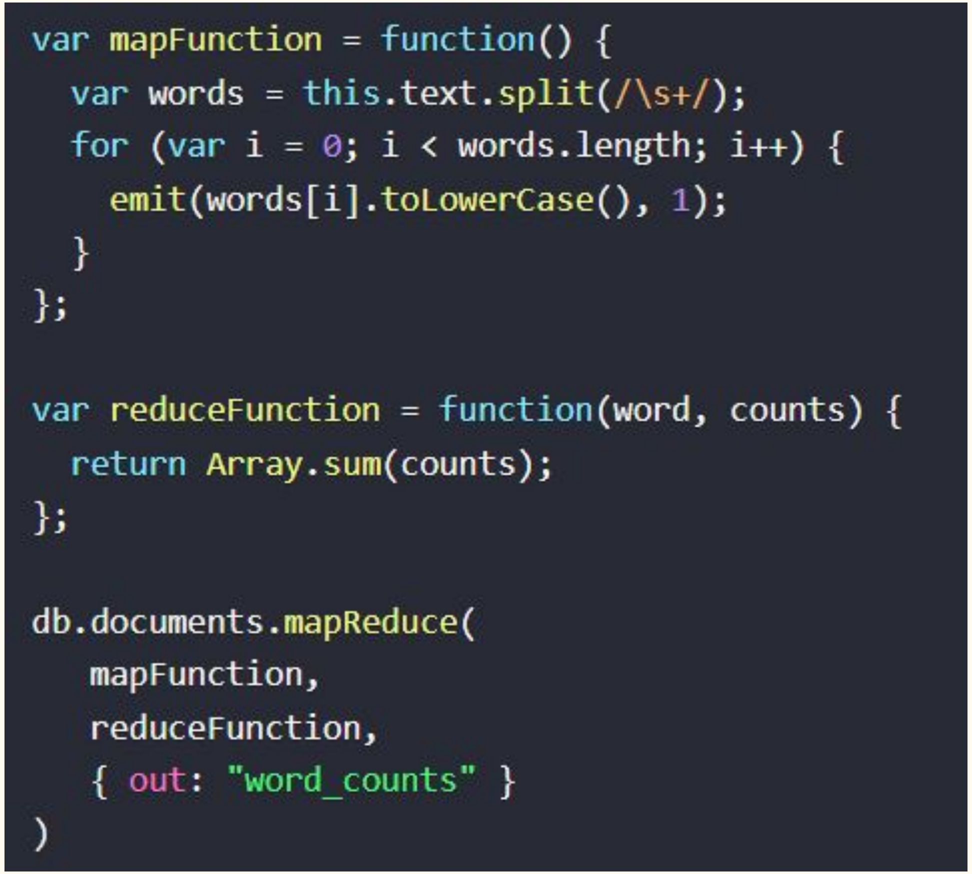
```
{
  cust_id: "A123",
  amount: 500,
  status: "A"
}
{
  cust_id: "A123",
  amount: 250,
  status: "A"
}
{
  cust_id: "B212",
  amount: 200,
  status: "A"
}
```

```
{ "A123": [ 500, 250 ] }
{ "B212": 200 }
```

```
{
  _id: "A123",
  value: 750
}
{
  _id: "B212",
  value: 200
}
```

Counting word occurrences

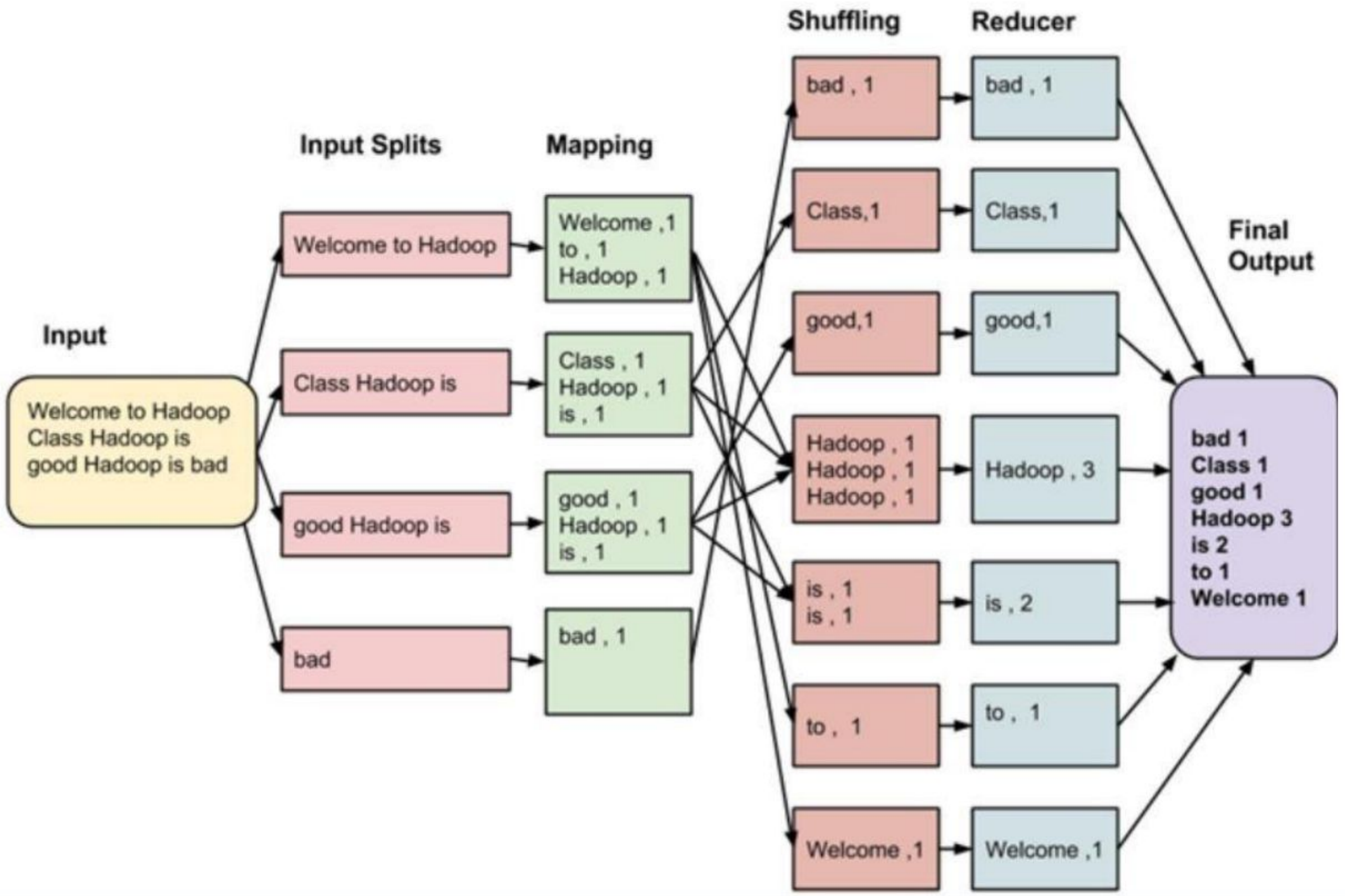
