Couchbase Developer Tutorial with Java (and some Ruby)

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Couchbase

Objective

- A lecture and Hands-on based program
  - To get started on programming with Couchbase using Java (and some Ruby)
  - To learn about the basic operations, asynchronous and advanced operations
  - To learn about secondary indexing with views and queries (a Couchbase Server 2.0 feature)
  - To enhance applications with views and queries

Speaker Introduction

- Architect and Evangelist working with developers
- Speaker at JavaOne, RSA conferences, Sun Tech Days, JUGs and other developer conferences
- Taught undergrad and grad courses
- Technology Evangelist at Sun Microsystems for 10+ years
- Still trying to understand and work more effectively on Java and distributed systems
- Couchbase Developer Advocate working with Java and Ruby developers
- Philosophy: "*Better to have an unanswered question than a unquestioned answer*"

AGENDA


Intro. and Getting Started
Async. operations
Advanced operations
Doc. Design and Beer Data
Query and Views

Software Requirements

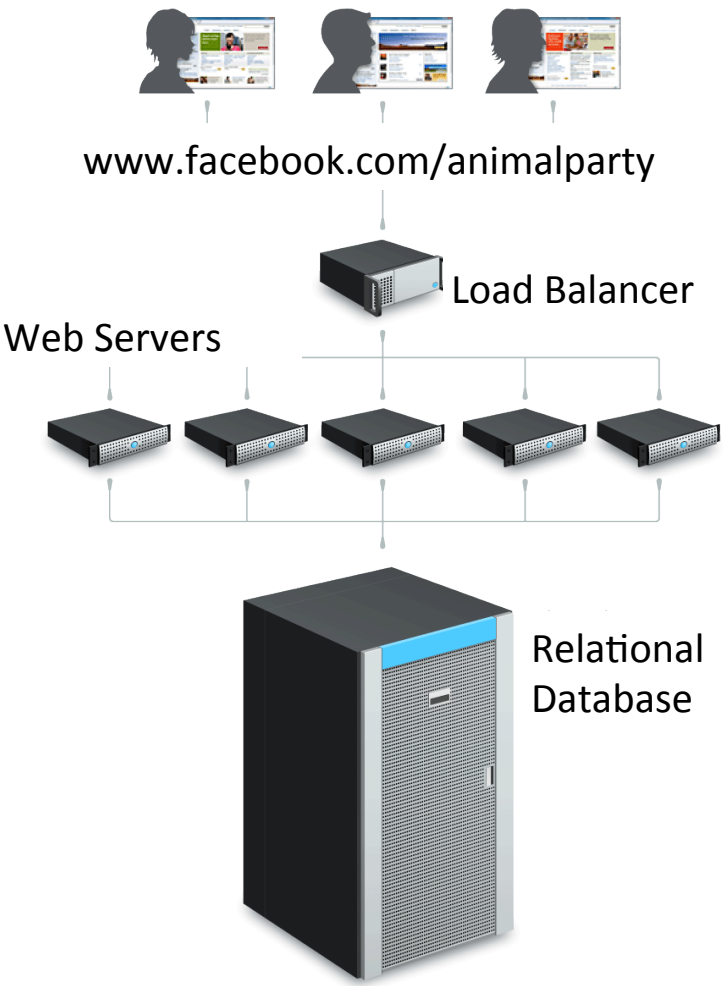
- You will need to install the following software on your laptops:
  - Web Browser
  - Java 6
  - SSH Client (if planning to use Amazon EC2 or other cloud provider)
  - Eclipse (Java EE version with JSP support) or your favorite IDE
  - Couchbase Java SDK (http://www.couchbase.com/develop/java/next)
  - PDF Viewer

