



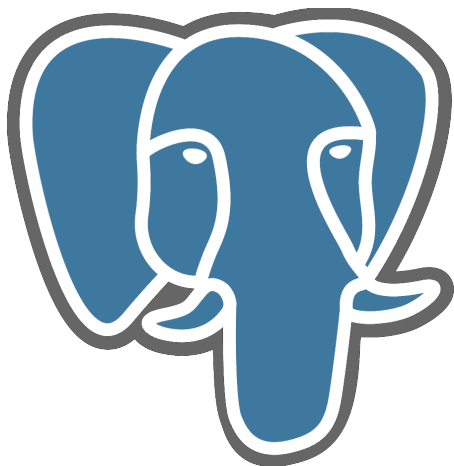
CouchDB
relax

Vs



mongoDB

Database



No SQL

SQLite

ORACLE®



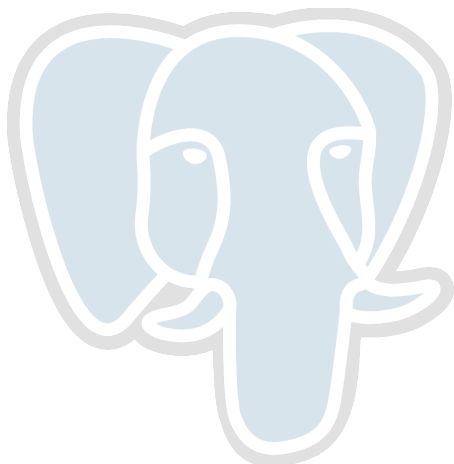
 mongoDB

Redis

 Cassandra


CouchDB
relax

GEMSTONE 



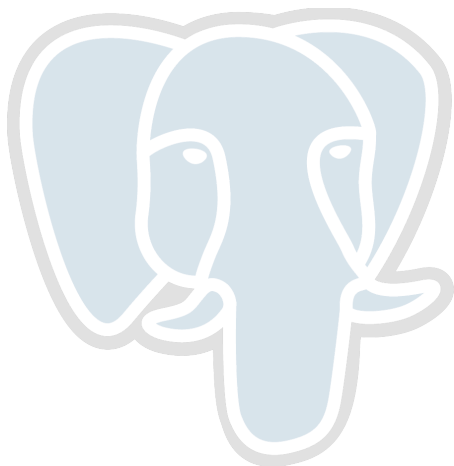
VERTICA


MySQL™

Key-Value Database

SQLite

ORACLE®



Document Database

SQLite

ORACLE®



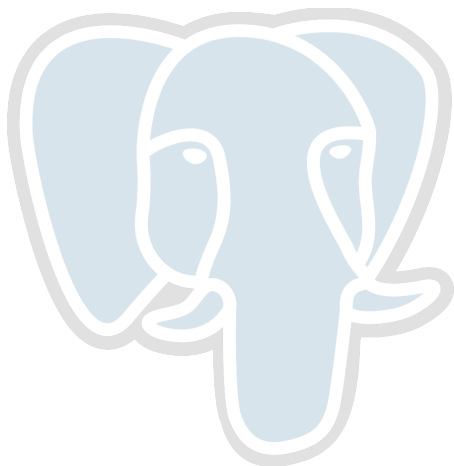
 mongoDB

Redis

 Cassandra


CouchDB
relax

GEMSTONE S



VERTICA

MySQL 

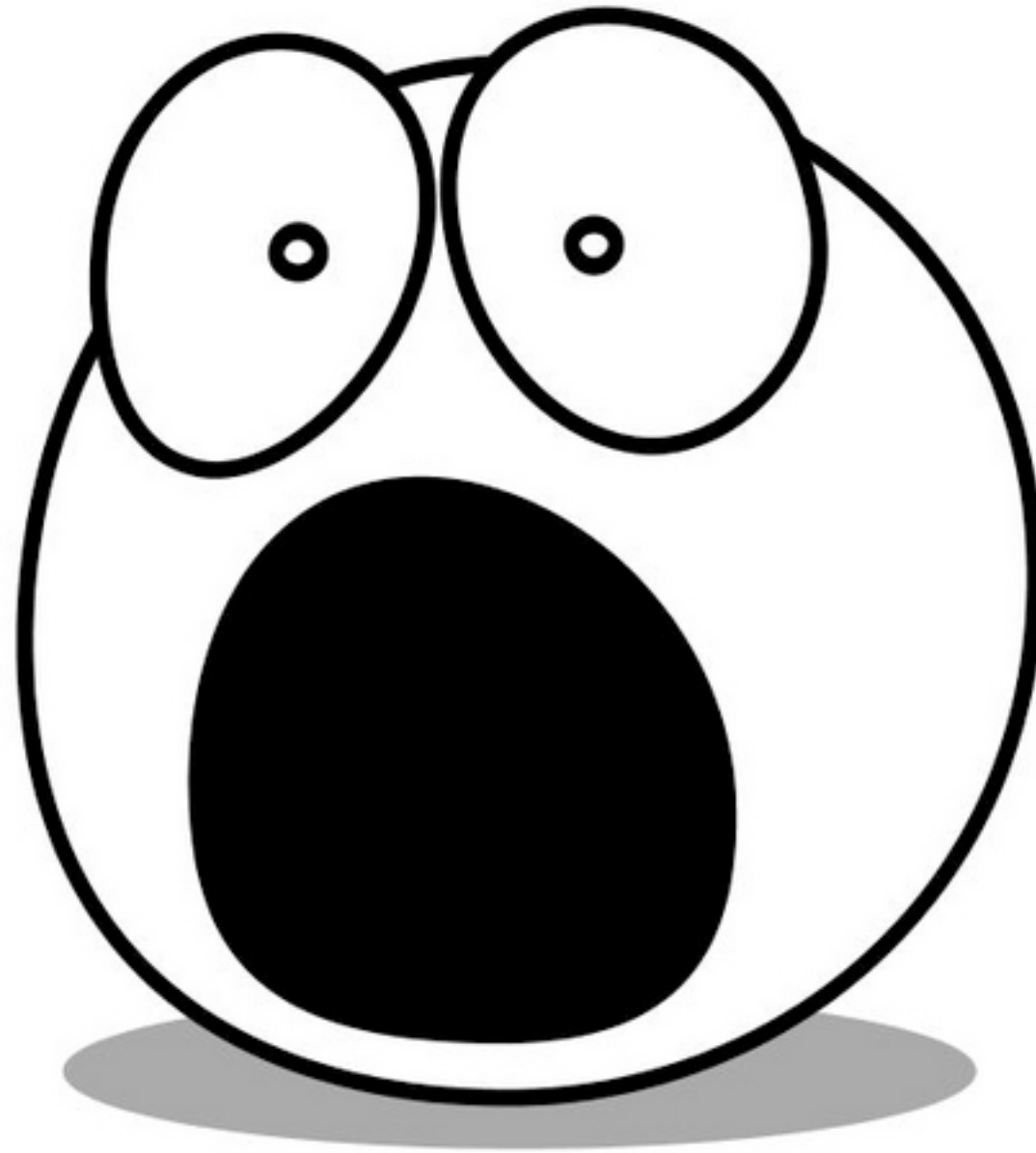
Document

Key ->

```
{  
  "day": [ 2010, 01, 23 ],  
  "products": {  
    "apple": {  
      "price": 10  
      "quantity": 6  
    },  
    "kiwi": {  
      "price": 20  
      "quantity": 2  
    }  
  },  
  "checkout": 100  
}
```

	Couchdb	Mongodb
Data Model	Document-Oriented (JSON)	Document-Oriented (BSON)
Interface	HTTP/REST	Custom protocol over TCP/IP
Object Storage	Database contains Documents	Database contains Collections Collections contains Documents
Query Method	Map/Reduce (javascript + others) creating Views + Range queries	Map/Reduce (javascript) creating Collections + Object-Based query language
Replication	Master-Master with custom conflict resolution functions	Master-Slave
Concurrency	MVCC (Multi Version Concurrency Control)	Update in-place
Written In	Erlang	C++

Map/Reduce???



Example: Tickets

```
{  
  "id": 1,  
  "day": 20100123,  
  "checkout": 100  
}
```

```
{  
  "id": 2,  
  "day": 20100123,  
  "checkout": 42  
}
```

```
{  
  "id": 3,  
  "day": 20100123,  
  "checkout": 215  
}
```

```
{  
  "id": 4,  
  "day": 20100123,  
  "checkout": 73  
}
```

Sum(checkout)?

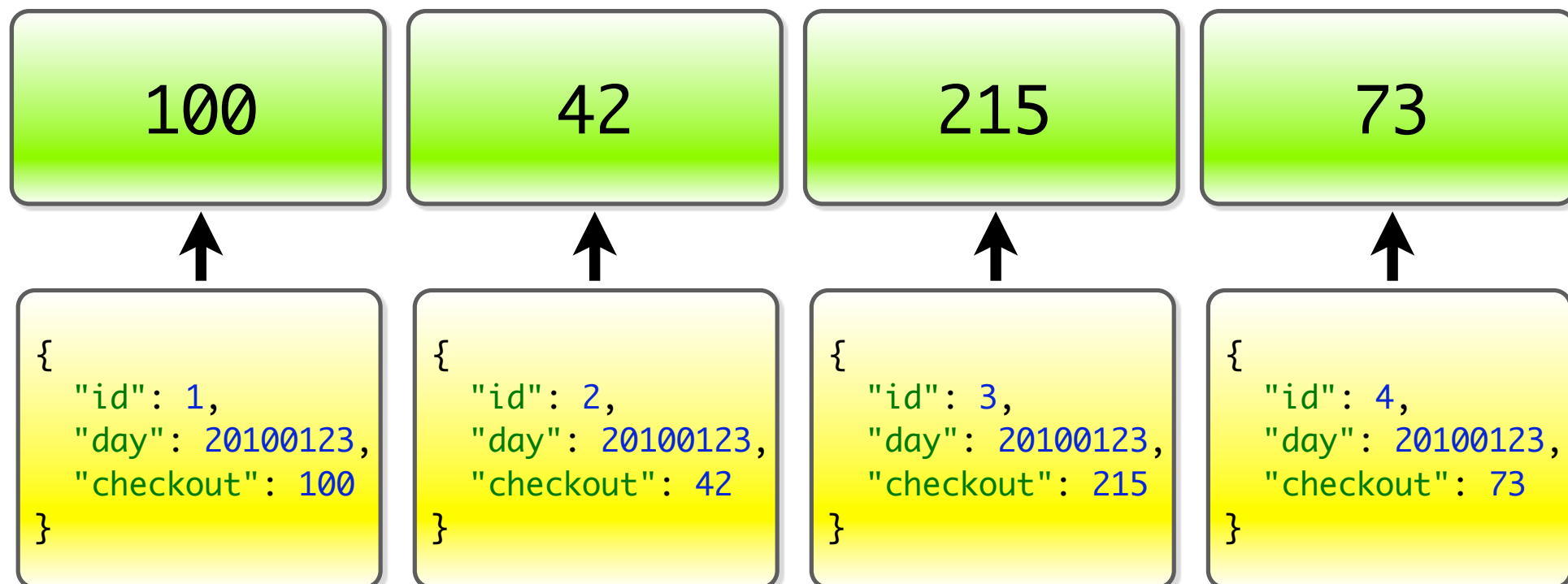
```
{  
  "id": 1,  
  "day": 20100123,  
  "checkout": 100  
}
```

```
{  
  "id": 2,  
  "day": 20100123,  
  "checkout": 42  
}
```

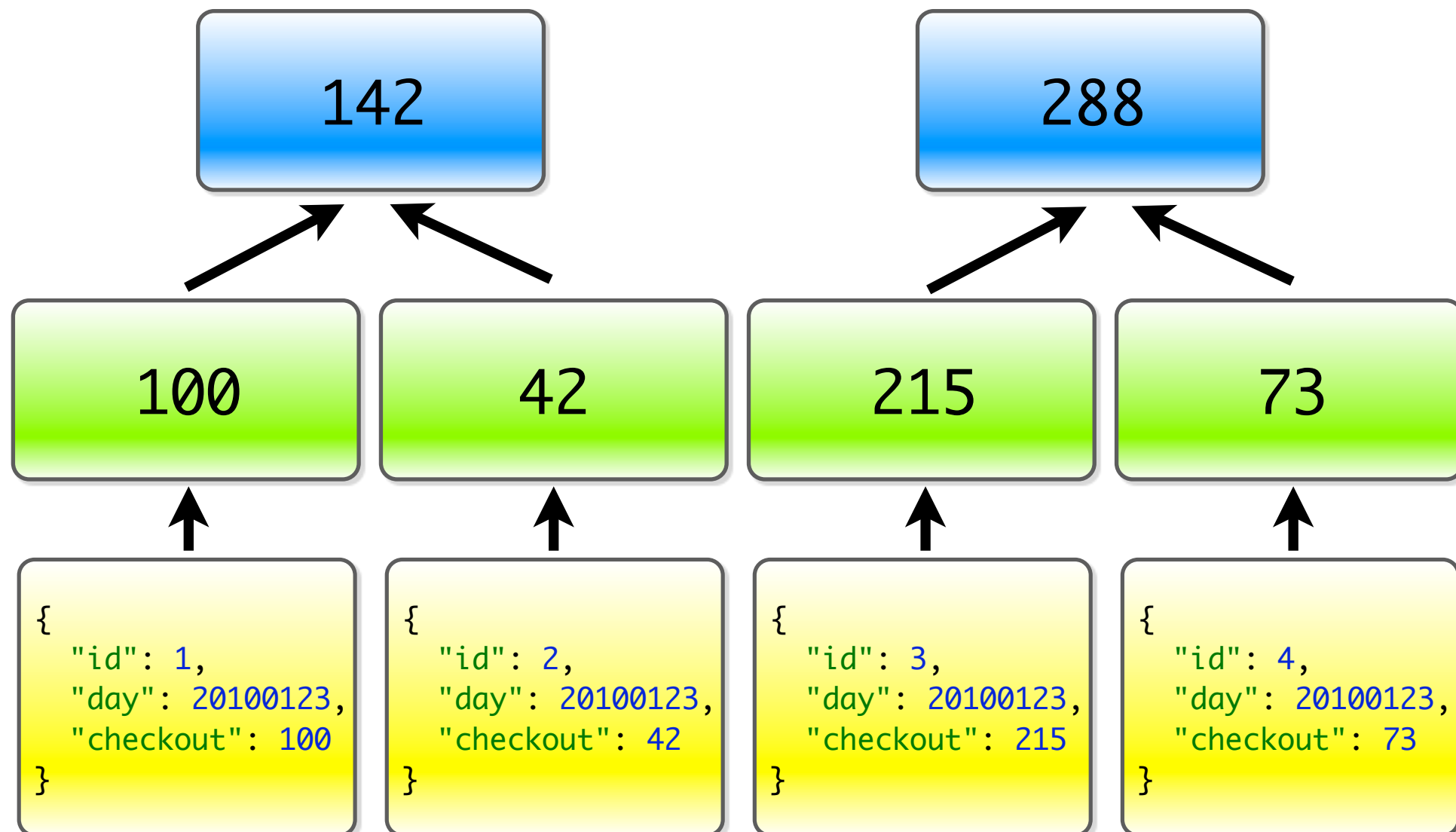
```
{  
  "id": 3,  
  "day": 20100123,  
  "checkout": 215  
}
```

```
{  
  "id": 4,  
  "day": 20100123,  
  "checkout": 73  
}
```