```
db.text.mapReduce(
  function() {
    emit(this.word, 1);
  },
  function(key, values) {
    return Array.sum(values);
  },
  { out: "word_count" }
)
```



```
var mapFunction = function() {
  var words = this.text.split(/\s+/);
  for (var i = 0; i < words.length; i++) {
    emit(words[i].toLowerCase(), 1);
  }
};

var reduceFunction = function(word, counts) {
  return Array.sum(counts);
};

db.documents.mapReduce(
   mapFunction,
   reduceFunction,
   { out: "word_counts" }
)
```


Shuffling
Reducer
Input Splits
Mapping
Input
Final Output
Welcome to Hadoop Class Hadoop is good Hadoop is bad
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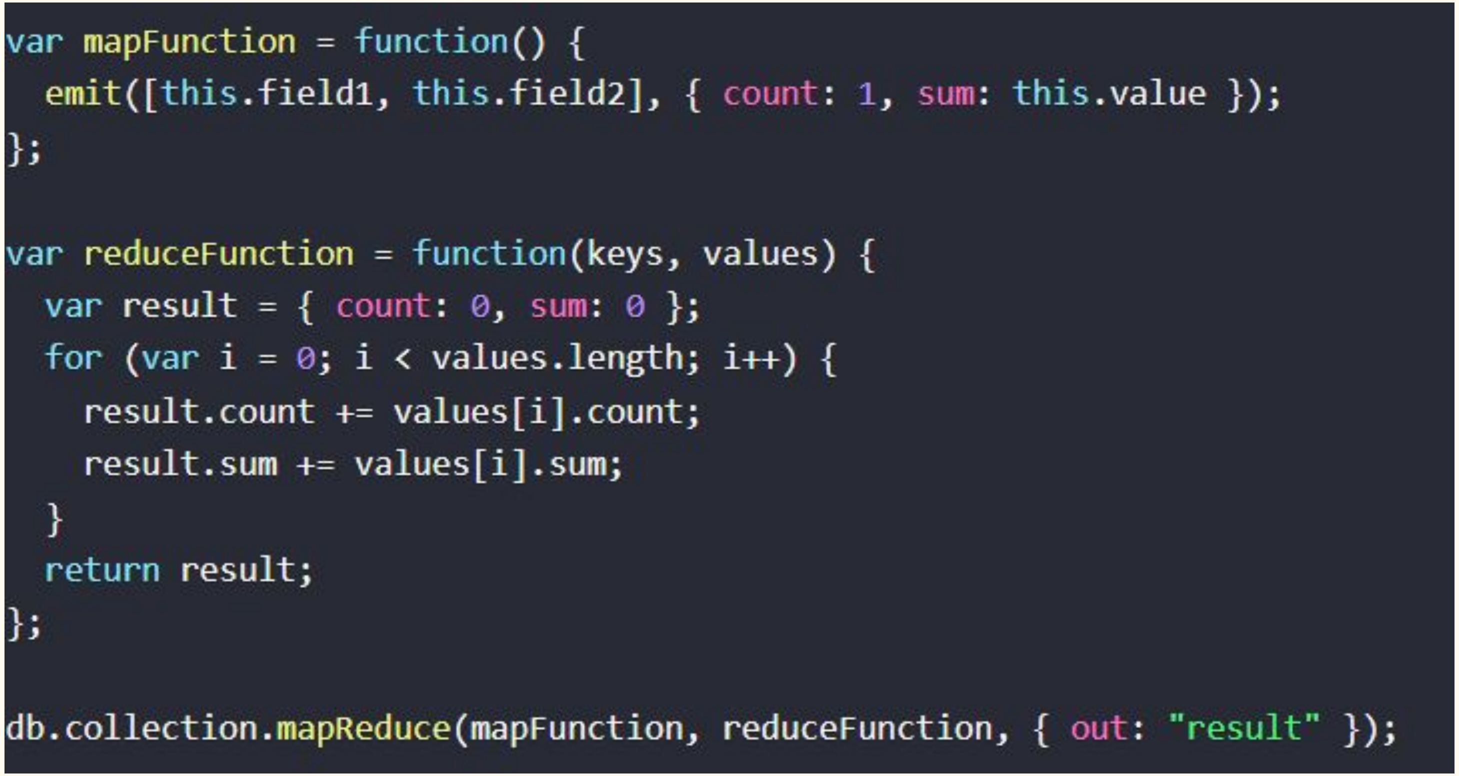
Group documents by multiple fields and calculate sums for each group.

