

CouchBase

Data management for interactive web and mobile applications.

DALE HARVEY





RELAX



@perezd



What is Couchbase?

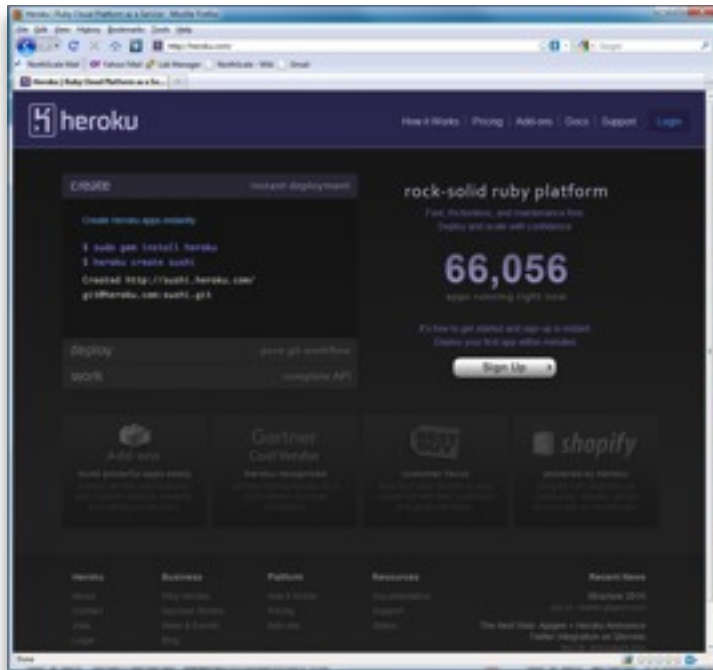


1+1 really does equal 3

WHAT IS MEMBASE?



Deployments Leading Membase

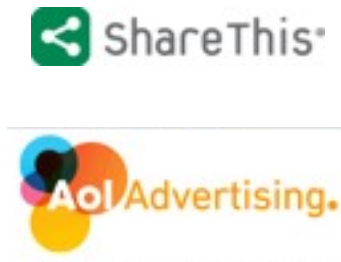


- Leading cloud service (PAAS) provider
- Over 65,000 hosted applications
- **Membase Server** serving over 1,200 Heroku customers (as of June 10, 2010)



- Social game leader – FarmVille, Mafia Wars, Café World
- Over 230 million monthly users
- **Membase Server** is the 500,000 ops-per-second database behind FarmVille and Café World

Ad targeting



1
events



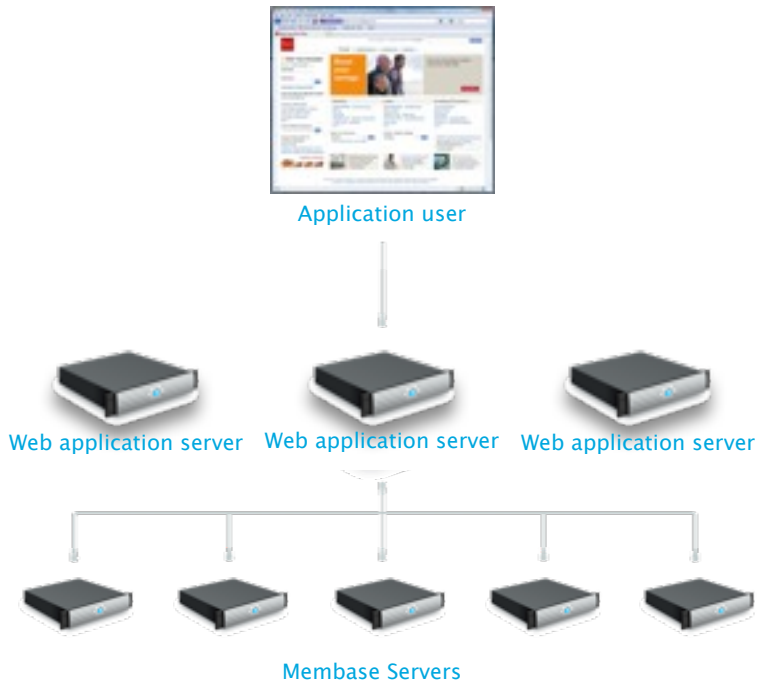
3
profiles, real time campaign statistics



40 milliseconds to come up with an answer.