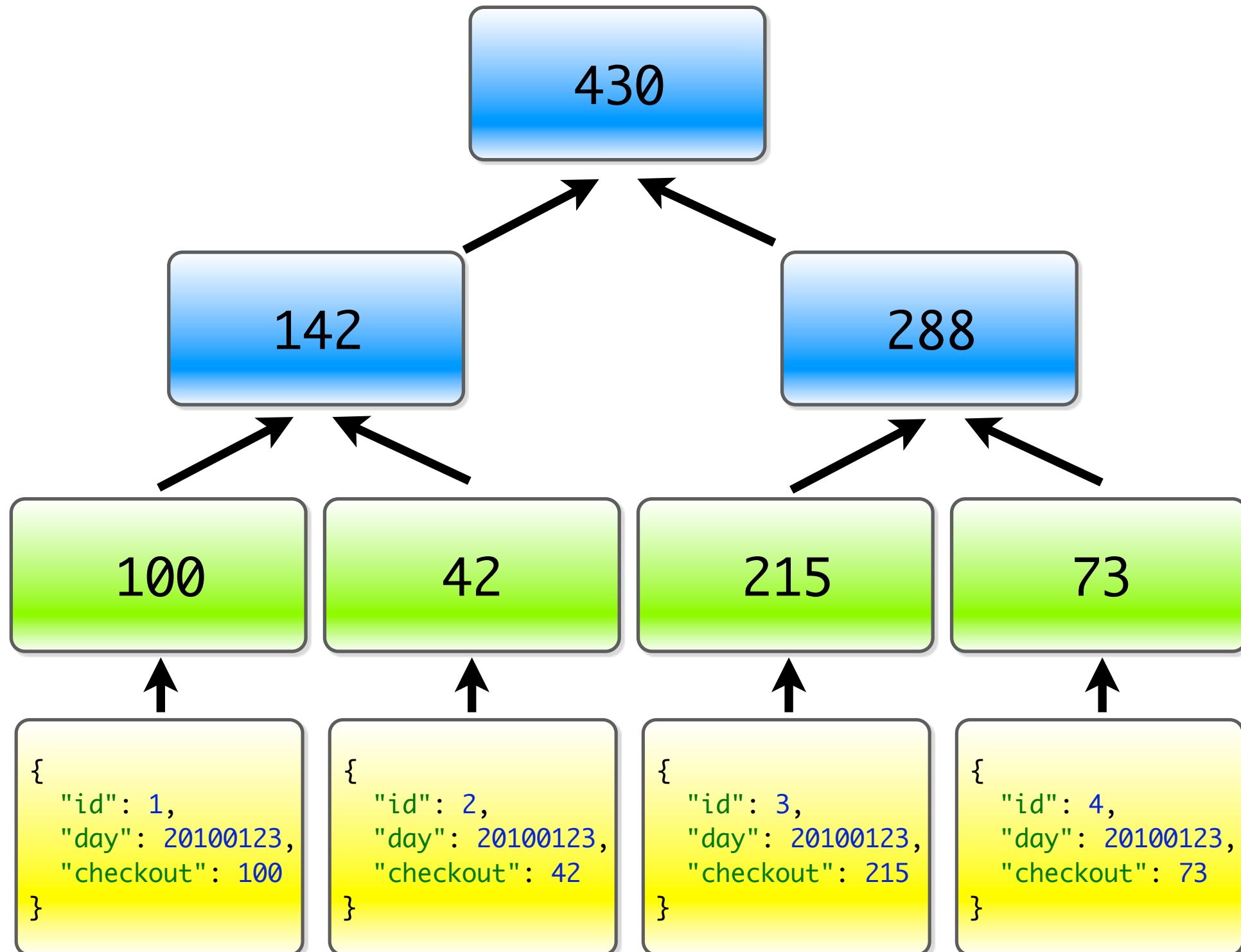
Map: emit(checkout)



Reduce: `sum(checkouts)`



Reduce: `sum(checkouts)`



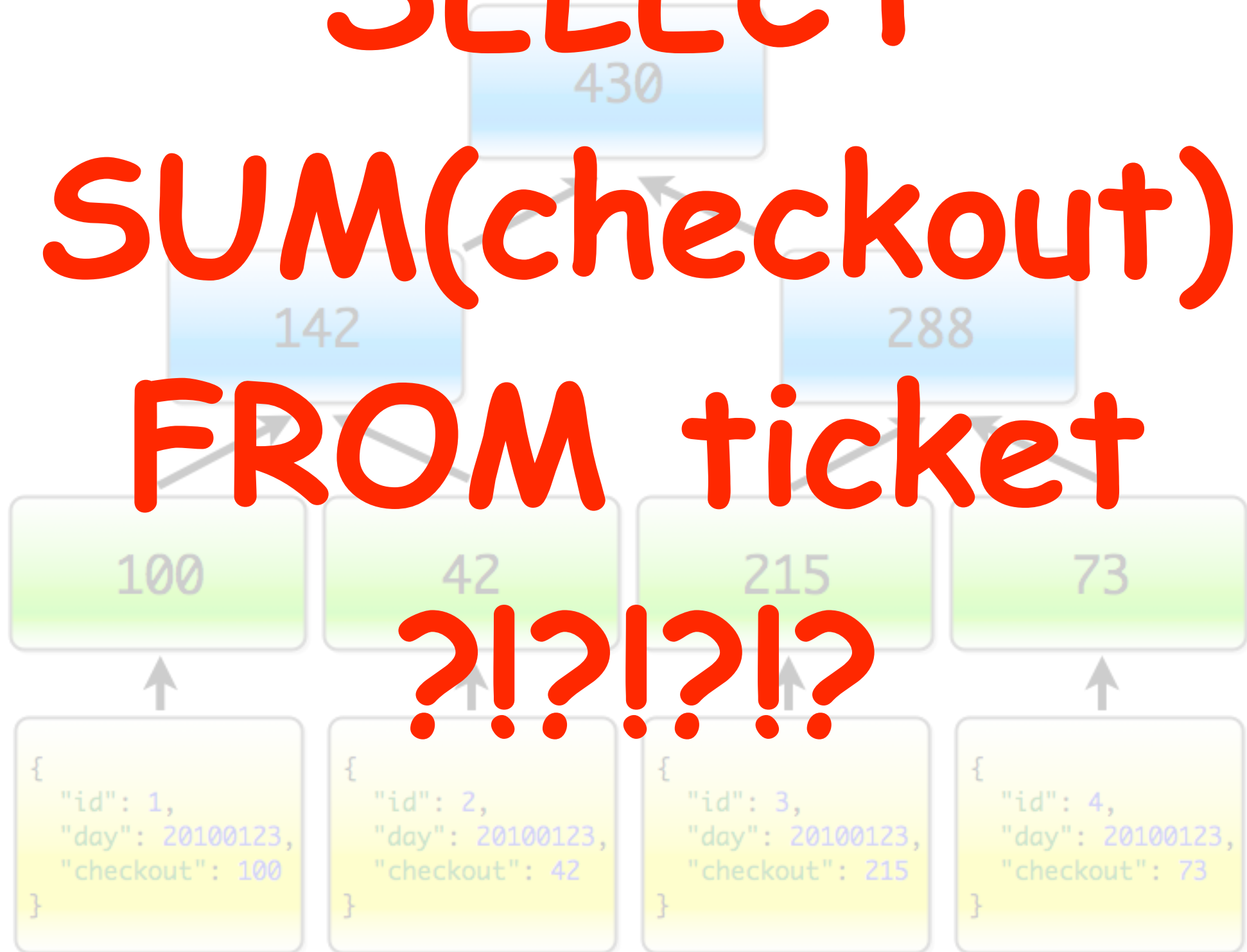
Reduce must be associative

$$\text{reduce}(\boxed{100} \boxed{42} \boxed{215} \boxed{73}) == \boxed{430}$$

Must be equal to

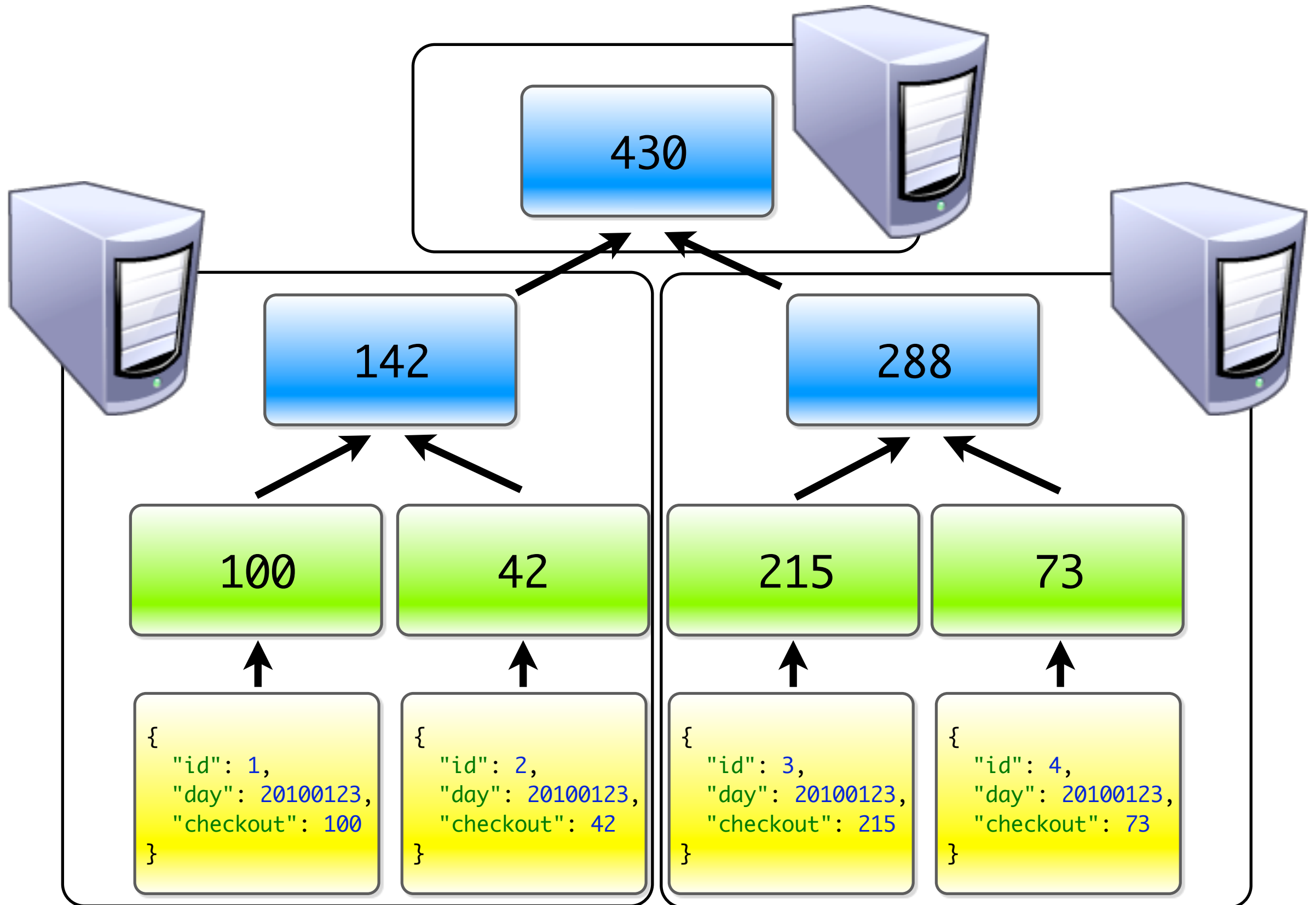
$$\begin{aligned} &\text{reduce}(\text{reduce}(\boxed{100} \boxed{42}) == \boxed{142} \\ &\quad \text{reduce}(\boxed{215} \boxed{73}) == \boxed{288} \\ &) == \boxed{430} \end{aligned}$$