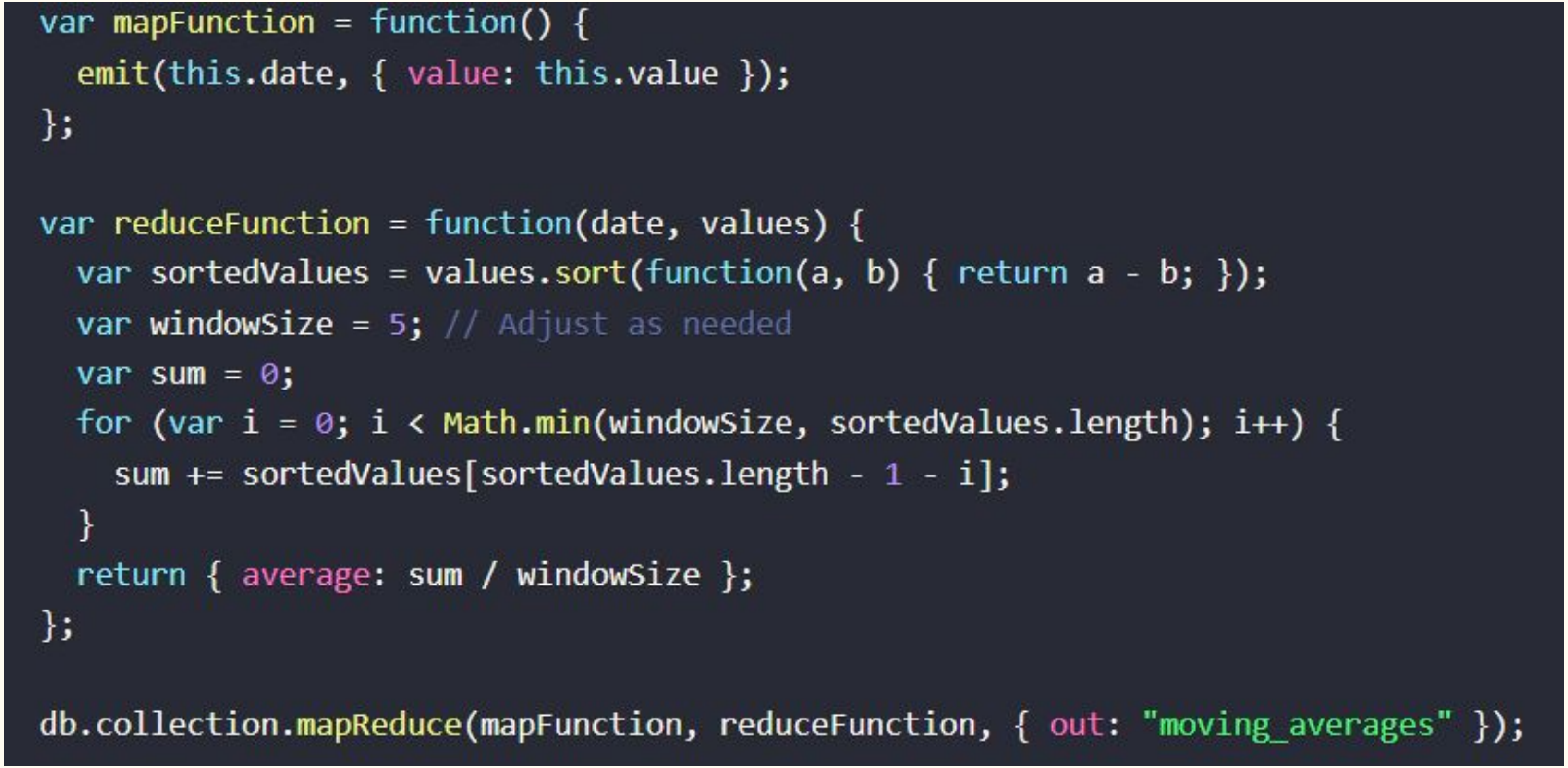


```
var mapFunction = function() {
  emit([this.field1, this.field2], { count: 1, sum: this.value });
};

var reduceFunction = function(keys, values) {
  var result = { count: 0, sum: 0 };
  for (var i = 0; i < values.length; i++) {
    result.count += values[i].count;
    result.sum += values[i].sum;
  }
  return result;
};

db.collection.mapReduce(mapFunction, reduceFunction, { out: "result" });
```

Calculate moving averages over a series of documents

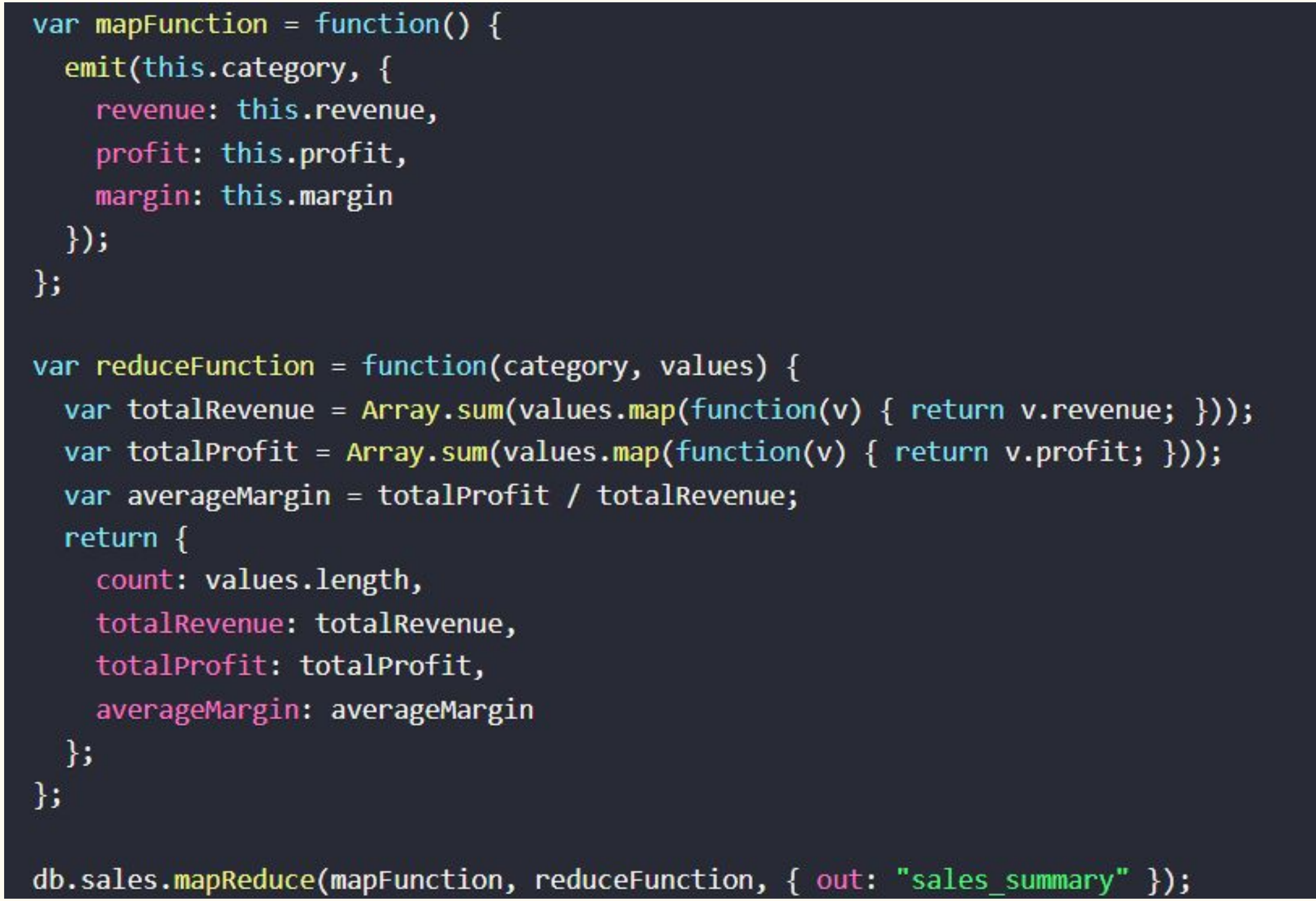


```javascript
var mapFunction = function() {
  emit(this.date, { value: this.value });
};