2
profiles, campaigns

Membase is a distributed database

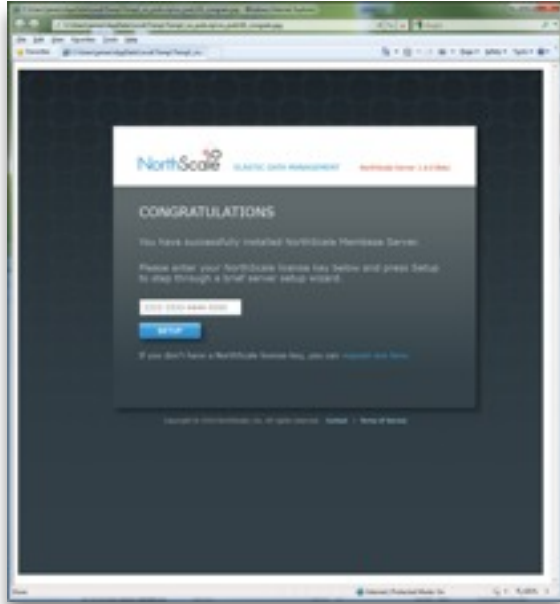


In the data center



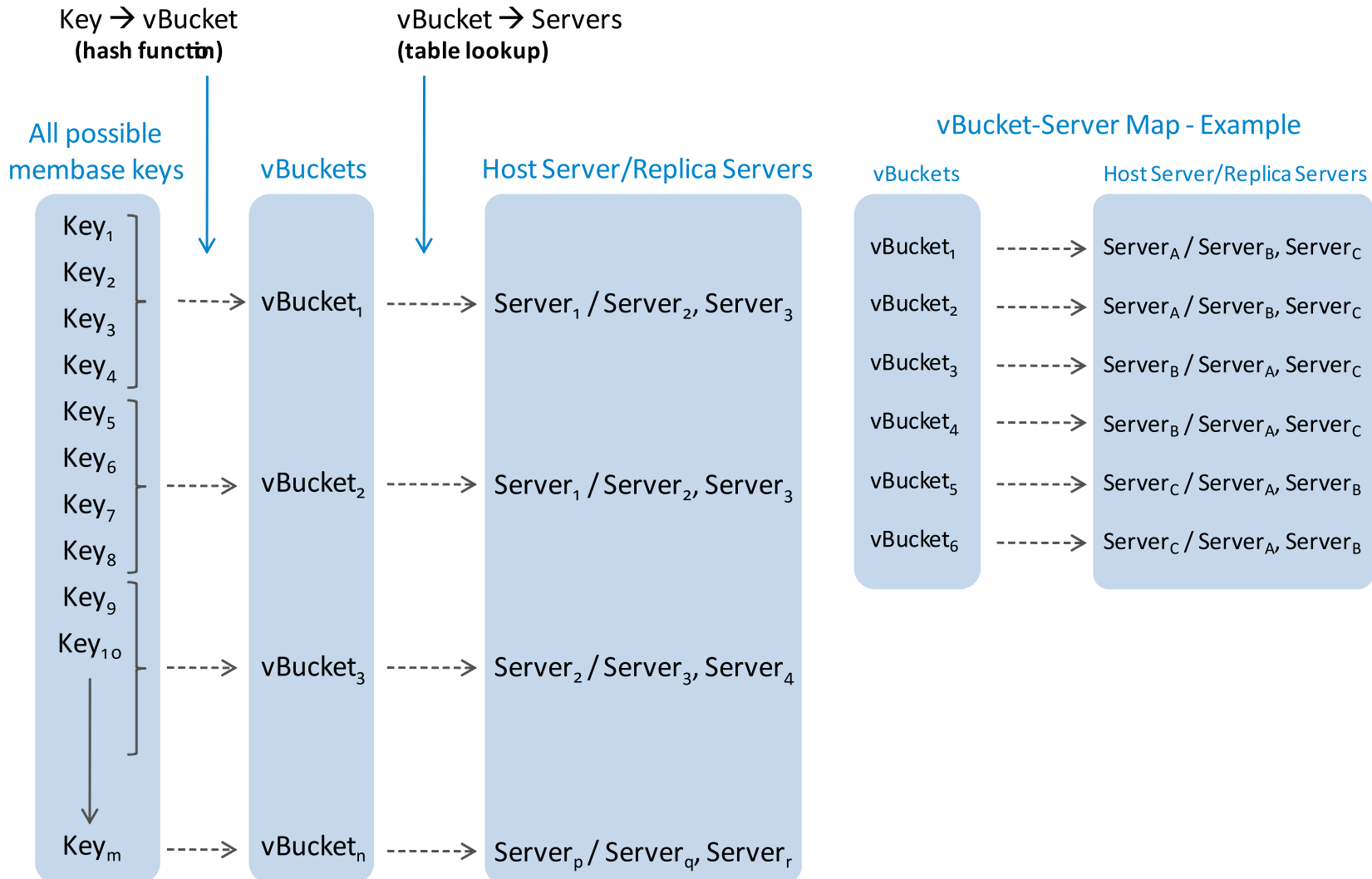
On the administrator console

Membase is Simple, Fast, Elastic



- ✧ Five minutes or less to a working cluster
 - Downloads for Linux and Windows
 - Start with a single node
 - One button press joins nodes to a cluster
- ✧ Easy to develop against
 - Just SET and GET – no schema required
 - Drop it in. 10,000+ existing applications already “speak membase” (via memcached)
 - Practically every language and application framework is supported, out of the box
- ✧ Easy to manage
 - One-click failover and cluster rebalancing
 - Graphical and programmatic interfaces
 - Configurable alerting