SELECT
SUM(checkout)
FROM ticket

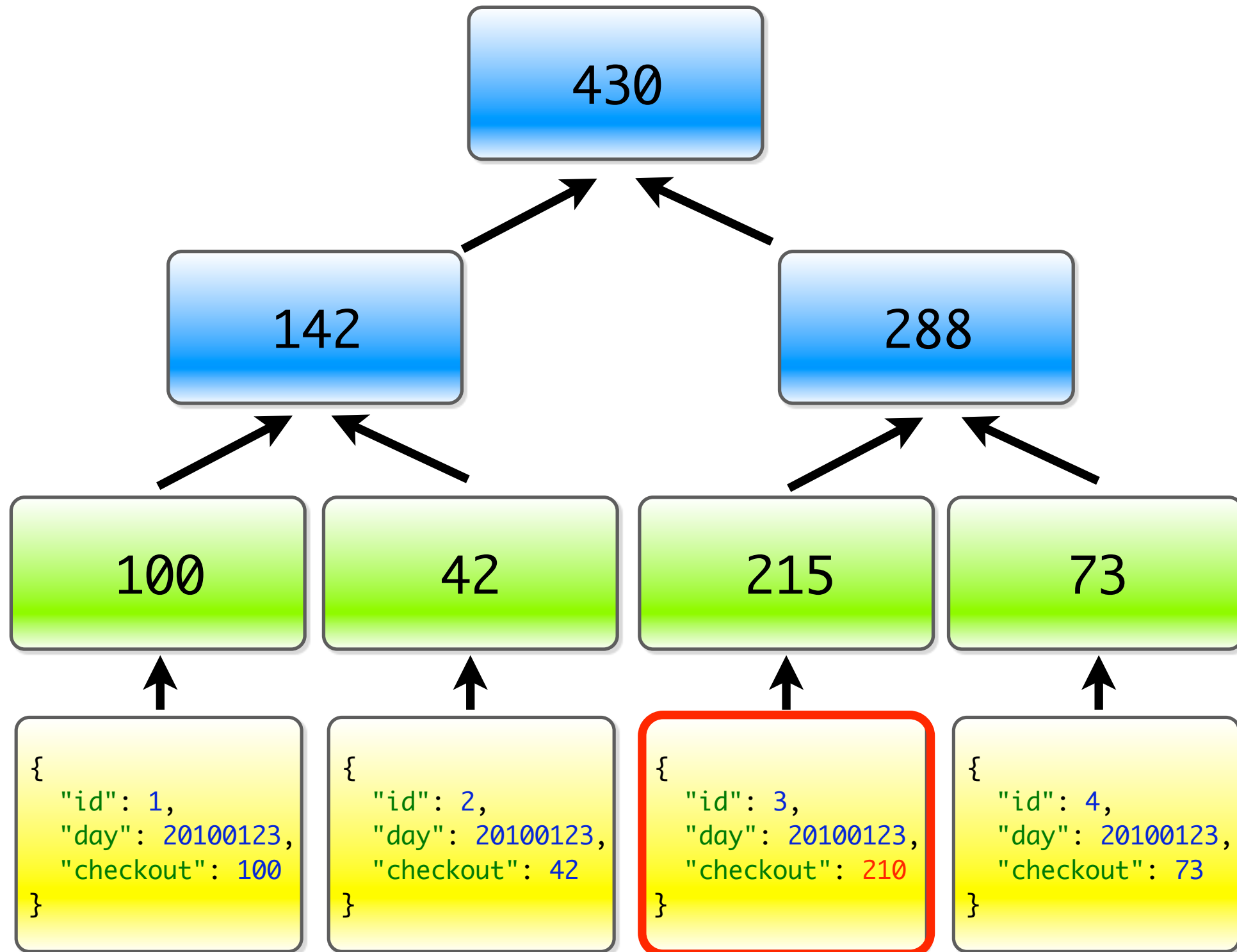


?!?!?!?