var reduceFunction = function(date, values) {
  var sortedValues = values.sort(function(a, b) { return a - b; });
  var windowSize = 5; // Adjust as needed
  var sum = 0;
  for (var i = 0; i < Math.min(windowSize, sortedValues.length); i++) {
    sum += sortedValues[sortedValues.length - 1 - i];
  }
  return { average: sum / windowSize };
};

db.collection.mapReduce(mapFunction, reduceFunction, { out: "moving_averages" });
```

Calculating Compound Metrics

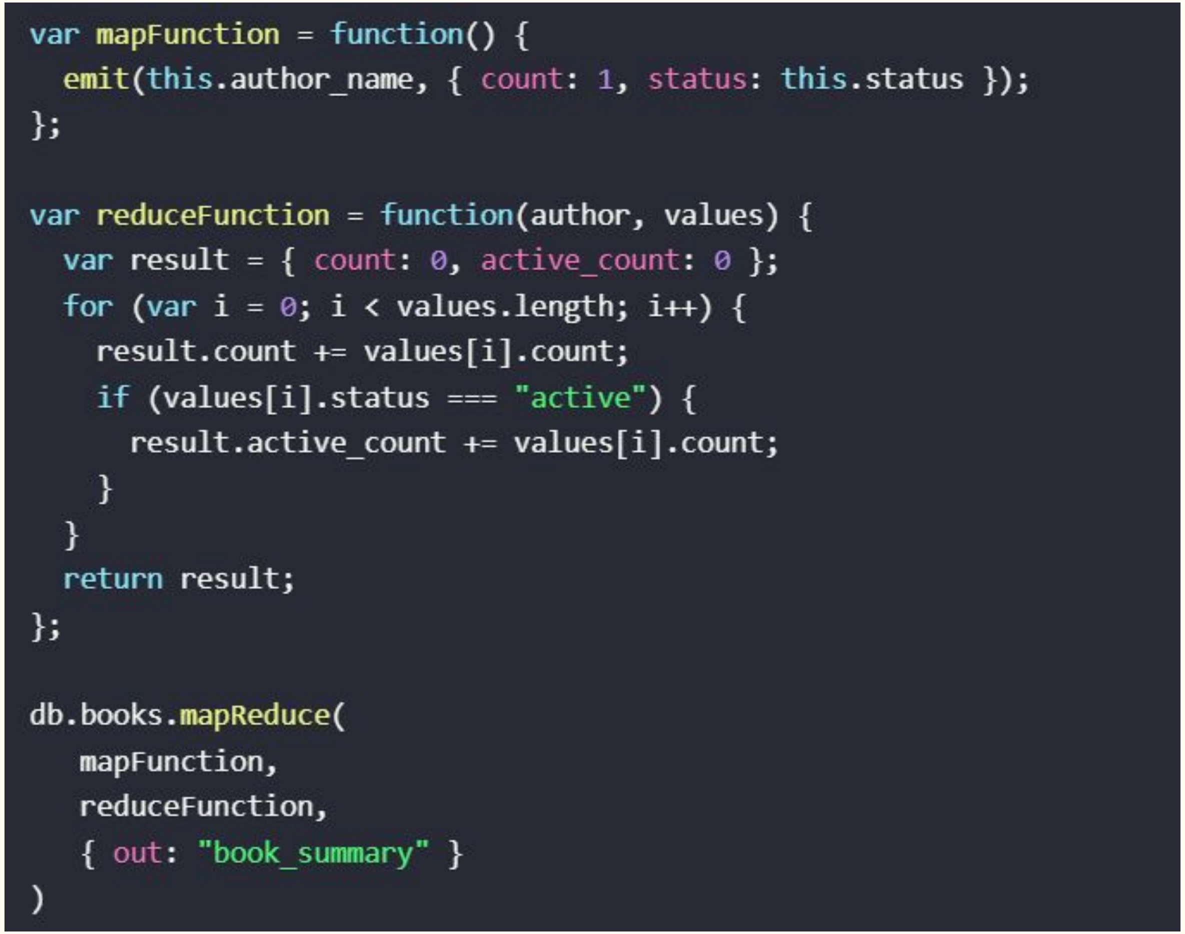


```
var mapFunction = function() {
  emit(this.category, {
    revenue: this.revenue,
    profit: this.profit,
    margin: this.margin
  });