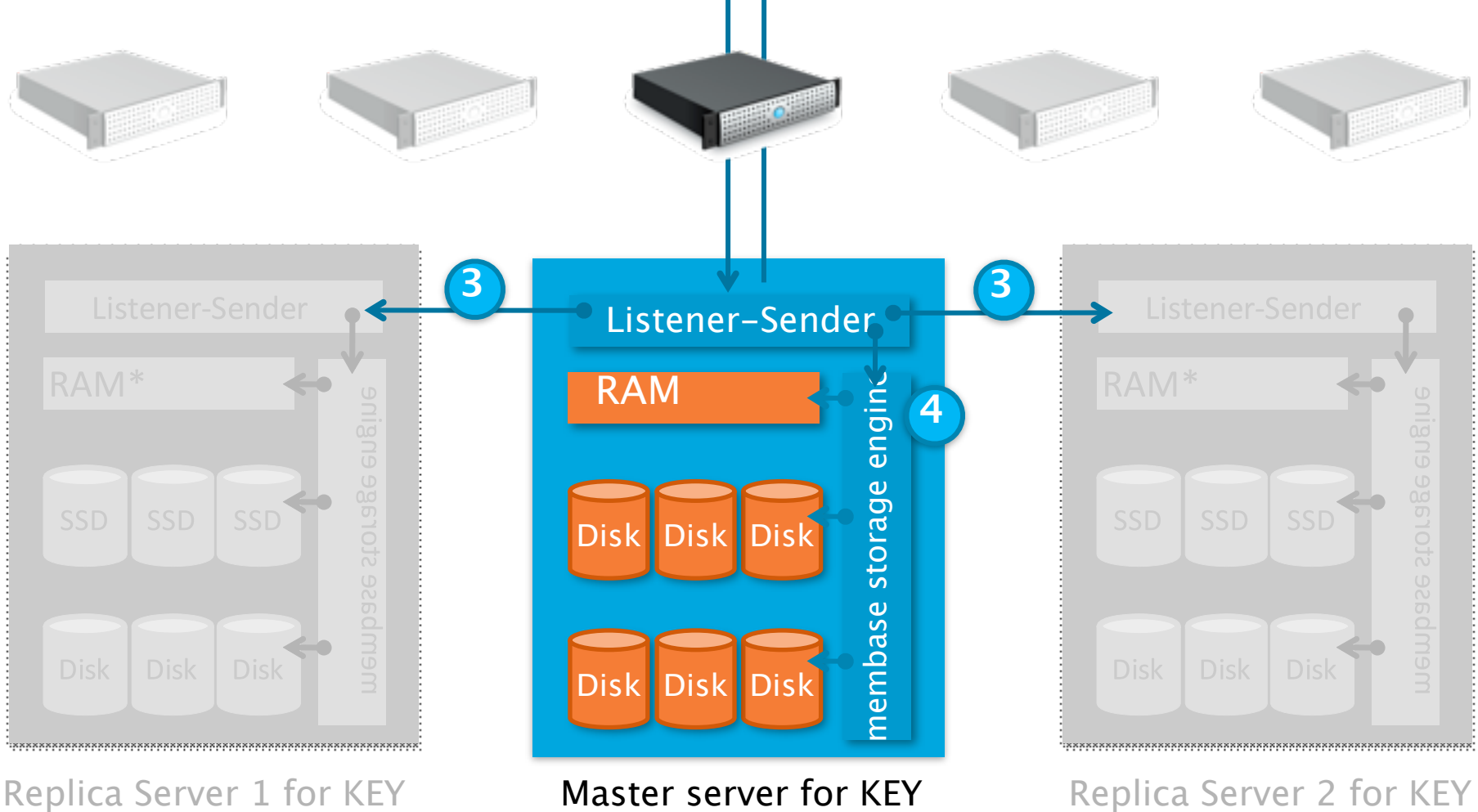
Data is sharded into vBuckets



Clustering With Membase

SET request arrives at KEY's master server 1

2 SET acknowledgement returned to application



Membase is Simple, Fast, Elastic



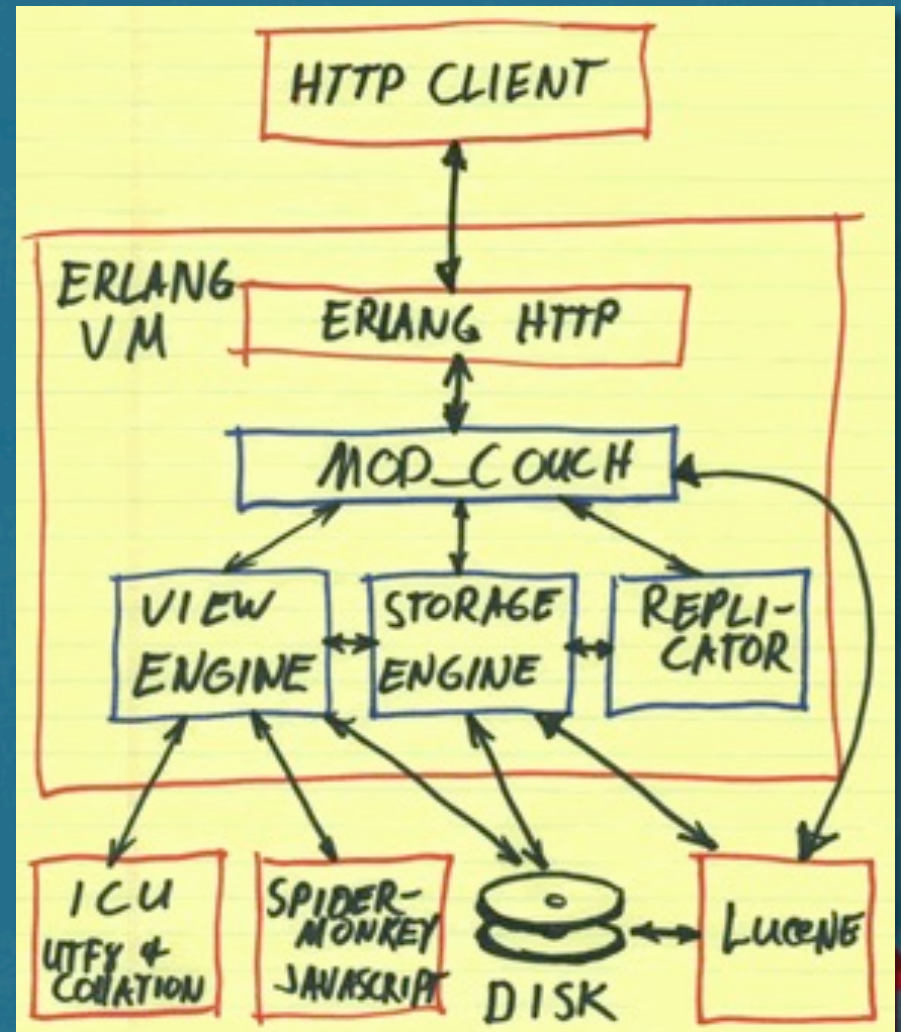
- ✧ Zero-downtime elasticity
 - Spread I/O and data across commodity servers (or VMs)
 - Consistent performance with linear cost
 - Dynamic rebalancing of a live cluster
- ✧ All nodes are created equal
 - No special case nodes
 - Any node can replace any other node, online
 - Clone to grow
- ✧ Extensible
 - Filtered TAP interface provides hook points for external systems (e.g. full-text search, backup, warehouse)
 - Data bucket – engine API for specialized container types

WHAT IS CouchDB?





Robust
JSON
Replication
Map Reduce
GeoCouch
HTTP



USE CASES



DOCUMENT STORE

=> GET <http://127.0.0.1:5984/mydatabase/uniqueid>

=> PUT <http://127.0.0.1:5984/mydatabase/uniqueid>

=> POST <http://127.0.0.1:5984/mydatabase/uniqueid>

=> DELETE <http://127.0.0.1:5984/mydatabase/uniqueid>

```
{
  "_id"      : "uniqueid",
  "_rev"     : 1234567,
  "title"    : "My New Blog Post",
  "body"     : "A quick brown fox .....",
  "_attachments": {
    "profile.jpg": { ..... }
  }
}
```



ROBUST STORAGE ENGINE

**Append-Only
Reliable & Concurrent
Hot Backups
Compaction**



INCREMENTAL MAP REDUCE

```
function(doc) {  
  if (doc.type == "post") {  
    emit(  
      [doc._id, 0],  
      {body:doc.body, title:doc.title}  
    );  
  } else if (doc.type == "comment") {  
    emit(  
      [doc.post_id, doc.created_at],  
      {comment:doc.comment, user:doc.user}  
    );  
  }  
};
```

_count

```
function(keys, values, rereduce) {  
  if (rereduce) {  
    return sum(values);  
  } else {  
    return values.length;  
  }  
};
```

PEER-BASED REPLICATION

```
curl -X POST http://127.0.0.1:5984/_replicate -d
'{
  "source":
    "http://couch.example.com:5984/remote-db",
  "target":
    "local-db"
}'
```