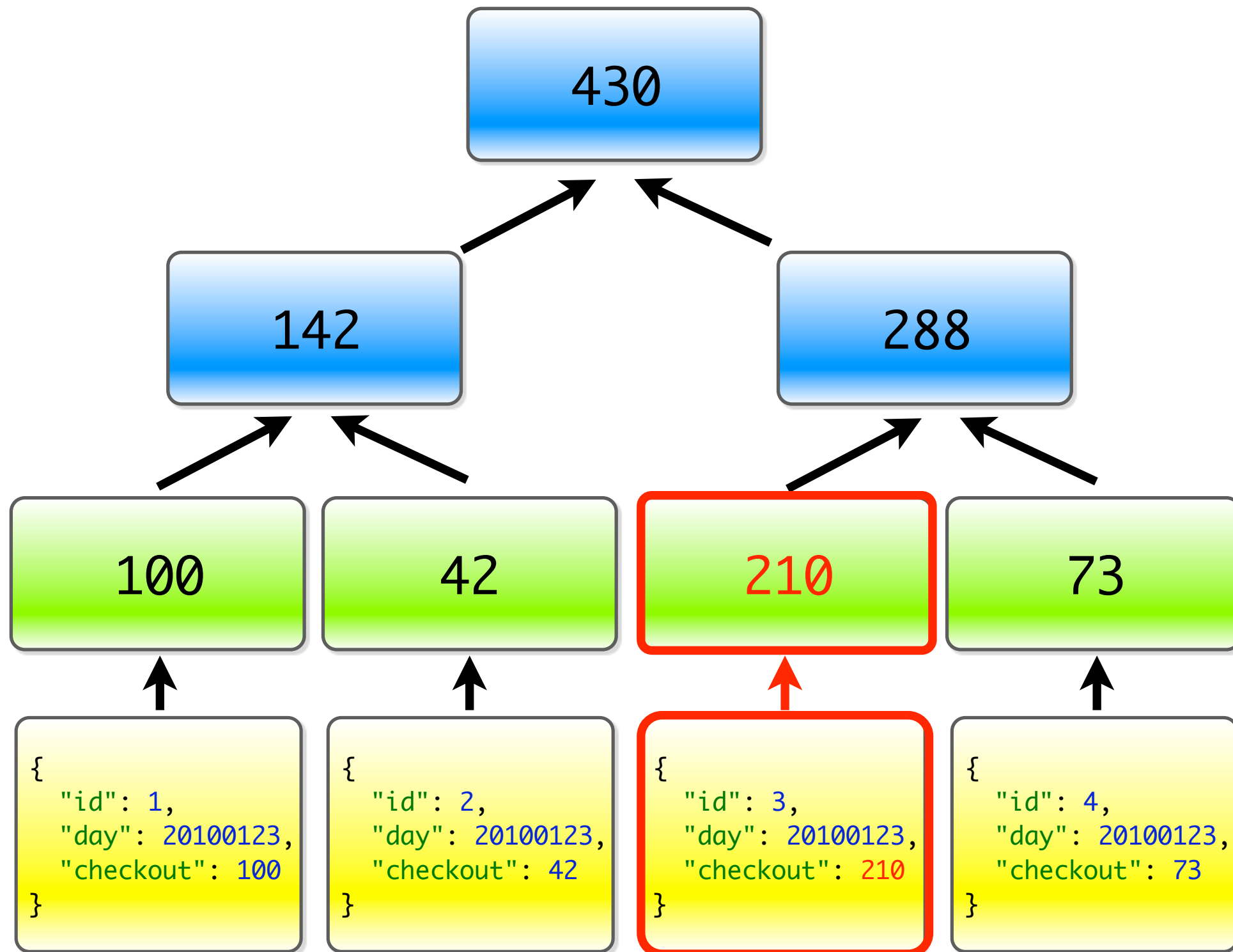
Inherently distributed



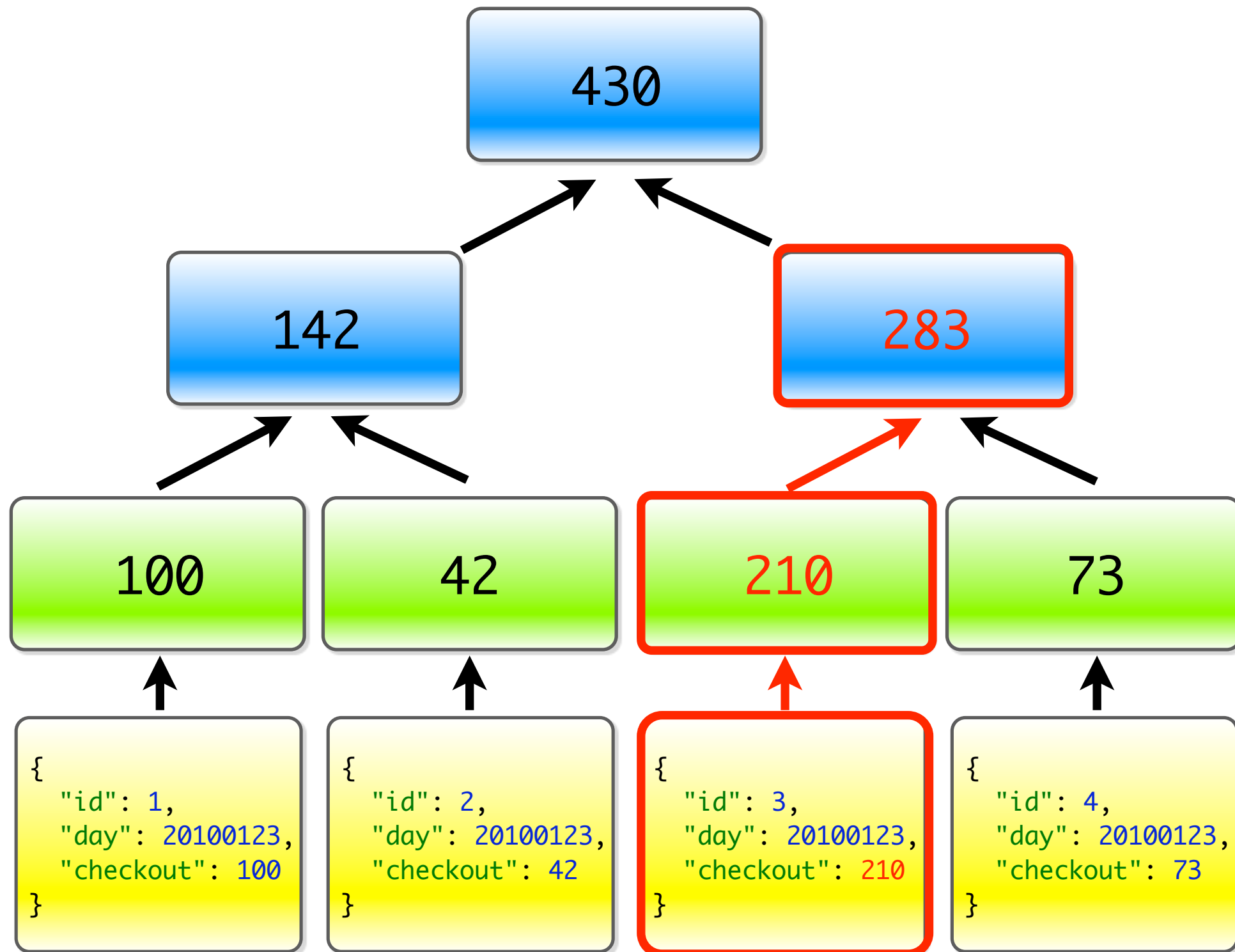
Logarithmic Update



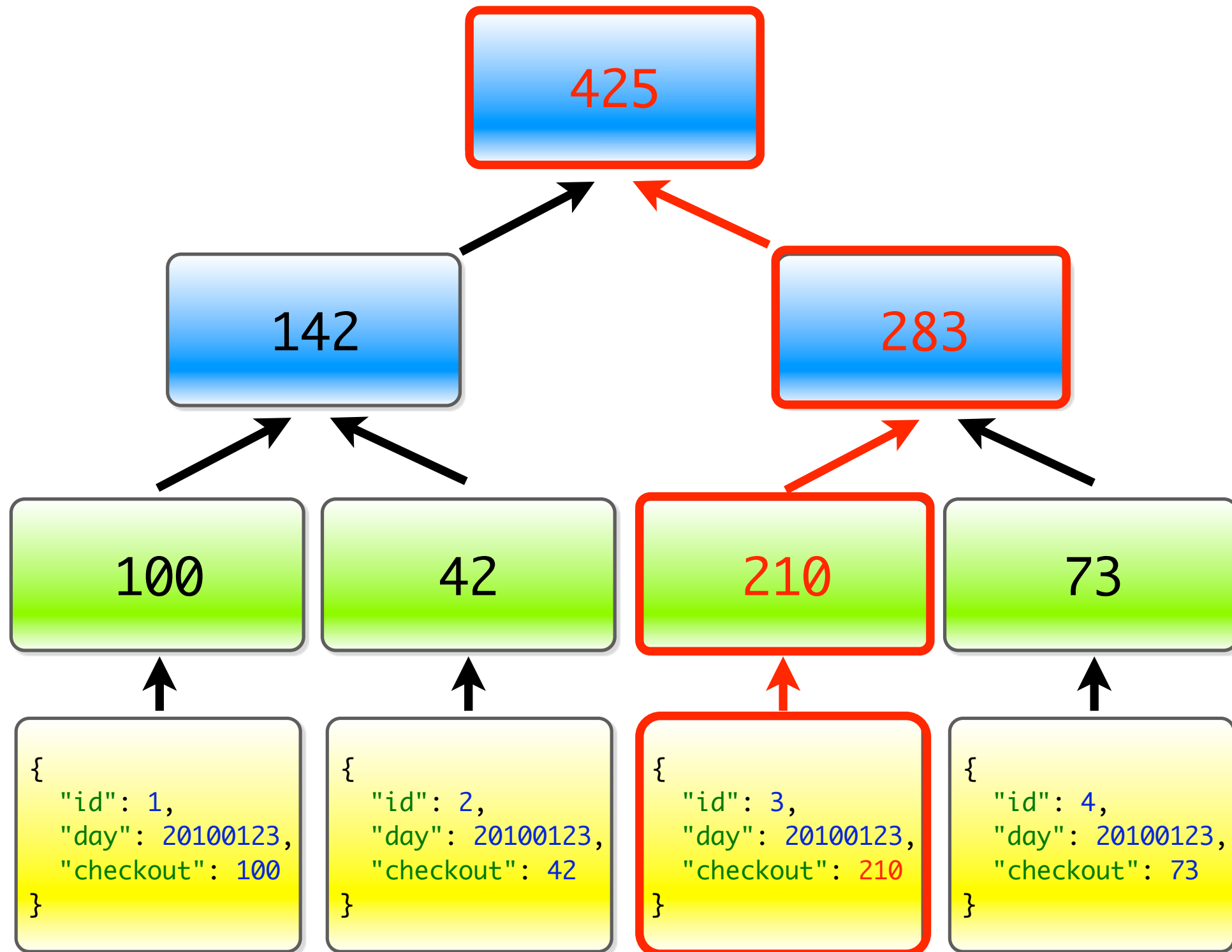
Logarithmic Update



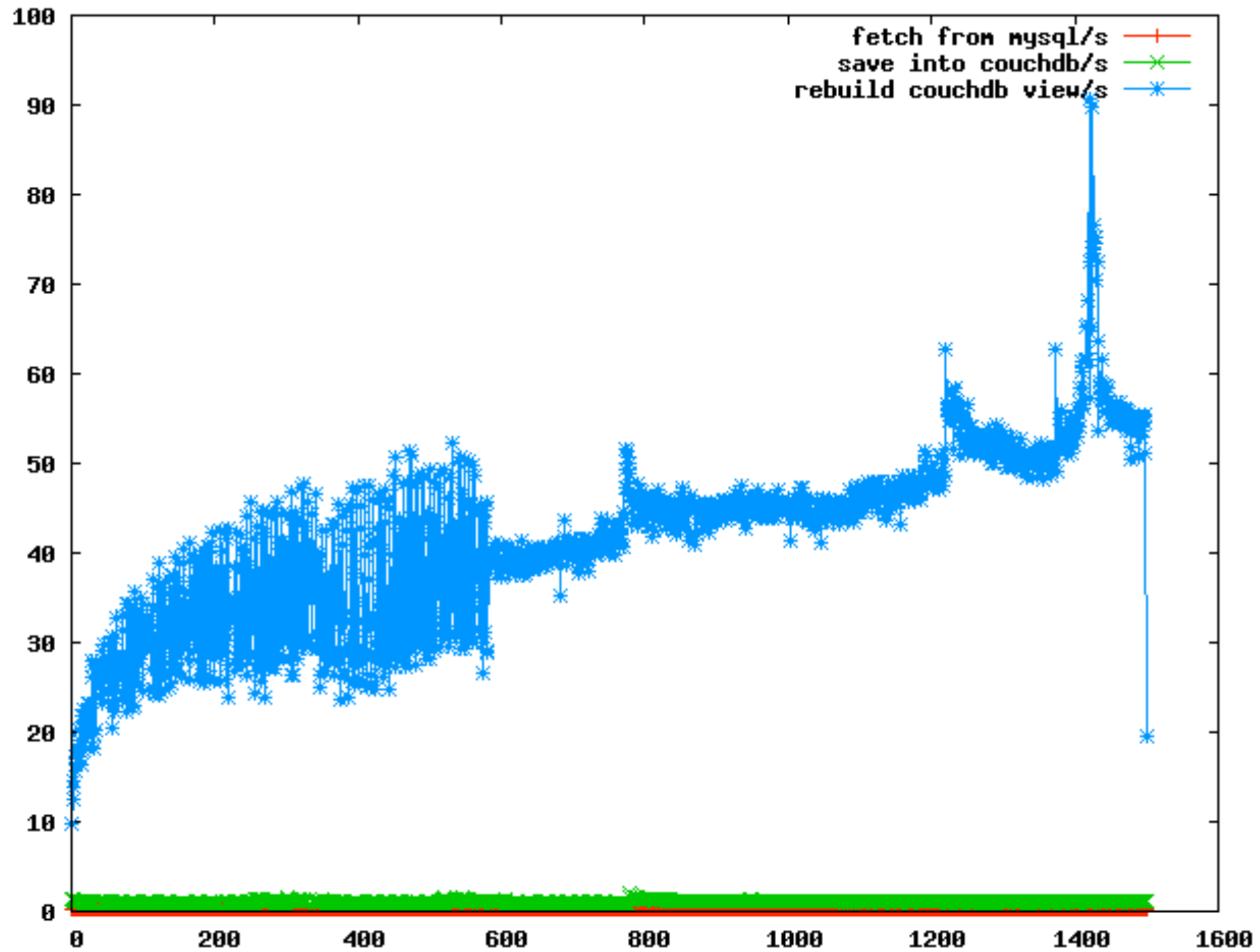
Logarithmic Update



Logarithmic Update



Logarithmic Update





Sum(checkout)

http://localhost:5984/_utils/document.html?ugialt_net/1

Apache CouchDB - Futon: V...

Overview > ugialt_net > 1

Save Document Add Field Upload Attachment... Delete Document...

Field	Value
_id	"1"
_rev	"1-19850e8c171da1ae079441bfb7b07af1"
checkout	100
day	"20090123"

← Previous Version | Next Version →

CouchDB relax

Tools

- Overview
- Configuration
- Replicator
- Status
- Test Suite

Recent Databases

- ugialt_net



Sum(checkout)

http://localhost:5984/_utils/document.html?ugialt_net/1

Apache CouchDB - Futon: V...

Overview > ugialt_net > 1

Save Document Add Field Upload Attachment... Delete Document...

Fields Source

Source

```
{
  "_id": "1",
  "_rev": "2-2dce33a7dc011558f12393f9b44019e1",
  "day": "20090123",
  "checkout": 100
}
```

Showing revision 2 of 2

← Previous Version | Next Version →

CouchDB relax

Tools

- Overview
- Configuration
- Replicator
- Status
- Test Suite

Recent Databases

- ugialt_net



Sum(checkout)

View Code _design/ticket

Map Function:

```
function(ticket) {  
  emit(null, ticket.checkout);  
}
```

Reduce Function (optional):

```
function(key, checkouts) {  
  return sum(checkouts)  
}
```

Run Language: javascript = Revert Save As... Save

Key ▼	Grouping: exact ▼	Value	<input type="checkbox"/> Reduce
null ID: 4		73	
null ID: 3		210	
null ID: 2		42	
null ID: 1		100	

Showing 1-4 of 4 rows

← Previous Page | Rows per page: 10 ▼ | Next Page →



Sum(checkout)

View Code _design/ticket

Map Function:

```
function(ticket) {  
  emit(null, ticket.checkout);  
}
```

Reduce Function (optional):

```
function(key, checkouts) {  
  return sum(checkouts)  
}
```

Run Language: javascript = Revert Save As... Save

Key ▼	Grouping: exact ▼	Value	<input checked="" type="checkbox"/> Reduce
null		425	

Showing 1-1 of unknown rows ← Previous Page | Rows per page: 10 ▼ | Next Page →



Sum(checkout)

```
# START SERVER
```

```
$ ~/opt/mongodb-1.3.0/bin/mongod \  
  --dbpath=./db/mongodb.01/ \  
  --logpath=./log/mongodb.01 \  
  --port 30001
```

```
# START SHELL
```

```
$ ~/opt/mongodb-1.3.0/bin/mongo localhost:30001  
connecting to: localhost:30001/test  
type "help" for help  
> show dbs  
admin  
local
```

```
> use checkout
```

```
switched to db checkout
```

```
> db.tickets.save({ "_id": 1, "day": 20100123, "checkout": 100 })
```

```
> db.tickets.save({ "_id": 2, "day": 20100123, "checkout": 42 })
```

```
> db.tickets.save({ "_id": 3, "day": 20100123, "checkout": 215 })
```

```
> db.tickets.save({ "_id": 4, "day": 20100123, "checkout": 73 })
```

```
> db.tickets.count()
```

```
4
```

```
> db.tickets.find()
```

```
{ "_id" : 1, "day" : 20100123, "checkout" : 100 }
```

```
...
```

```
> db.tickets.find({ "_id": 1 })
```

```
{ "_id" : 1, "day" : 20100123, "checkout" : 100 }
```

Sum(checkout)

```
> var map = function() {  
... emit(null, this.checkout)  
... }  
  
> var reduce = function(key, values) {  
... var sum = 0  
... for (var index in values) sum += values[index]  
... return sum  
... }
```

```
> sumOfCheckouts = db.tickets.mapReduce(map, reduce)
{
  "result" : "tmp.mr.mapreduce_1263717818_4",
  "timeMillis" : 8,
  "counts" : { "input" : 4, "emit" : 4, "output" : 1 },
  "ok" : 1
}

> db.getCollectionNames()
[
  "tickets",
  "tmp.mr.mapreduce_1263717818_4",
]

> db[sumOfCheckouts.result].find()
{ "_id" : null, "value" : 430 }
```

```
> db.tickets.mapReduce(map, reduce, { "out": "sumOfCheckouts" })

> db.getCollectionNames()
[
  "sumOfCheckouts",
  "tickets",
  "tmp.mr.mapreduce_1263717818_4"
]

> db.sumOfCheckouts.find()
{ "_id" : null, "value" : 430 }

> db.sumOfCheckouts.findOne().value
430
```



Sum(checkout) Reduce by Group

```
# GROUP AS MAP/REDUCE ALTERNATIVE
```

```
> db.tickets.group({  
... "initial": { "sum": 0 },  
... "reduce": function(ticket, checkouts) {  
..... checkouts.sum += ticket.checkout  
..... }  
... })  
[ { "sum" : 430 } ]
```

Sum(checkout) Group By day

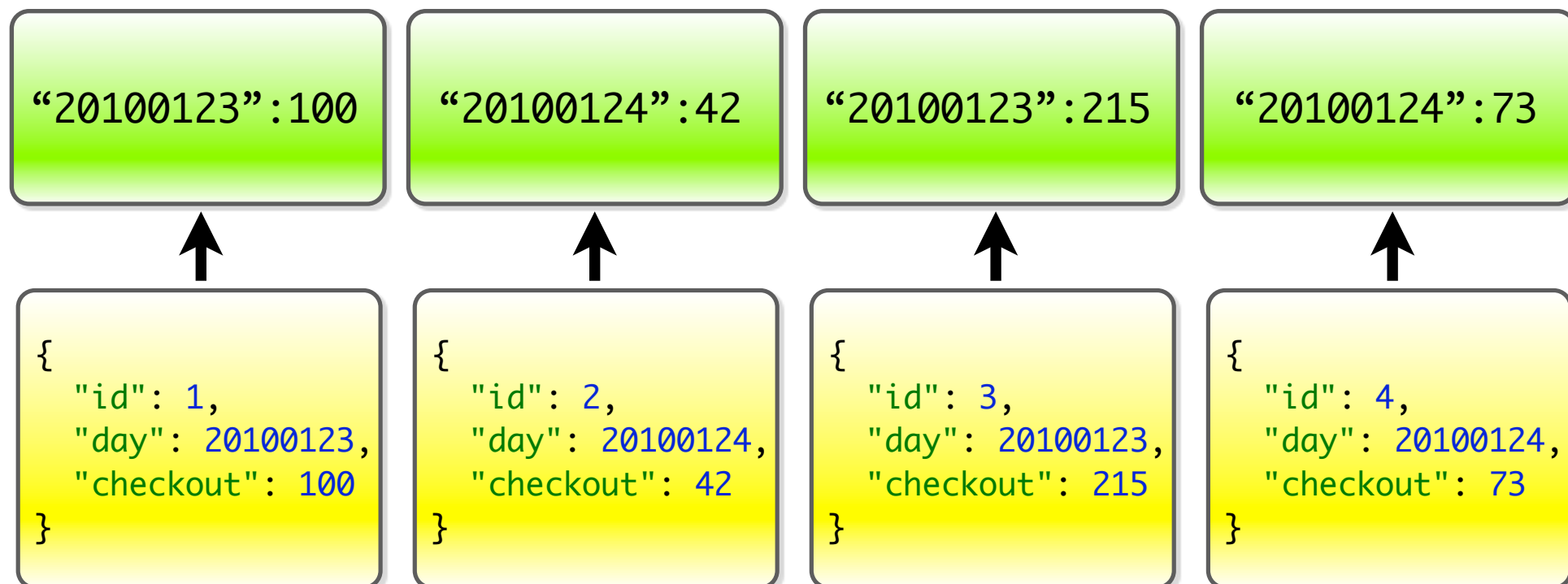
```
{  
  "id": 1,  
  "day": 20100123,  
  "checkout": 100  
}
```

```
{  
  "id": 2,  
  "day": 20100124,  
  "checkout": 42  
}
```