};

var reduceFunction = function(category, values) {
  var totalRevenue = Array.sum(values.map(function(v) { return v.revenue; }));
  var totalProfit = Array.sum(values.map(function(v) { return v.profit; }));
  var averageMargin = totalProfit / totalRevenue;
  return {
    count: values.length,
    totalRevenue: totalRevenue,
    totalProfit: totalProfit,
    averageMargin: averageMargin
  };
};

db.sales.mapReduce(mapFunction, reduceFunction, { out: "sales_summary" });
```

Grouping Books by Author and Counting Active Books

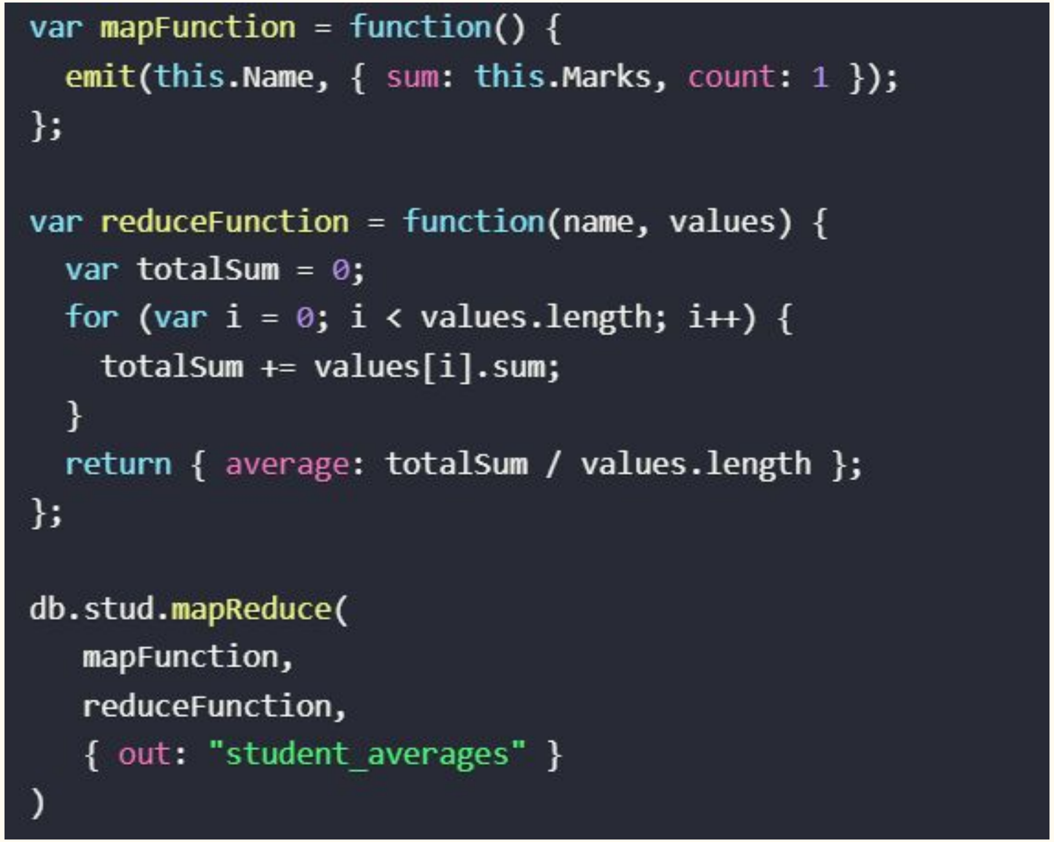


```
var mapFunction = function() {
  emit(this.author_name, { count: 1, status: this.status });