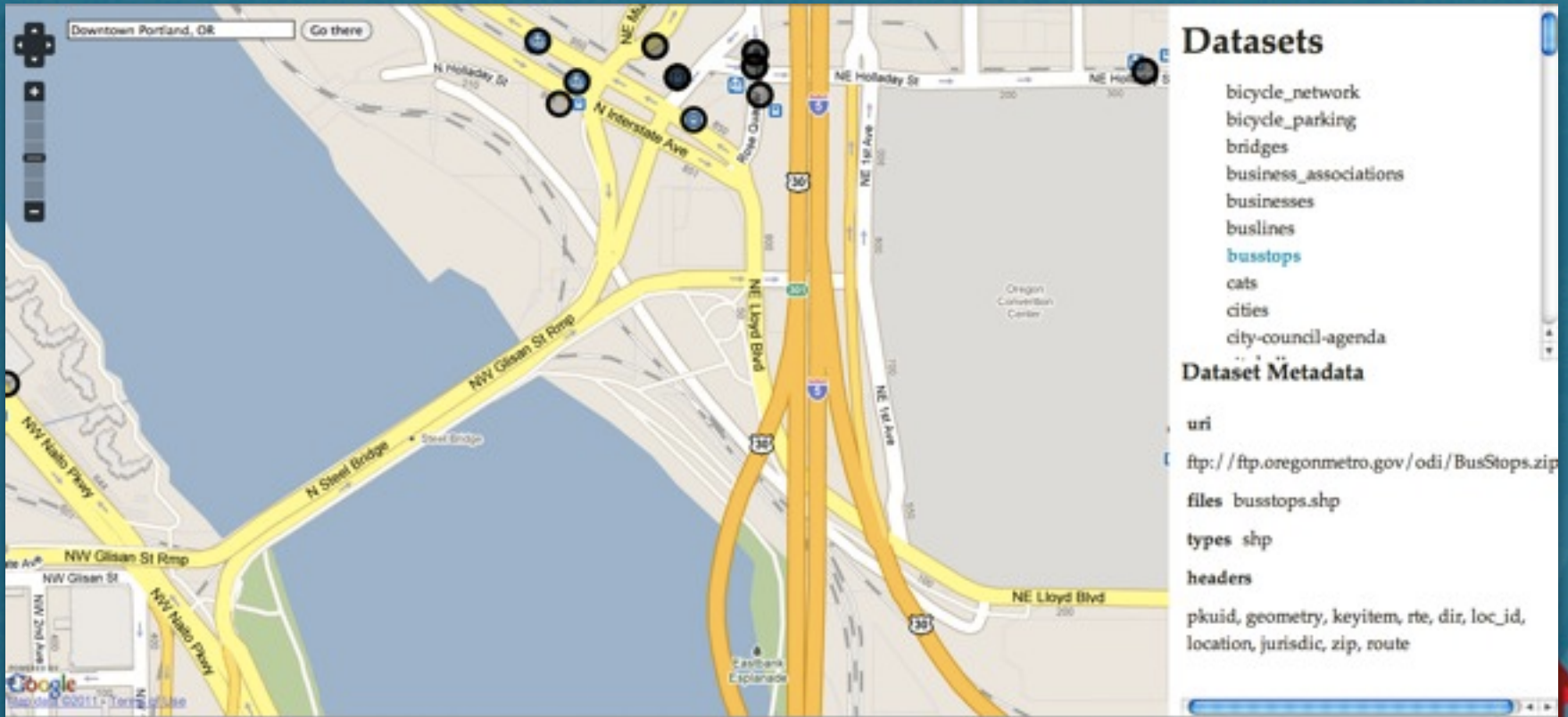
NAILING MOBILE

- **Extremely Robust Storage Engine**
Consumer devices may lose power at any time
- **Lightweight Runtime**
Small install, low memory footprint, easy on battery life
- **Offline sync via Replication**
Multi-master synchronization engine
- **GeoSpatial Index**
Mapping and location aware apps
- **HTML5 Application Server**
Easy to add a web view to your mobile