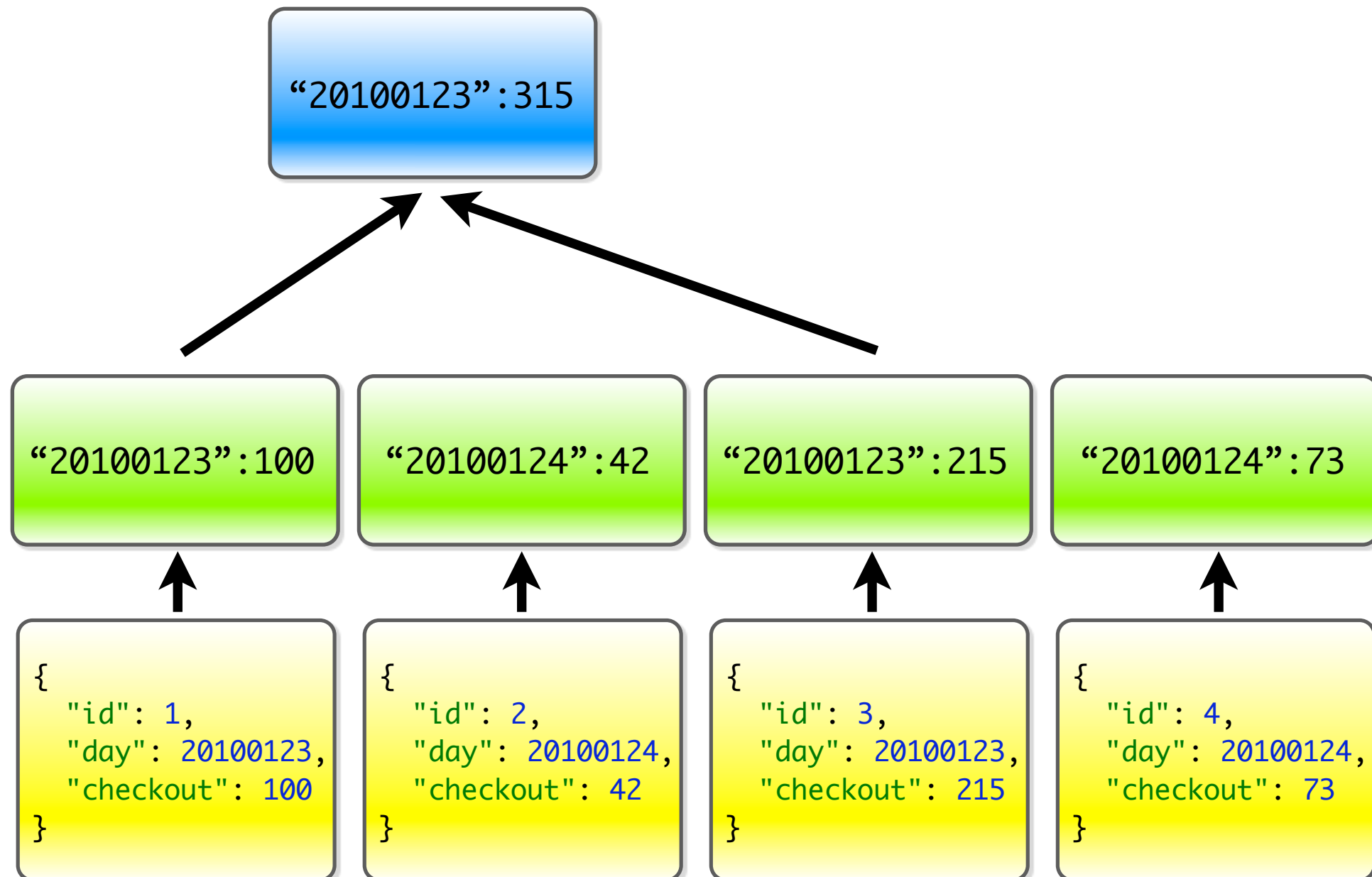
```
{  
  "id": 3,  
  "day": 20100123,  
  "checkout": 215  
}
```

```
{  
  "id": 4,  
  "day": 20100124,  
  "checkout": 73  
}
```

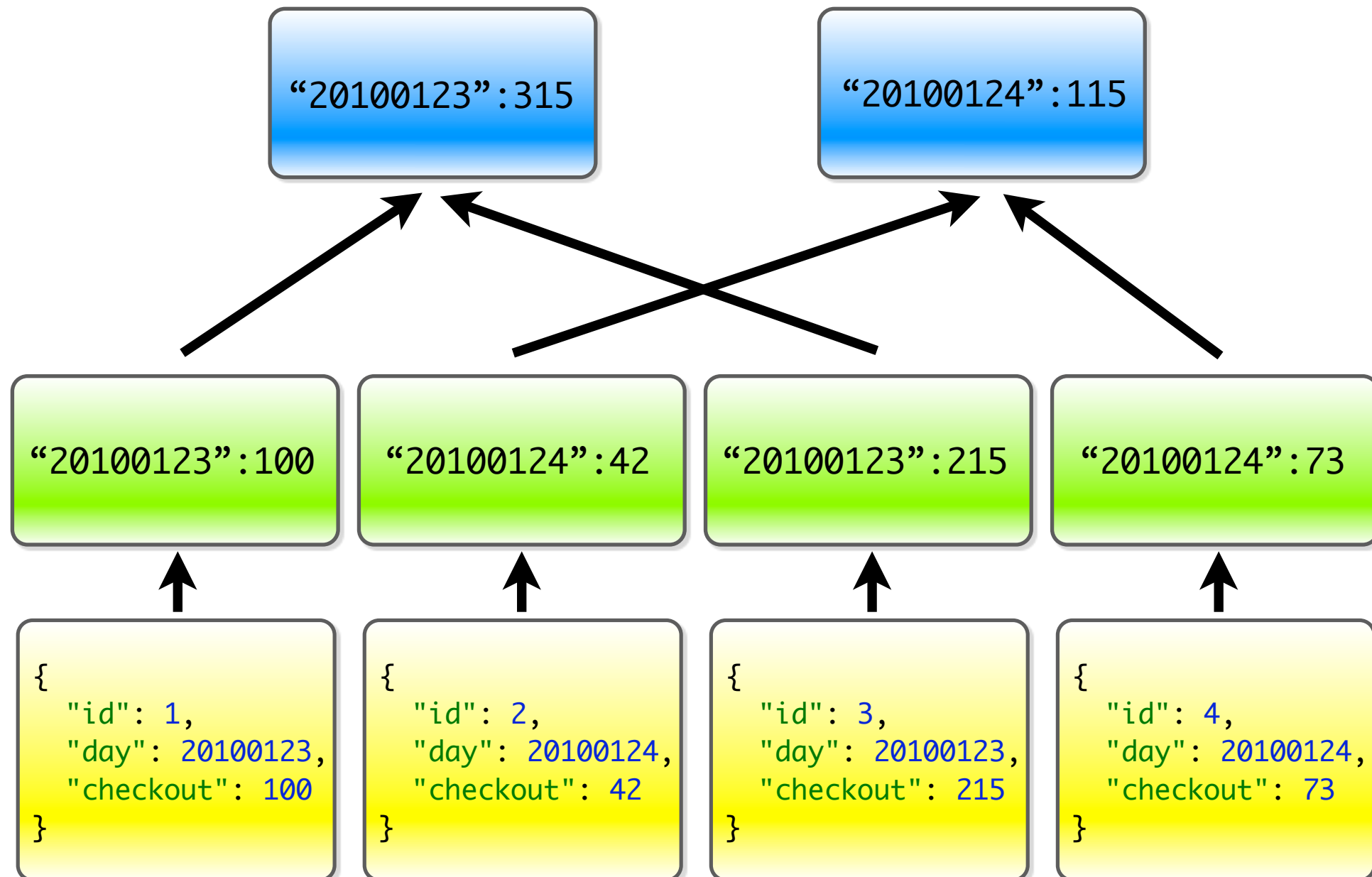

Map: emit(day,checkout)



Reduce: `sum(checkouts)`



Reduce: `sum(checkouts)`





Sum(checkout) Group By day

▼ View Code

Map Function:

```
function(ticket) {  
  emit(ticket.day, ticket.checkout);  
}
```

Reduce Function (optional):

```
function(key, checkouts) {  
  return sum(checkouts)  
}
```

Run

Language: javascript ▼

=

Revert

Save As...

Save

Key ▼	Grouping: exact ▼	Value	<input type="checkbox"/> Reduce
"20100124" ID: 4		73	
"20100124" ID: 2		42	
"20100123" ID: 3		215	
"20100123" ID: 1		100	

Showing 1-4 of 4 rows

← Previous Page | Rows per page: 10 ▼ | Next Page →



Sum(checkout) Group By day

▼ View Code

_design/ticket

Map Function:

function(ticket) {
 emit(ticket.day, ticket.checkout);
}

Reduce Function (optional):

function(key, checkouts) {
 return sum(checkouts)
}

Run

Language: javascript ▼

=

Revert

Save As...

Save

Key ▼	Grouping: exact ▼	Value	<input checked="" type="checkbox"/> Reduce
"20100124"		115	
"20100123"		315	

Showing 1-2 of unknown rows

← Previous Page | Rows per page: 10 ▼ | Next Page →



Design Documents are Documents

Key ▼	Value
"_design/ticket" ID: _design/ticket	{rev: "1-c65906e83bb1c1b030bb6b669d218c5f"}
"4" ID: 4	{rev: "1-a378bf029d75e0b0253e6be9a7fc78f6"}
"3" ID: 3	{rev: "1-09d8c5d2a8e01813d9a9cd60f36e4cd1"}
"2" ID: 2	{rev: "1-fada6118b6f8e647b8d973d3ad2a43d0"}
"1" ID: 1	{rev: "1-355cedaf88d93a7d00346d39ae143ef8"}

Showing 1-5 of 5 rows ← Previous Page | Rows per page: 10 ▼ | Next Page →



Design Documents are Documents

Overview > ugialt_net > _design/ticket

✓ Save Document + Add Field ↑ Upload Attachment... ✕ Delete Document...

Fields Source

Field	Value
_id	"_design/ticket"
_rev	"1-c65906e83bb1c1b030bb6b669d218c5f"
✕ language	"javascript"
✕ views	<div>[-] checkout</div> <pre>map "function(ticket) { emit(ticket.day, ticket.checkout); }" reduce "function(key, checkouts) { return sum(checkouts) }"</pre>

← Previous Version | Next Version →



Non trivial Map: Calculate Checkout

Source

```
{
  "_id": "1",
  "_rev": "3-ea4ef48674ab499de6ae054a3be015d6",
  "day": "20100123",
  "products": {
    "apple": {
      "quantity": 5,
      "price": 10
    },
    "kiwi": {
      "quantity": 2,
      "price": 25
    }
  }
}
```

Showing revision 3 of 3

[← Previous Version](#) | [Next Version →](#)



Non trivial Map: Calculate Checkout

▼ View Code

Map Function:

```
function(ticket) {  
  var checkout = 0;  
  for (var name in ticket.products) {  
    var product = ticket.products[name]  
    checkout += (product.quantity * product.price)  
  }  
  emit(ticket.day, checkout);  
}
```

Reduce Function (optional):

```
function(key, checkouts) {  
  return sum(checkouts)  
}
```

Run

Language: javascript

=

Revert

Save As...

Save

Key ▼	Grouping: exact	Value	<input type="checkbox"/> Reduce
"20100124" ID: 4		70	
"20100124" ID: 2		40	
"20100123" ID: 3		215	
"20100123" ID: 1		100	

Showing 1-4 of 4 rows

← Previous Page | Rows per page: 10 | Next Page →



Non trivial Map: Calculate Checkout

▼ View Code

_design/ticket

Map Function:

function(ticket) {
 var checkout = 0;
 for (var name in ticket.products) {
 var product = ticket.products[name]
 checkout += (product.quantity * product.price)
 }
 emit(ticket.day, checkout);
}

Reduce Function (optional):

function(key, checkouts) {
 return sum(checkouts)
}

Run

Language: javascript ▼

=

Revert

Save As...

Save

Key ▼	Grouping: exact ▼	Value	<input checked="" type="checkbox"/> Reduce
"20100124"		110	
"20100123"		315	

Showing 1-2 of unknown rows

← Previous Page | Rows per page: 10 ▼ | Next Page →



Structured Keys and Group Levels

```
Source

{
  "_id": "1",
  "_rev": "5-5c105f6d262f705d2c75e172ce3976a7",
  "day": [
    2010,
    1,
    23
  ],
  "products": {
    "apple": {
      "quantity": 5,
      "price": 10
    },
    "kiwi": {
      "quantity": 2,
      "price": 25
    }
  }
}
```

Showing revision 5 of 5

[← Previous Version](#) | [Next Version →](#)



Structured Keys and Group Levels

▼ View Code

Map Function:

```
function(ticket) {  
  var checkout = 0;  
  for (var name in ticket.products) {  
    var product = ticket.products[name]  
    checkout += (product.quantity * product.price)  
  }  
  emit(ticket.day, checkout);  
}
```

Reduce Function (optional):

```
function(key, checkouts) {  
  return sum(checkouts)  
}
```

Run

Language: javascript

=

Revert

Save As...

Save

Key ▼	Grouping: exact	Value	<input checked="" type="checkbox"/> Reduce
[2010, 1, 24]		110	
[2010, 1, 23]		315	

Showing 1-2 of unknown rows

← Previous Page | Rows per page: 10 | Next Page →



Structured Keys and Group Levels

▼ View Code

_design/ticket

Map Function:

function(ticket) {
 var checkout = 0;
 for (var name in ticket.products) {
 var product = ticket.products[name]
 checkout += (product.quantity * product.price)
 }
 emit(ticket.day, checkout);
}

Reduce Function (optional):

function(key, checkouts) {
 return sum(checkouts)
}

Run

Language: javascript ▼

=

Revert

Save As...

Save

Key ▼	Grouping: level 1 ▼	Value	<input checked="" type="checkbox"/> Reduce
[2010]		425	

Showing 1-1 of unknown rows

← Previous Page | Rows per page: 10 ▼ | Next Page →



Structured Keys and Group Levels

▼ View Code

Map Function:

```
function(ticket) {  
  var checkout = 0;  
  for (var name in ticket.products) {  
    var product = ticket.products[name]  
    checkout += (product.quantity * product.price)  
  }  
  emit(ticket.day, checkout);  
}
```

Reduce Function (optional):

```
function(key, checkouts) {  
  return sum(checkouts)  
}
```

Run

Language: javascript ▼

=

Revert

Save As...