};

var reduceFunction = function(author, values) {
  var result = { count: 0, active_count: 0 };
  for (var i = 0; i < values.length; i++) {
    result.count += values[i].count;
    if (values[i].status === "active") {
      result.active_count += values[i].count;
    }
  }
  return result;
};

db.books.mapReduce(
   mapFunction,
   reduceFunction,
   { out: "book_summary" }
)
```

Calculating Average Marks for Students

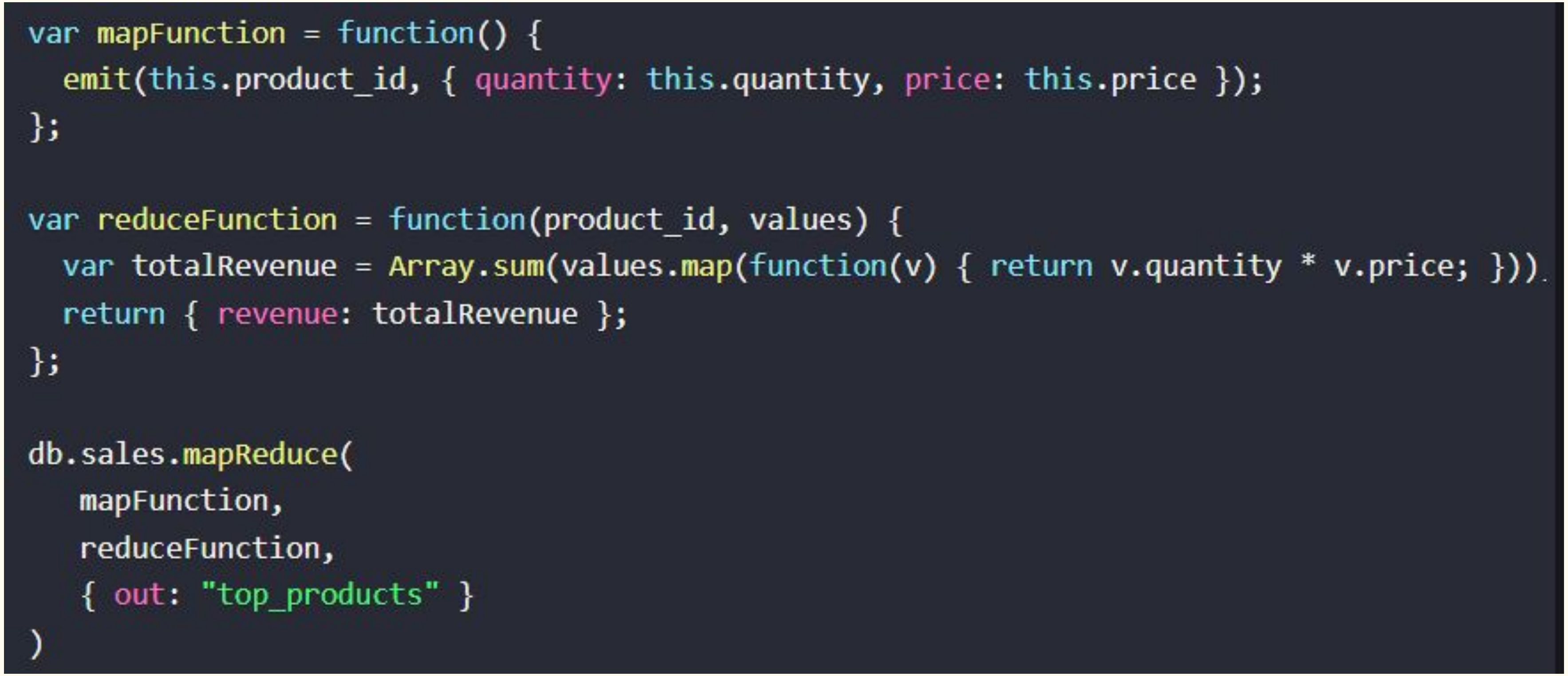


```
var mapFunction = function() {
  emit(this.Name, { sum: this.Marks, count: 1 });
};

var reduceFunction = function(name, values) {
  var totalSum = 0;
  for (var i = 0; i < values.length; i++) {
    totalSum += values[i].sum;
  }
  return { average: totalSum / values.length };
};

db.stud.mapReduce(
   mapFunction,
   reduceFunction,
   { out: "student_averages" }
)
```

Finding Top-Selling Products



```
var mapFunction = function() {
  emit(this.product_id, { quantity: this.quantity, price: this.price });
};

var reduceFunction = function(product_id, values) {
  var totalRevenue = Array.sum(values.map(function(v) { return v.quantity * v.price; }))
  return { revenue: totalRevenue };
};

db.sales.mapReduce(
   mapFunction,
   reduceFunction,
   { out: "top_products" }
)
```