<https://github.com/couchbaselabs/iOS-Couchbase>



GEOCOUCH CIVICAPI.COM, ETC



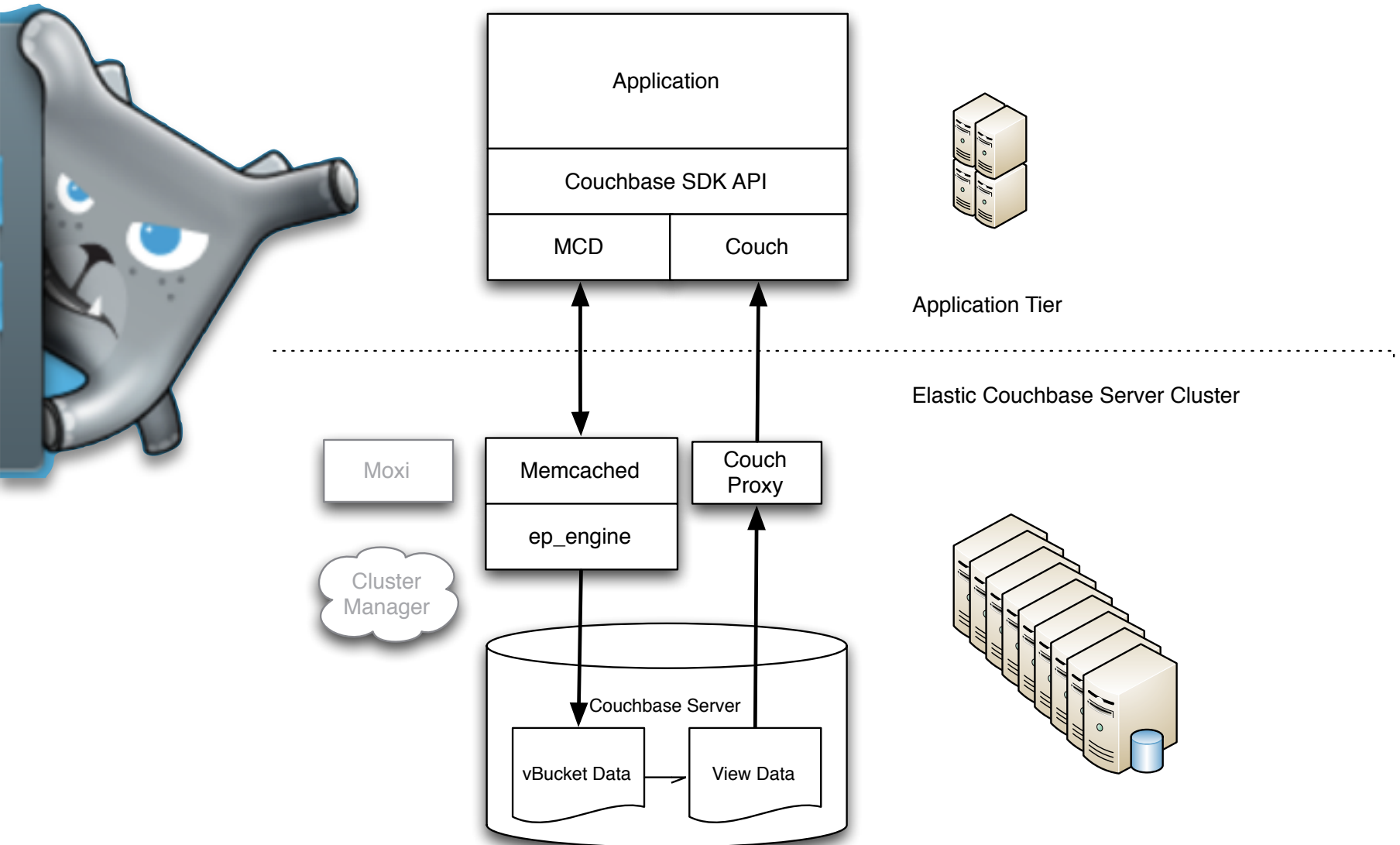
Advanced R-Tree Index

CouchBase

ARCHITECTURE



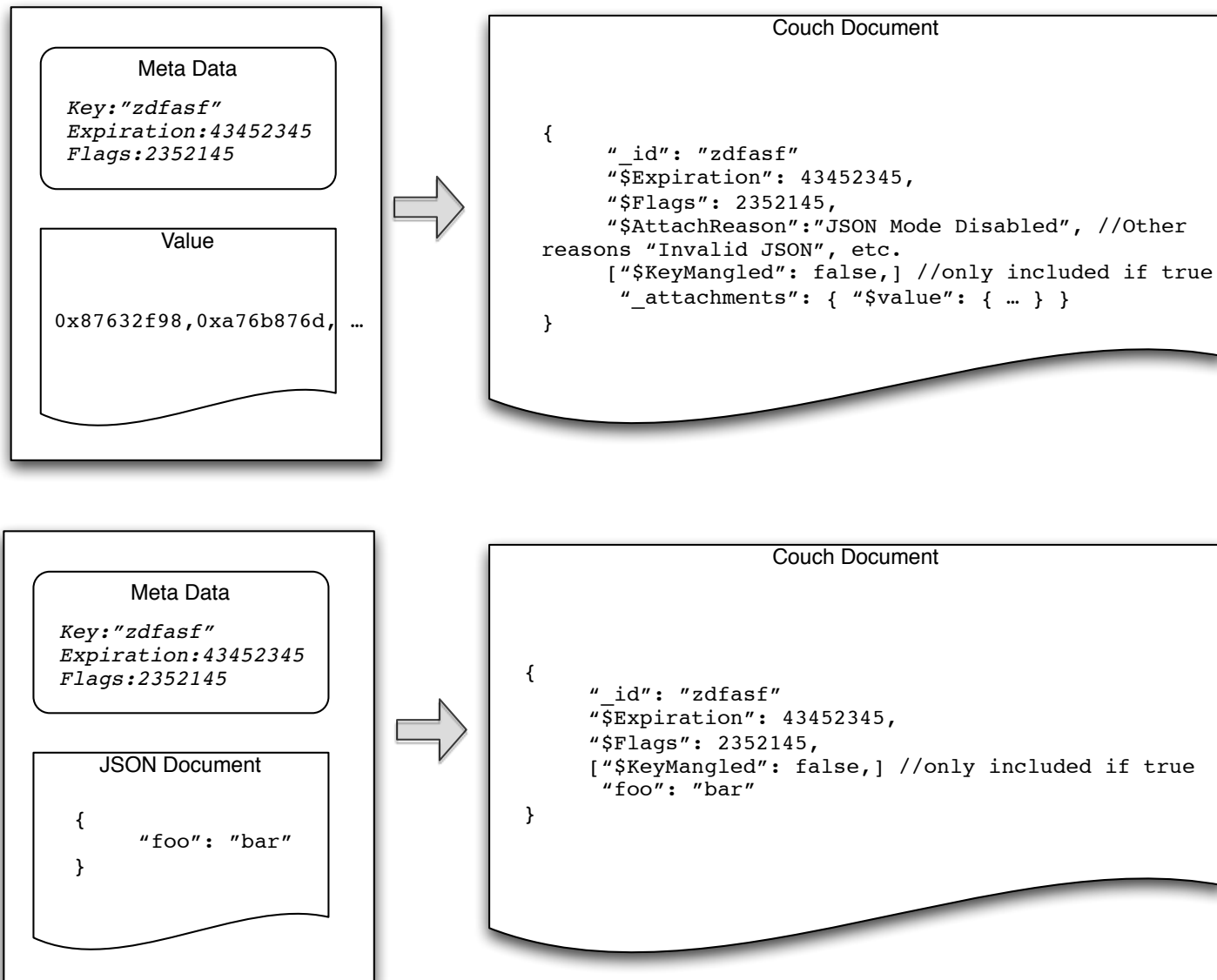
2.0 Architecture Overview



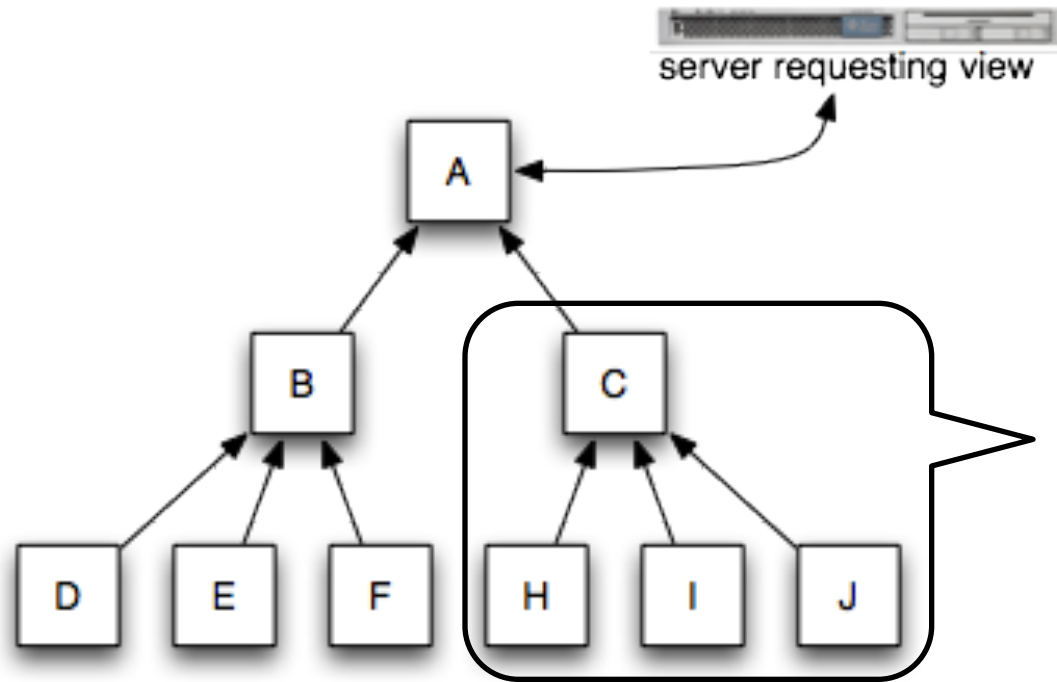
JSON Document Handling

- Per Bucket JSON Document Mode toggle
- JSON Document Mode disabled (or invalid JSON)
 - Values are opaque to couch (and in views)
 - Stored as attachments to documents that hold metadata
 - Returned values are guaranteed bitwise identical
- JSON Document Mode enabled
 - Values are expected to be valid JSON
 - Stored in document along metadata
 - Returned values may not be bitwise identical but