Save

Key ▼	Grouping: level 2 ▼	Value	<input checked="" type="checkbox"/> Reduce
[2010, 1]		425	

Showing 1-1 of unknown rows

← Previous Page | Rows per page: 10 ▼ | Next Page →



Structured Keys and Group Levels

```
Source

{
  "_id": "5",
  "_rev": "3-6980a31521b0d0629c429b10483732dc",
  "day": [
    2010,
    2,
    11
  ],
  "products": {
    "kiwi": {
      "quantity": 4,
      "price": 25
    },
    "banana": {
      "quantity": 3,
      "price": 20
    }
  }
}
```

Showing revision 3 of 3

[← Previous Version](#) | [Next Version →](#)



Structured Keys and Group Levels

▼ View Code

Map Function:

```
function(ticket) {  
  var checkout = 0;  
  for (var name in ticket.products) {  
    var product = ticket.products[name]  
    checkout += (product.quantity * product.price)  
  }  
  emit(ticket.day, checkout);  
}
```

Reduce Function (optional):

```
function(key, checkouts) {  
  return sum(checkouts)  
}
```

Run

Language: javascript ▼

=

Revert

Save As...

Save

Showing 1-2 of unknown rows

← Previous Page | Rows per page: 10 ▼ | Next Page →



Structured Keys and Group Levels

▼ View Code

Map Function:

```
function(ticket) {  
  var checkout = 0;  
  for (var name in ticket.products) {  
    var product = ticket.products[name]  
    checkout += (product.quantity * product.price)  
  }  
  emit(ticket.day, checkout);  
}
```

Reduce Function (optional):

```
function(key, checkouts) {  
  return sum(checkouts)  
}
```

Run

Language: javascript ▼

=

Revert

Save As...

Save

Key ▼	Grouping: exact ▼	Value	<input checked="" type="checkbox"/> Reduce
[2010, 2, 12]		160	
[2010, 1, 24]		110	
[2010, 1, 23]		315	

Showing 1-3 of unknown rows

← Previous Page | Rows per page: 10 ▼ | Next Page →



mongoDB

Sum(Checkout) by day Update In-Place

```
> db.tickets.update({ "_id": 1 }, {  
... $set: { "products": {  
..... "apple": { "quantity": 5, "price": 10 },  
..... "kiwi": { "quantity": 2, "price": 25 }  
..... }  
... },  
... $unset: { "checkout": 1 }  
... })  
  
> db.tickets.find()  
{ "_id" : 1, "day" : 20100123, "products" : {  
  "apple" : { "quantity" : 5, "price" : 10 },  
  "kiwi" : { "quantity" : 2, "price" : 25 }  
}}  
{ "_id" : 2, "day" : 20100123, "checkout" : 42 }  
{ "_id" : 3, "day" : 20100123, "checkout" : 215 }  
{ "_id" : 4, "day" : 20100123, "checkout" : 73 }
```



mongoDB

Sum(Checkout) by day

Calculate Checkout

```
> db.tickets.find()
{ "_id" : 1, "day" : 20100123, "products" : {
  "apple" : { "quantity" : 5, "price" : 10 },
  "kiwi" : { "quantity" : 2, "price" : 25 } } }

{ "_id" : 2, "day" : 20100124, "products" : {
  "banana" : { "quantity" : 2, "price" : 20 } } }

{ "_id" : 3, "day" : 20100123, "products" : {
  "kiwi" : { "quantity" : 4, "price" : 25 },
  "banana" : { "quantity" : 5, "price" : 20 },
  "lemon" : { "quantity" : 3, "price" : 5 } } }

{ "_id" : 4, "day" : 20100124, "products" : {
  "kiwi" : { "quantity" : 2, "price" : 25 },
  "banana" : { "quantity" : 1, "price" : 20 } } }
```



mongoDB

Sum(Checkout) by day

Calculate Checkout

```
> var map = function() {  
... var checkout = 0  
... for (var name in this.products) {  
..... var product = this.products[name]  
..... checkout += product.quantity * product.price  
..... }  
... emit(this.day, checkout)  
}  
  
> var reduce = function(key, values) {  
... var sum = 0  
... for (var index in values) sum += values[index]  
... return sum  
}
```



mongoDB

Sum(Checkout) by day Calculate Checkout

```
> db.tickets.mapReduce(map, reduce, { "out": "sumOfCheckouts" })  
  
> db.sumOfCheckouts.find()  
{ "_id" : 20100123, "value" : 315 }  
{ "_id" : 20100124, "value" : 110 }
```



mongoDB

Sum(Checkout) by day Data Normalization

```
> db.tickets.find()
{ "_id" : 1, "day" : 20100123, "products" : {
  "apple" : 5, "kiwi" : 2 } }
{ "_id" : 2, "day" : 20100124, "products" : {
  "banana" : 2 } }
{ "_id" : 3, "day" : 20100123, "products" : {
  "kiwi" : 4, "banana" : 5, "lemon" : 3 } }
{ "_id" : 4, "day" : 20100124, "products" : {
  "kiwi" : 2, "banana" : 1 } }
```

```
> db.product.find()
{ "_id" : "apple", "price" : 10 }
{ "_id" : "kiwi", "price" : 25 }
{ "_id" : "banana", "price" : 20 }
{ "_id" : "lemon", "price" : 5 }
```



mongoDB

Sum(Checkout) by day Data Normalization

```
> var map = function() {  
... var checkout = 0  
... for (var name in this.products) {  
..... var quantity = this.products[name]  
..... var price = db.product.findOne({ "_id": name }).price  
..... checkout += quantity * price  
..... }  
... emit(this.day, checkout)  
}  
  
> var reduce = function(key, values) {  
... var sum = 0  
... for (var index in values) sum += values[index]  
... return sum  
}
```



mongoDB

Sum(Checkout) by day Data Normalization

```
> db.tickets.mapReduce(map, reduce, { "out": "sumOfCheckouts" })  
  
> db.sumOfCheckouts.find()  
{ "_id" : 20100123, "value" : 315 }  
{ "_id" : 20100124, "value" : 110 }
```


Count of unique elements?

```
> db.view.find();
{ "user" : "001", "page" : "example.com/001", "time" : 2 }
{ "user" : "001", "page" : "example.com/002", "time" : 4 }
{ "user" : "002", "page" : "example.com/001", "time" : 6 }
{ "user" : "002", "page" : "example.com/002", "time" : 10 }
{ "user" : "002", "page" : "example.com/002", "time" : 12 }
{ "user" : "002", "page" : "example.com/003", "time" : 1 }
{ "user" : "003", "page" : "example.com/001", "time" : 42 }
{ "user" : "003", "page" : "example.com/001", "time" : 9 }
```

```
# USER NAVIGATION SURVEY = FOR EACH USER
# NUMBER OF UNIQUE PAGES
# AVERAGE TIME ON A PAGE
```

Count of unique elements?

```
> var map = function() {  
... var accumulator = {  
..... "numberOfViews": 1,  
..... "visitedPages": {},  
..... "totalTime": 0  
..... };  
  
... accumulator["visitedPages"][this.page] = 1  
... accumulator["totalTime"] += this.time  
... emit(this.user, accumulator)  
}
```

Count of unique elements?

```
# EASY TO DEBUG
```

```
> var aUser = db.view.findOne({ "user": "001" })
```

```
> var emit = function(id, value) { print(tojson(value)) }
```

```
> map.call(aUser)
```

```
{  
  "numberOfViews" : 1,  
  "visitedPages" : {  
    "example.com/001" : 1  
  },  
  "totalTime" : 2  
}
```

Count of unique elements?

```
> var reduce = function(key, values) {  
  ... var accumulator = {  
    ..... "numberOfViews": 0,  
    ..... "visitedPages": {},  
    ..... "totalTime": 0  
    ..... };  
  
  ... values.forEach(function(value) {  
    ..... accumulator["numberOfViews"] += value["numberOfViews"]  
    ..... accumulator["totalTime"] += value["totalTime"]  
  
    ..... for (var page in value["visitedPages"]) {  
      ..... if (accumulator["visitedPages"][page] === undefined) {  
        ..... accumulator["visitedPages"][page] = 0  
        ..... }  
      ..... accumulator["visitedPages"][page] += 1  
    ..... }  
  ... })  
  
  ... return accumulator  
}
```

Count of unique elements?

```
> db.view.mapReduce(map, reduce,  
  { "out": "userNavigationSurvey" })
```

```
# NOT AS WE WANTED
```

```
> db.userNavigationSurvey.find()  
{ "_id" : "001", "value" : {  
  "numberOfViews" : 2,  
  "visitedPages" : {  
    "example.com/001" : 1,  
    "example.com/002" : 1 },  
  "totalTime" : 6 } }
```

```
{ "_id" : "002", "value" : {  
  "numberOfViews" : 4,  
  "visitedPages" : {  
    ...
```

Count of unique elements?

```
> var finalize = function(key, accumulator) {  
... accumulator["averageTime"] =  
..... accumulator["totalTime"] / accumulator["numberOfViews"]  
... accumulator["numberOfUniquePages"] = 0  
... for (var page in accumulator["visitedPages"]) {  
..... accumulator["numberOfUniquePages"] += 1  
... }  
... delete accumulator["totalTime"]  
... delete accumulator["numberOfViews"]  
... delete accumulator["visitedPages"]  
... return accumulator  
}
```

Count of unique elements?

```
> db.view.mapReduce(map, reduce, {  
... "finalize": finalize,  
... "out": "userNavigationSurvey"  
})  
  
> db.userNavigationSurvey.find()  
{ "_id" : "001", "value" : {  
  "averageTime" : 3, "numberOfUniquePages" : 2 } }  
  
{ "_id" : "002", "value" : {  
  "averageTime" : 7.25, "numberOfUniquePages" : 3 } }  
  
{ "_id" : "003", "value" : {  
  "averageTime" : 25.5, "numberOfUniquePages" : 1 } }
```



Count of unique elements by steps

```
# STEP 1: CREATE THE BASE COLLECTION (WITHOUT UNIQUE ELEMENTS)
```

```
> var mapBase = function() {  
... emit(this.user, {  
..... "numberOfViews": 1,  
..... "totalTime": this.time  
... })  
}
```

```
> var reduceBase = function(key, values) {  
... var accumulator = {  
..... "numberOfViews": 0,  
..... "totalTime": 0  
... };  
... values.forEach(function(value) {  
..... accumulator["numberOfViews"] += value["numberOfViews"]  
..... accumulator["totalTime"] += value["totalTime"]  
... })  
... return accumulator  
}
```

Count of unique elements by steps

```
> var finalizeBase = function(key, accumulator) {  
... accumulator["numberOfUniquePages"] = 0  
... accumulator["averageTime"] =  
..... accumulator["totalTime"] / accumulator["numberOfViews"]  
... delete accumulator["totalTime"]  
... delete accumulator["numberOfViews"]  
... return accumulator  
}  
  
> db.view.mapReduce(mapBase, reduceBase, {  
  "finalize": finalizeBase,  
  "out": "userNavigationSurvey"  
})  
  
> db.userNavigationSurvey.find()  
{ "_id" : "001", "value" : { "numberOfUniquePages" : 0, "averageTime" : 3 } }  
{ "_id" : "002", "value" : { "numberOfUniquePages" : 0, "averageTime" : 7.25 } }  
{ "_id" : "003", "value" : { "numberOfUniquePages" : 0, "averageTime" : 25.5 } }
```

Count of unique elements by steps

```
# STEP 2: CREATE THE COLLECTION OF UNIQUE ELEMENTS
```

```
> var mapUniquePages = function() {  
... emit(this.user + "-" + this.page, {  
..... "user": this.user,  
..... "page": this.page  
... })  
}
```

```
> var reduceUniquePages = function(key, values) {  
... return values[0]  
}
```

```
> db.view.mapReduce(mapUniquePages, reduceUniquePages {  
  "out": "userUniquePages"  
})
```

Count of unique elements by steps

```
> db.userUniquePages.find()

{ "_id" : "001-example.com/001", "value" : {
  "user" : "001", "page" : "example.com/001" } }

{ "_id" : "001-example.com/002", "value" : {
  "user" : "001", "page" : "example.com/002" } }

{ "_id" : "002-example.com/001", "value" : {
  "user" : "002", "page" : "example.com/001" } }

{ "_id" : "002-example.com/002", "value" : {
  "user" : "002", "page" : "example.com/002" } }

{ "_id" : "002-example.com/003", "value" : {
  "user" : "002", "page" : "example.com/003" } }

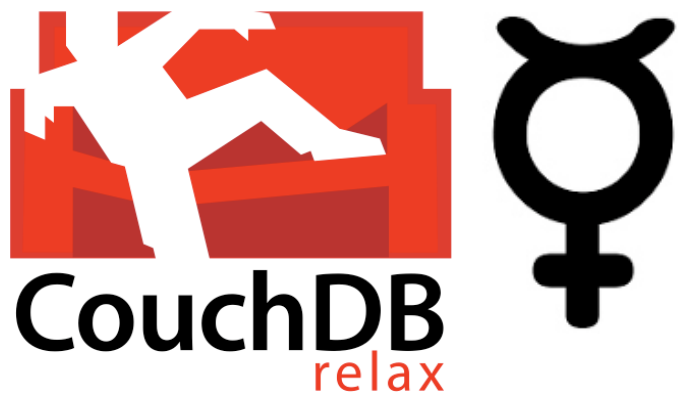
{ "_id" : "003-example.com/001", "value" : {
  "user" : "003", "page" : "example.com/001" } }
```