JSON Document Encodings for memcached

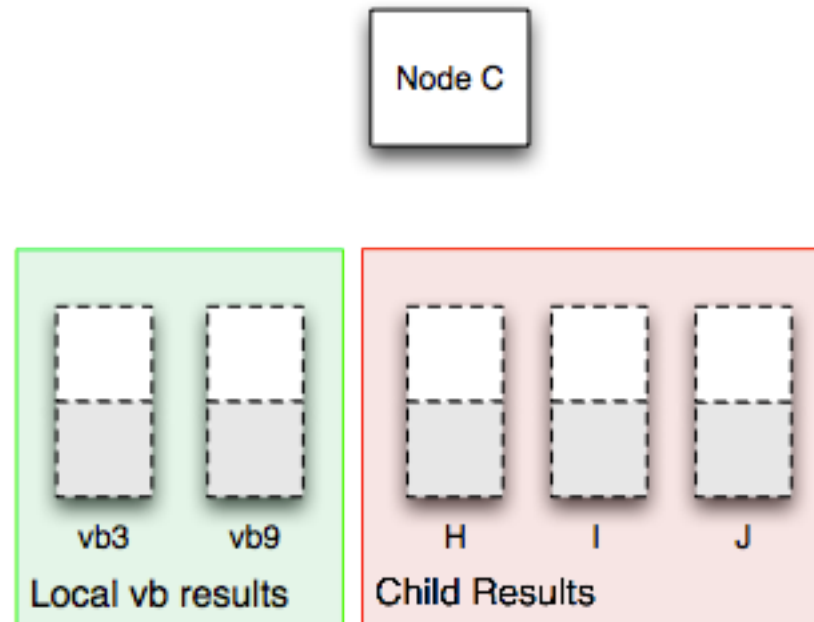


Scatter Gather Map Reduce

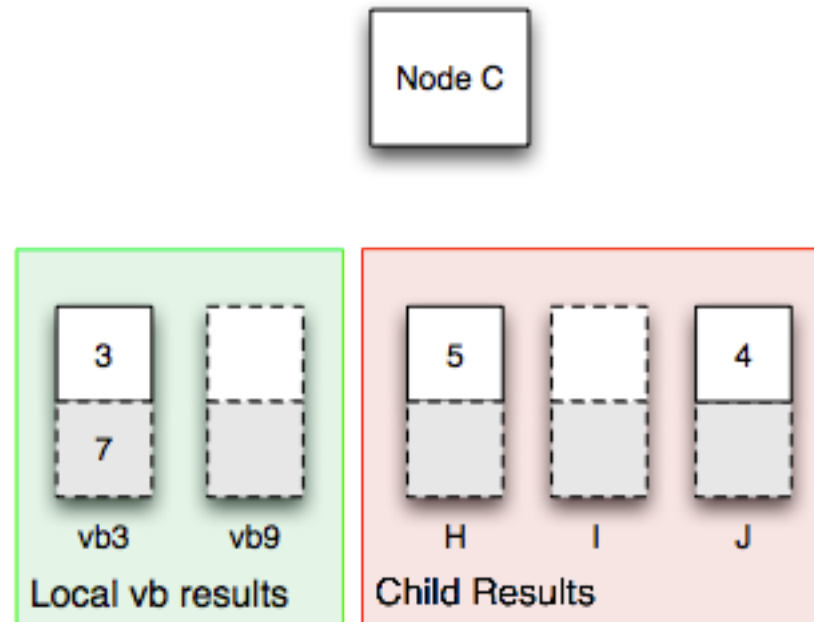


- Get next answer from local vBuckets and from child nodes to select the next result for a node
- Result includes info on number of vBuckets not included
 - Timeouts, Incorrect Design Doc version, etc