Count of unique elements by steps

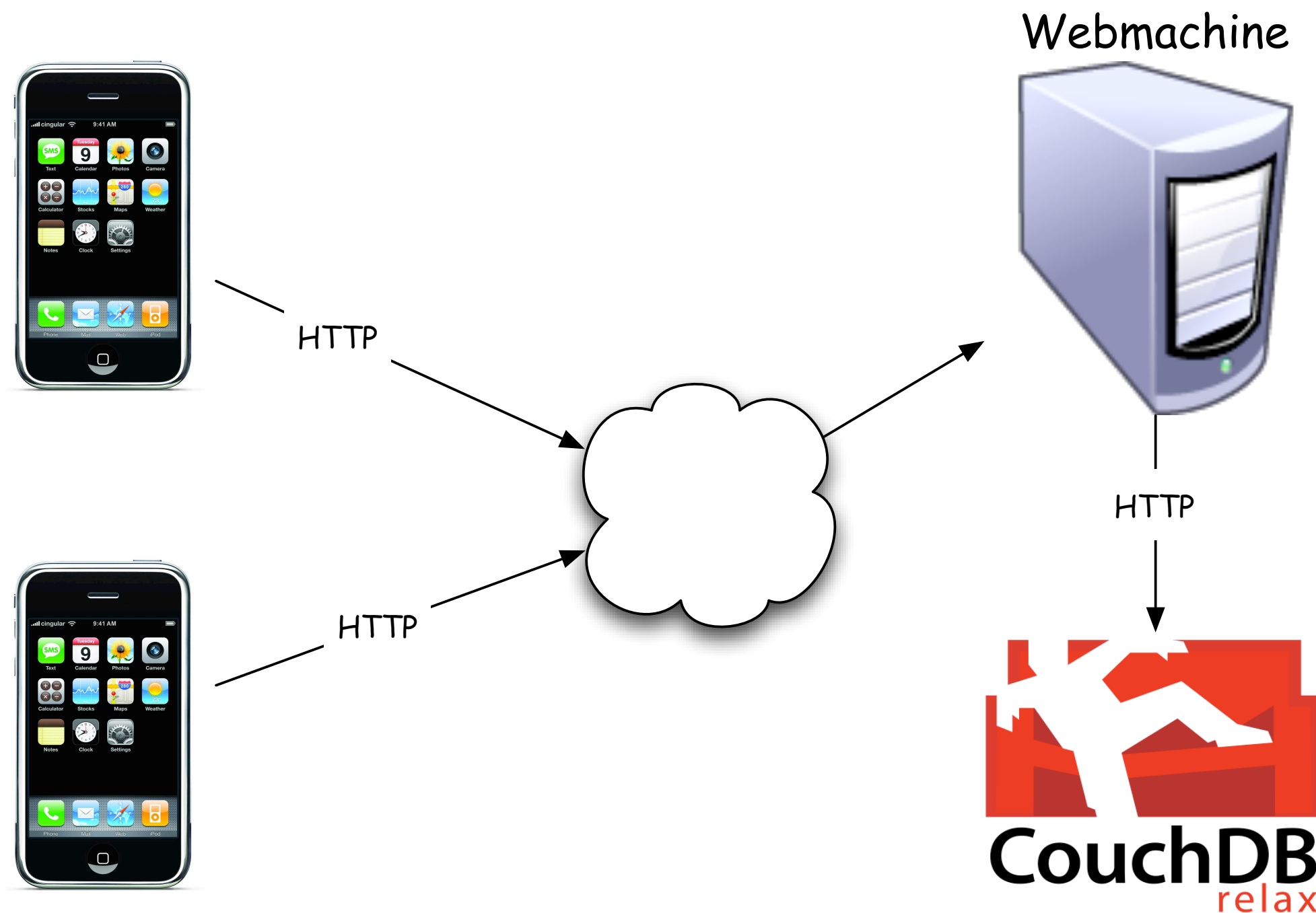
```
# STEP 3: UPDATE BASE COLLECTION WITH UNIQUE ELEMENTS COUNT
```

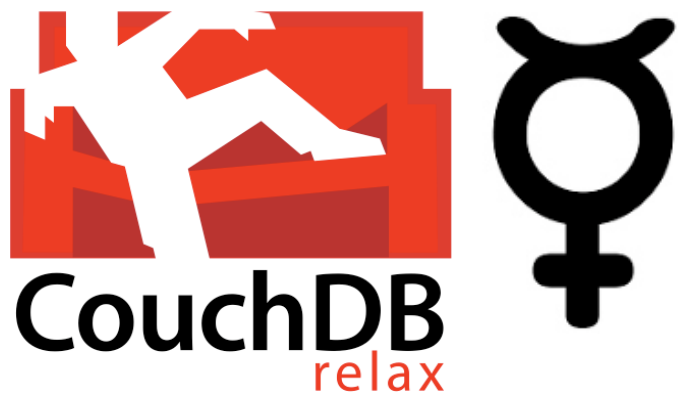
```
> db.userUniquePages.find().forEach(function(userUniquePage) {  
    db.userNavigationSurvey.update(  
        { "_id": userUniquePage.value.user },  
        { $inc: { "value.numberOfUniquePages": 1 } }  
    )  
})
```

```
> db.userNavigationSurvey.find()  
{ "_id" : "001", "value" : { "numberOfUniquePages" : 2, "averageTime" : 3 } }  
{ "_id" : "002", "value" : { "numberOfUniquePages" : 3, "averageTime" : 7.25 } }  
{ "_id" : "003", "value" : { "numberOfUniquePages" : 1, "averageTime" : 25.5 } }
```

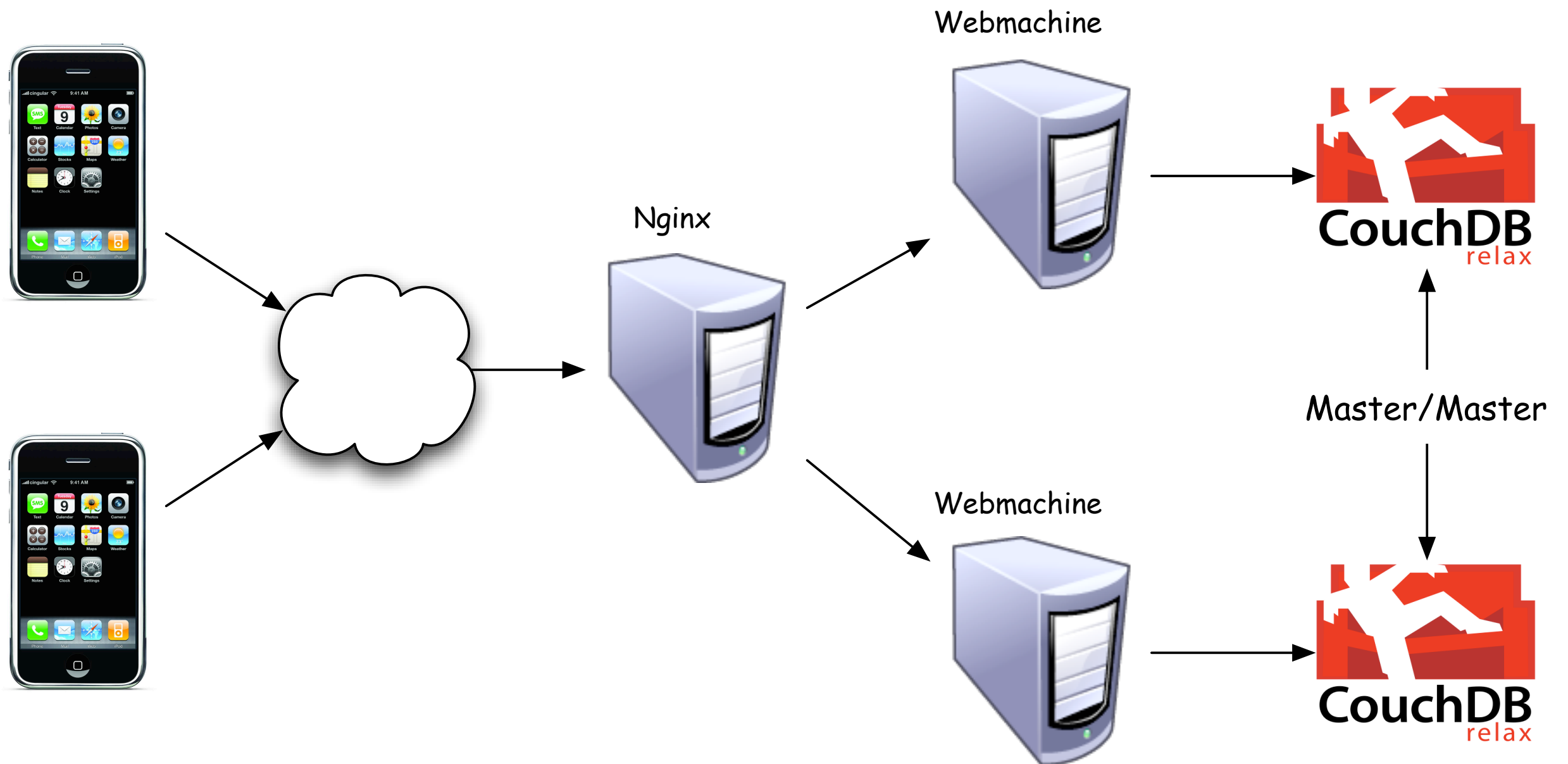


Architecture





Scalability





User Account

Source

```
{
  "_id": "8bc674f8b3278ec1de6112accd643b4f",
  "_rev": "4-509a47cc589b4c09f7a0d1955f7fe6f6",
  "contacts": {
    "243a3b6f7ddfea2599743ce3370d5229": {
      "found": true,
      "mutual": true
    }
  },
  "secret": "8456fbb37a7b601fa54de046dc177d0b",
  "user": {
    "id": "gabriele"
  }
}
```

Showing revision 4 of 4

[← Previous Version](#) | [Next Version →](#)

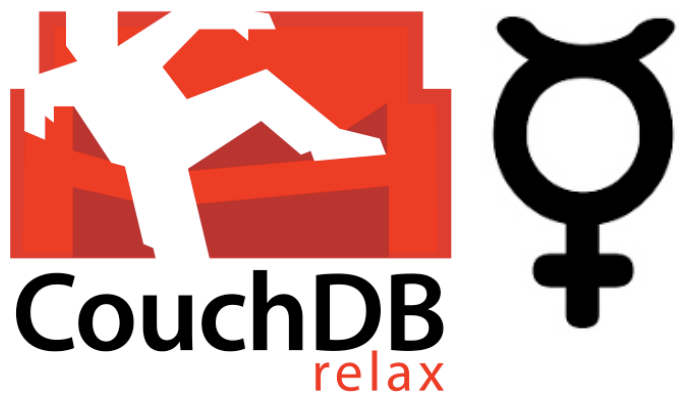


Message

Source

```
{
  "_id": "ff35356344ee0e9928c212b52e36e6f3",
  "_rev": "1-20180a309832323df8e988a0772ab3cc",
  "to": "243a3b6f7ddfea2599743ce3370d5229",
  "from": "8bc674f8b3278ec1de6112accd643b4f",
  "timestamp": 1263655442,
  "_attachments": {
    "content": {
      "content_type": "text/plain;charset=utf-8",
      "revpos": 1,
      "length": 16,
      "stub": true
    }
  }
}
```

← Previous Version | Next Version →



Received by <account> After <timestamp>?

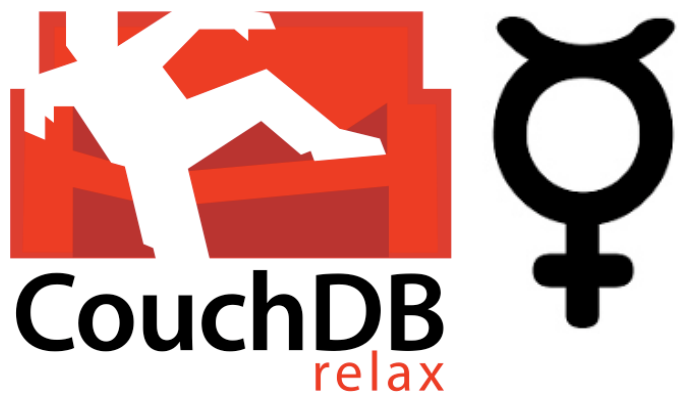
```
function(document) {  
  if (document.from && document.to) {  
    var key = [ document.to, document.timestamp ]  
    var content = document._attachments["content"]  
    var outline = {  
      "id": document._id,  
      "from": document.from,  
      "timestamp": document.timestamp,  
      "type": content["content_type"],  
      "length": content["length"],  
    }  
    emit(key, outline)  
  }  
}
```



Received by <account> After <timestamp>?

Field	Value
_id	"_design/message"
_rev	"1-ec1e970fe77582a6192a2a60644f534c"
language	"javascript"
views	<div><div>received_after</div><pre>map (function() { return function(document) { if (document.from && document.to) { var key = [document.to, document.timestamp] var content = document._attachments["content"] var outline = { "id": document.id, "from": document.from, "timestamp": document.timestamp, "type": content["content type"], "length": content["length"], } emit(key, outline) } } })()</pre></div>

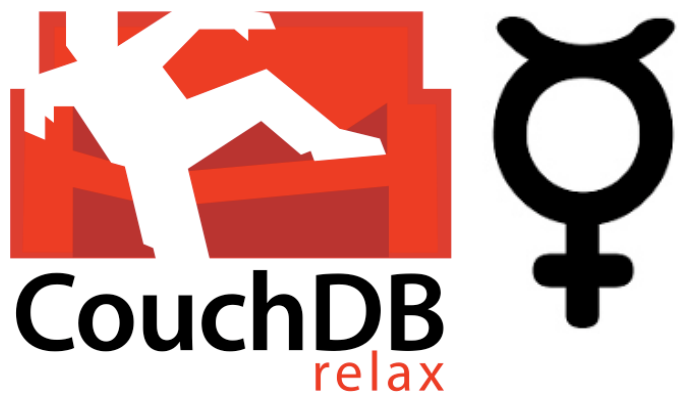
← Previous Version | Next Version →



Received by <account> After <timestamp>?

```
> curl -X GET ".../mercurio/_design/message/_view/received_after"
```

```
{ "total_rows":3, "offset":0, "rows": [
  {
    "id": "ff35356344ee0e9928c212b52e36e6f3",
    "key": [ "gabriele", 1263655442 ],
    "value": {
      "id": "ff35356344ee0e9928c212b52e36e6f3",
      "from": "chiara",
      "timestamp": 1263655442,
      "type": "text/plain;charset=utf-8",
      "length": 16
    }
  },
  ...
}
```



Results are ordered by Key

```
{ "key": [ "chiara", 126 ],  
  "value": {  
    "id": "ff35356344ee0e992...",  
    "from": "gabriele"  
  }  
}
```

```
{ "key": [ "chiara", 128 ],  
  "value": {  
    "id": "0deff99666425bacc...",  
    "from": "gabriele"  
  }  
}
```

```
{ "key": [ "gabriele", 120 ],  
  "value": {  
    "id": "9842063609746c661...",  
    "from": "chiara"  
  }  
}
```

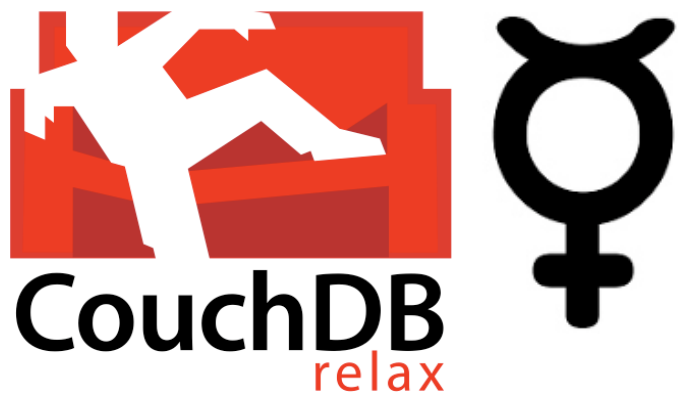
["chiara", 126]

== <

["chiara", 128]

<

["gabriele", 120]



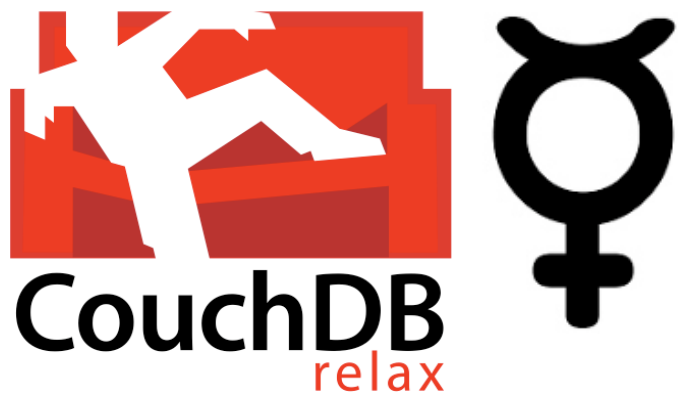
Select with Key

```
{ "key": [ "chiara", 126 ],  
  "value": {  
    "id": "ff35356344ee0e992...",  
    "from": "gabriele"  
  }  
}
```

```
{ "key": [ "chiara", 128 ],  
  "value": {  
    "id": "0deff99666425bacc...",  
    "from": "gabriele"  
  }  
}
```

```
{ "key": [ "gabriele", 120 ],  
  "value": {  
    "id": "9842063609746c661...",  
    "from": "chiara"  
  }  
}
```

received_after?
key=["chiara",126]



Select with range of Keys

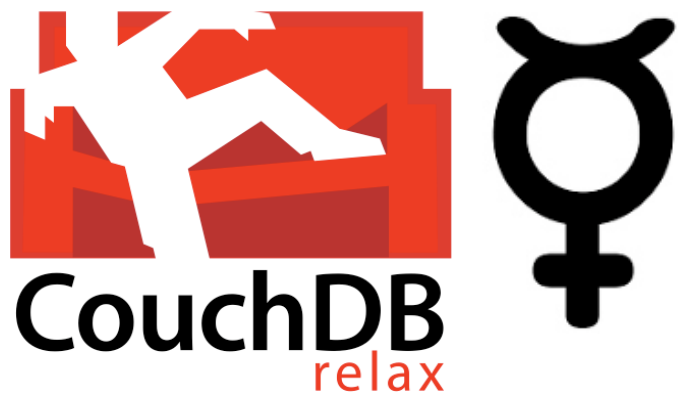
```
{ "key": [ "chiara", 126 ],  
  "value": {  
    "id": "ff35356344ee0e992...",  
    "from": "gabriele"  
  }  
}
```

```
{ "key": [ "chiara", 128 ],  
  "value": {  
    "id": "0deff99666425bacc...",  
    "from": "gabriele"  
  }  
}
```

```
{ "key": [ "gabriele", 120 ],  
  "value": {  
    "id": "9842063609746c661...",  
    "from": "chiara"  
  }  
}
```

received_after?

startkey=["chiara",126]&
endkey=["gabriele",0]



Select with range of Keys

```
{ "key": [ "chiara", 126 ],  
  "value": {  
    "id": "ff35356344ee0e992...",  
    "from": "gabriele"  
  }  
}
```

["chiara", []]

```
{ "key": [ "chiara", 128 ],  
  "value": {  
    "id": "0deff99666425bacc...",  
    "from": "gabriele"  
  }  
}
```

```
{ "key": [ "gabriele", 120 ],  
  "value": {  
    "id": "9842063609746c661...",  
    "from": "chiara"  
  }  
}
```

```
{ "key": [ "chiara", [] ],  
  "value": {  
    "id": "0deff99666425bacc...",  
    "from": "gabriele"  
  }  
}
```





Select with range of Keys

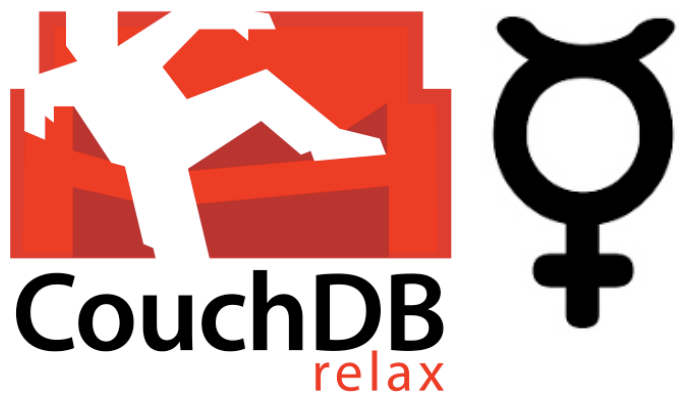
```
{ "key": [ "chiara", 126 ],  
  "value": {  
    "id": "ff35356344ee0e992...",  
    "from": "gabriele"  
  }  
}
```

```
{ "key": [ "chiara", 128 ],  
  "value": {  
    "id": "0deff99666425bacc...",  
    "from": "gabriele"  
  }  
}
```

```
{ "key": [ "gabriele", 120 ],  
  "value": {  
    "id": "9842063609746c661...",  
    "from": "chiara"  
  }  
}
```

received_after?

startkey=["chiara",126]&
endkey=["chiara",[]]



Received by "chiara"
After 126

```
{ "key": [ "chiara", 126 ],  
  "value": {  
    "id": "ff35356344ee0e992...",  
    "from": "gabriele"  
  }  
}
```

```
{ "key": [ "chiara", 128 ],  
  "value": {  
    "id": "0deff99666425bacc...",  
    "from": "gabriele"  
  }  
}
```

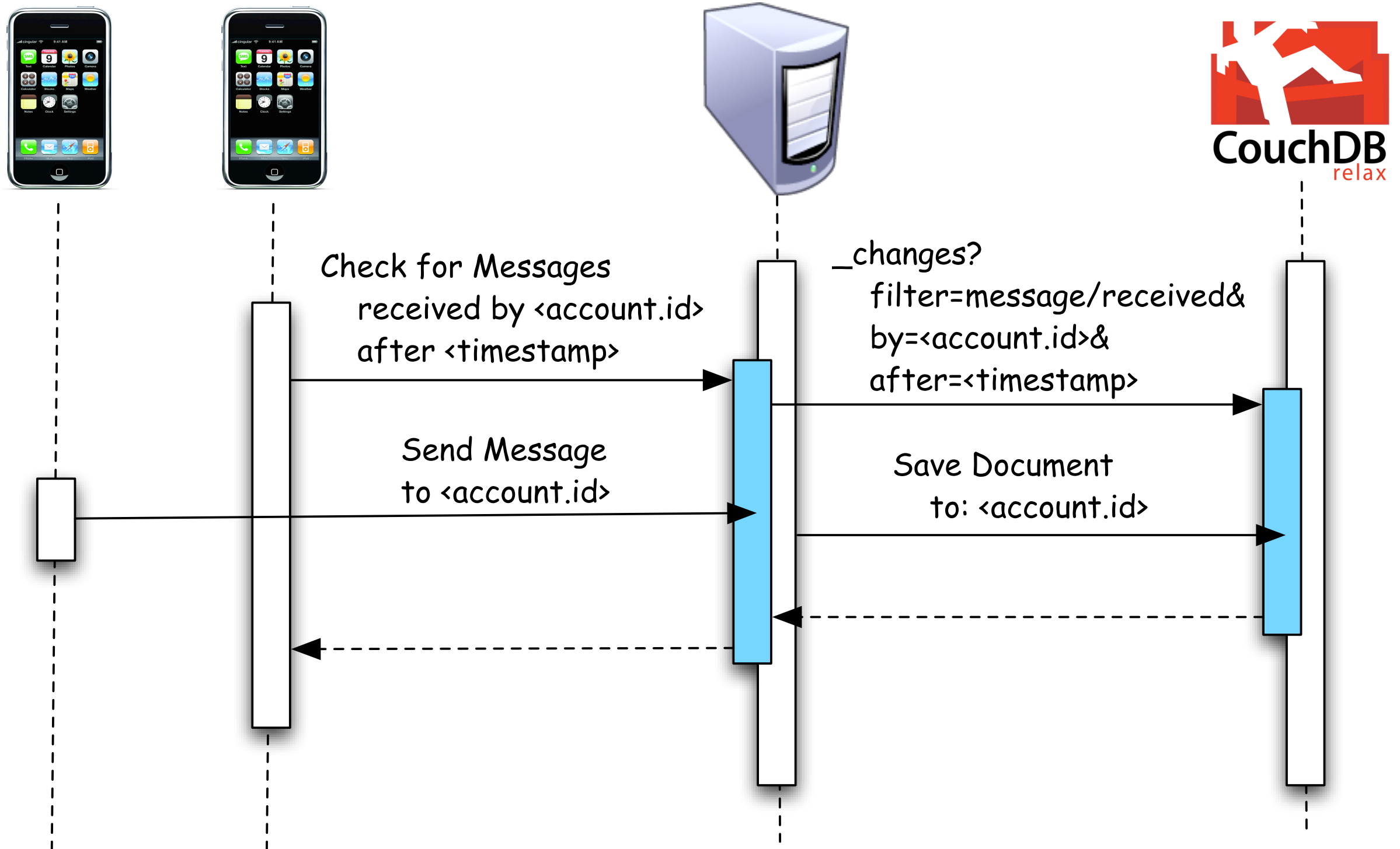
```
{ "key": [ "gabriele", 120 ],  
  "value": {  
    "id": "9842063609746c661...",  
    "from": "chiara"  
  }  
}
```

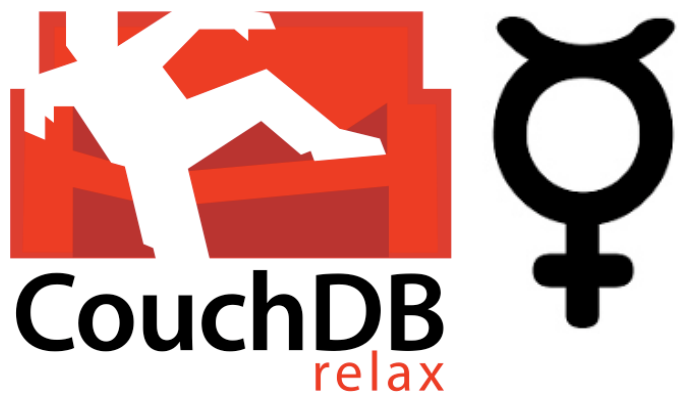
received_after?

startkey=["chiara",127]&
endkey=["chiara",[]]



Push Received Messages from Server





Push Received Messages from Server

`_changes?filter=message/received&by=<account.id>&after=<timestamp>`

```
function(document, request) {  
  var receivedByMe =  
    document.to === request.query.by  
  
  var receivedAfterLastTime =  
    document.receivedAt >= request.query.after  
  
  return receivedByMe && receivedAfterLastTime  
}
```



Backoffice as Couch Application

http://localhost:5984/_utils/document.html?ugialt_net/1

Apache CouchDB - Futon: V...

Overview > ugialt_net > 1

Save Document Add Field Upload Attachment... Delete Document...

Field	Value
_id	"1"
_rev	"1-19850e8c171da1ae079441bfb7b07af1"
checkout	100
day	"20090123"

← Previous Version | Next Version →

CouchDB relax

Tools

- Overview
- Configuration
- Replicator
- Status
- Test Suite

Recent Databases

- ugialt_net