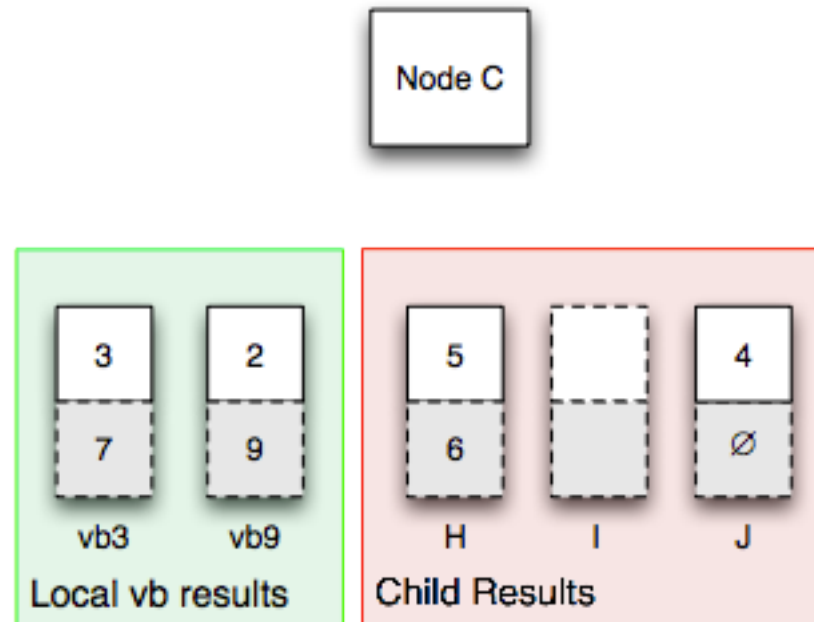
Scatter Gather Example



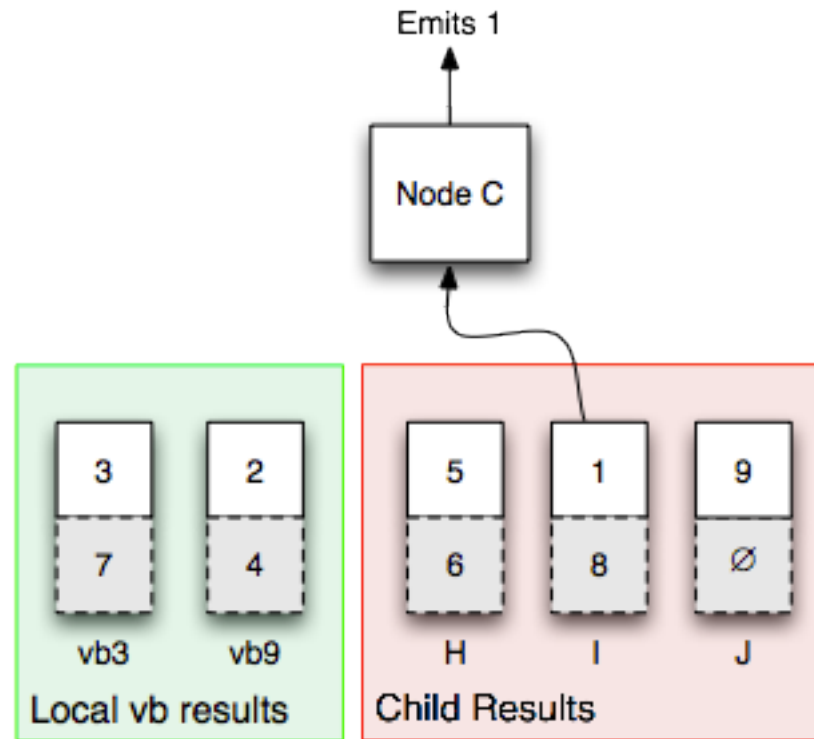
Scatter Gather Example



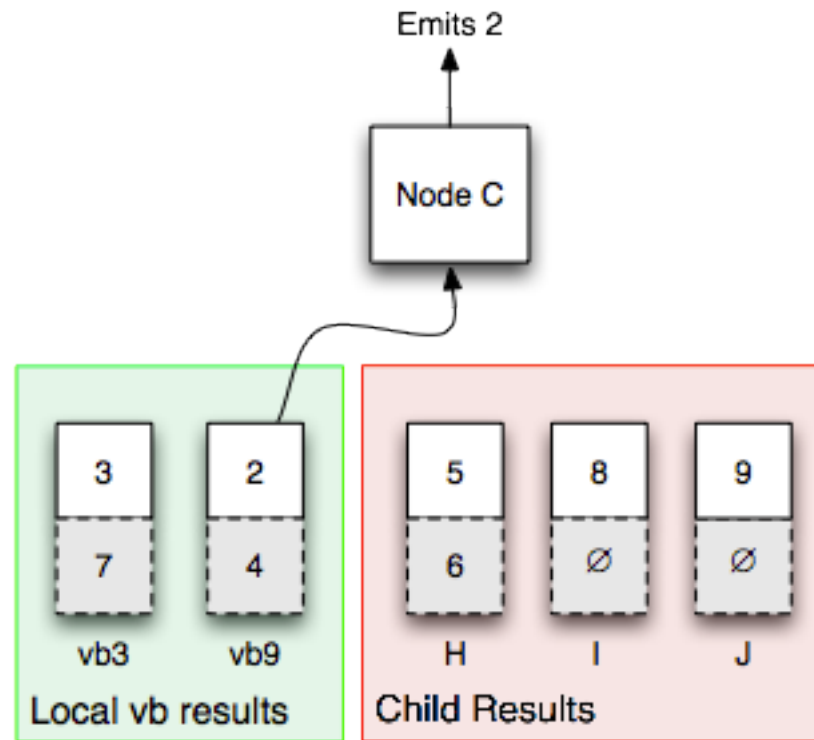
Scatter Gather Example



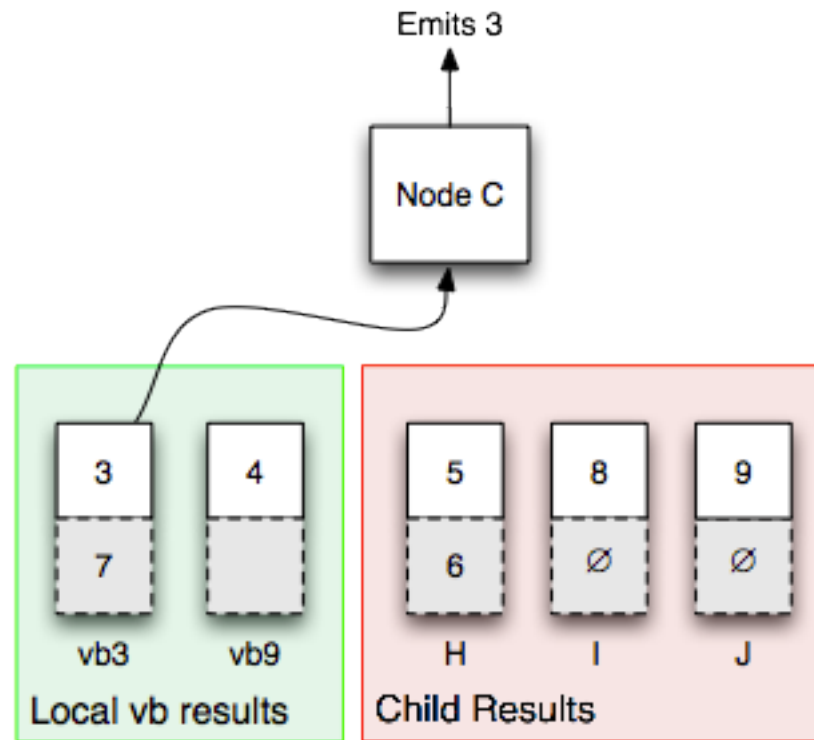
Scatter Gather Example



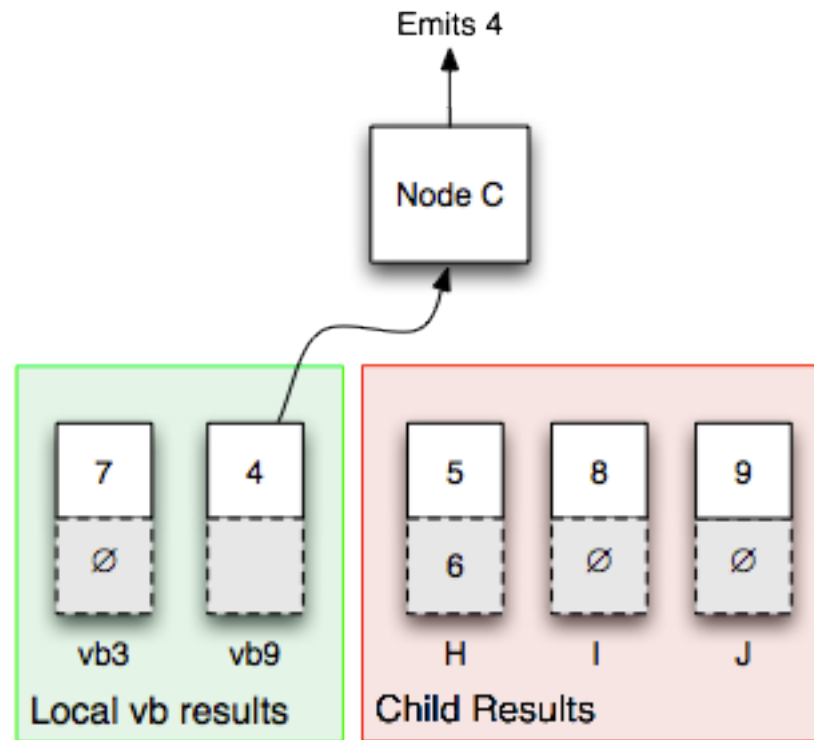
Scatter Gather Example



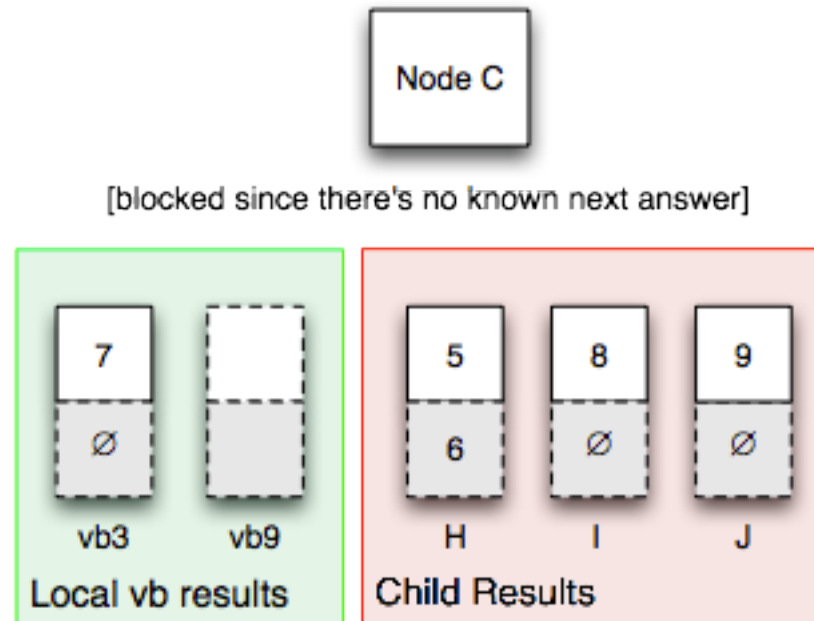
Scatter Gather Example



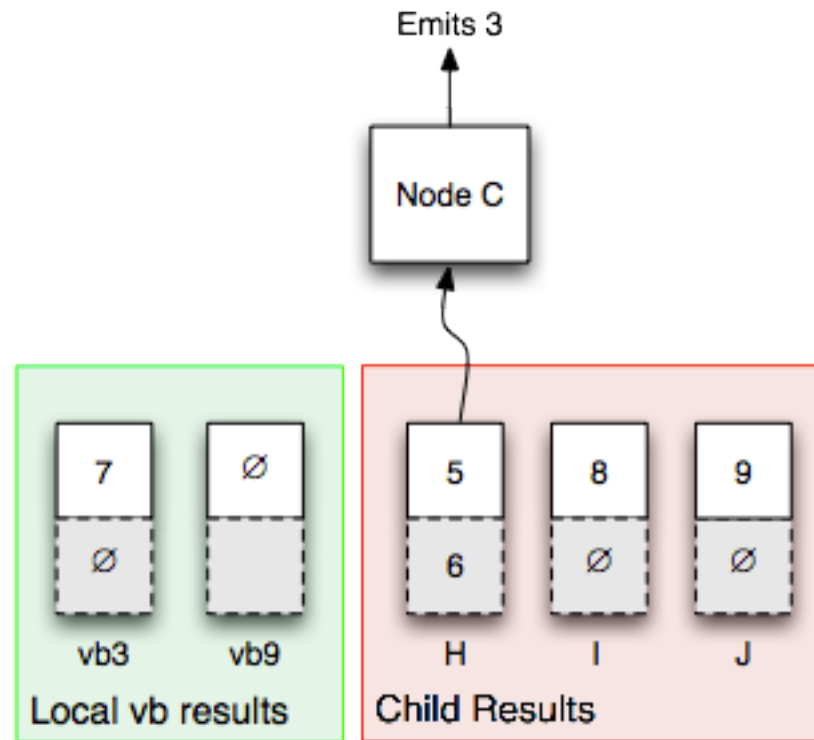
Scatter Gather Example



Scatter Gather Example



Scatter Gather Example

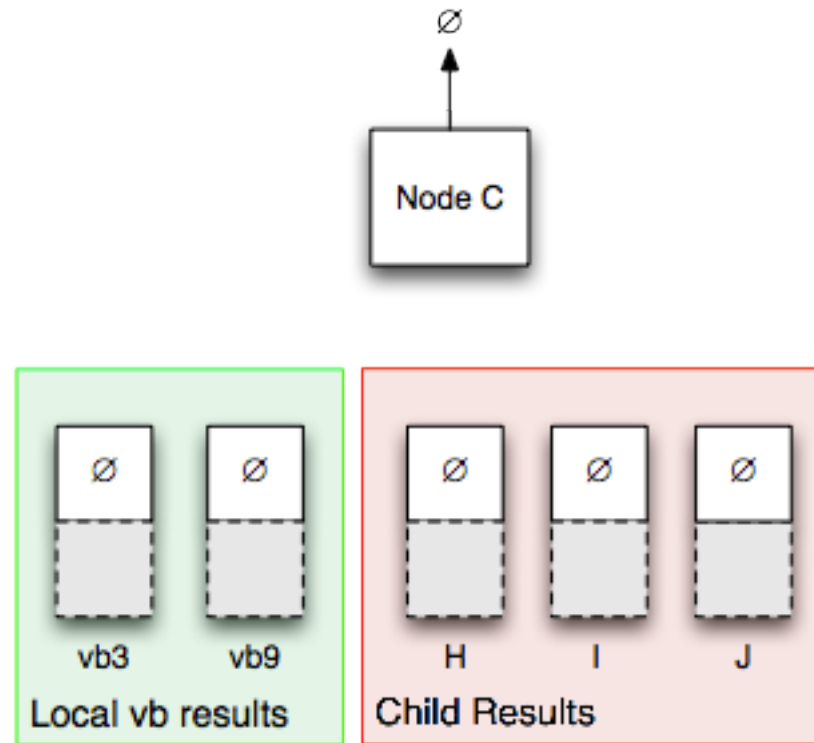


Scatter Gather Example



(Time Passes)

Scatter Gather Example



CouchBase

Q & A

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