Overview of Training Material/Exercises

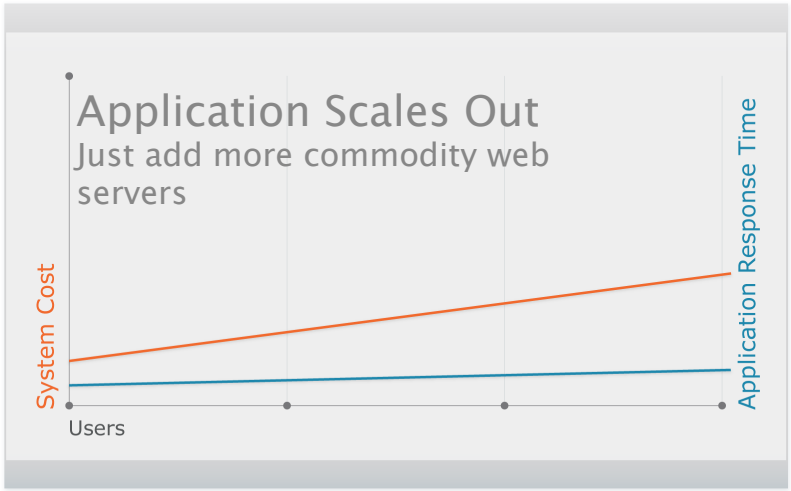
- After installing the prerequisite software
  - Unzip CouchbaseJavaTraining_v5.zip (appropriate version will be provided) into HOL_ROOT directory
  - Couchbase client JARs and dependencies are provided in the JARs subdirectory (for convenience)
  - Outline is in CouchbaseJavaOutline.pdf
  - Presentation and Exercise statements are in CouchbaseJavaPresentation.pdf or CouchbaseJavaPresentationAbbreviated.pdf
  - Lab manual (with sketchy instructions) are in CouchbaseJavaManual.pdf
  - Solutions to exercises (sometimes partial) are in the Exercises sub directory
  - Exercises are sequential in nature (i.e. exercises depend on successful execution of earlier exercises). Some are marked as optional

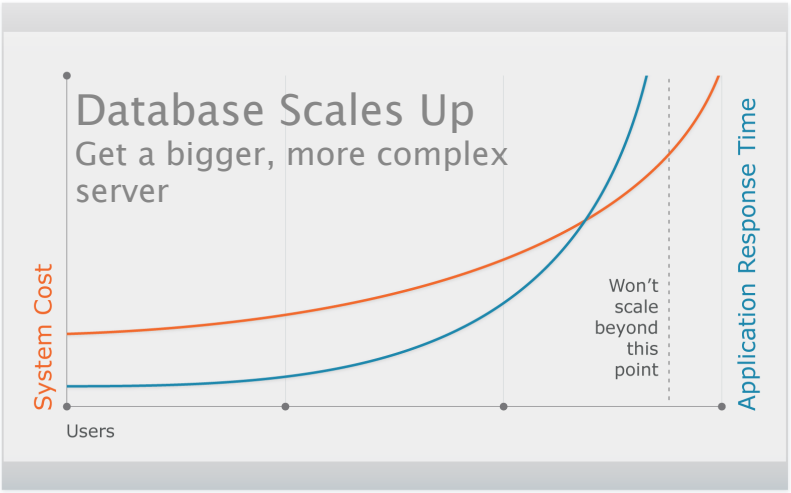
HIGH LEVEL ARCHITECTURE

Web Application Architecture and Performance



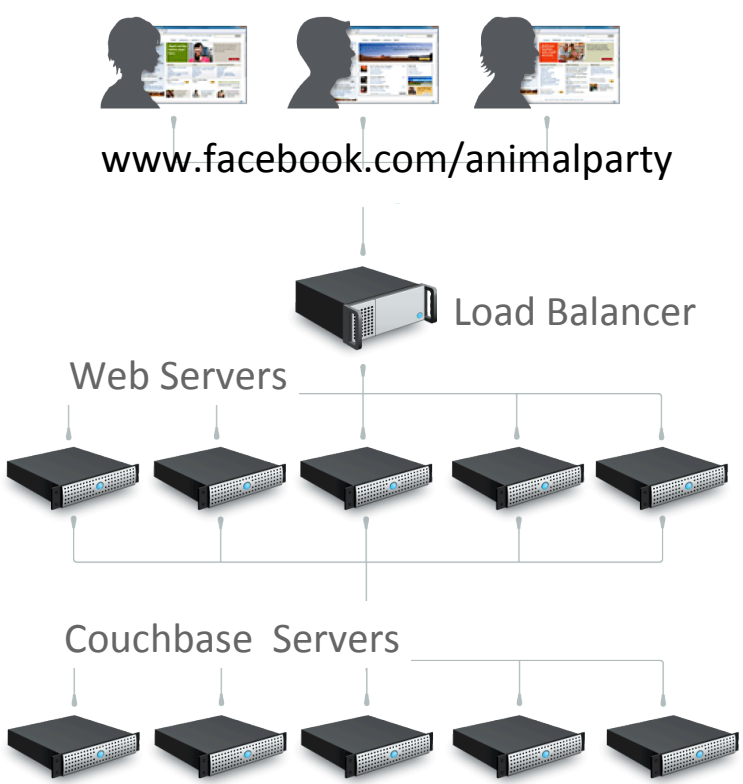
- Expensive and disruptive sharding
- Doesn't perform at Web Scale



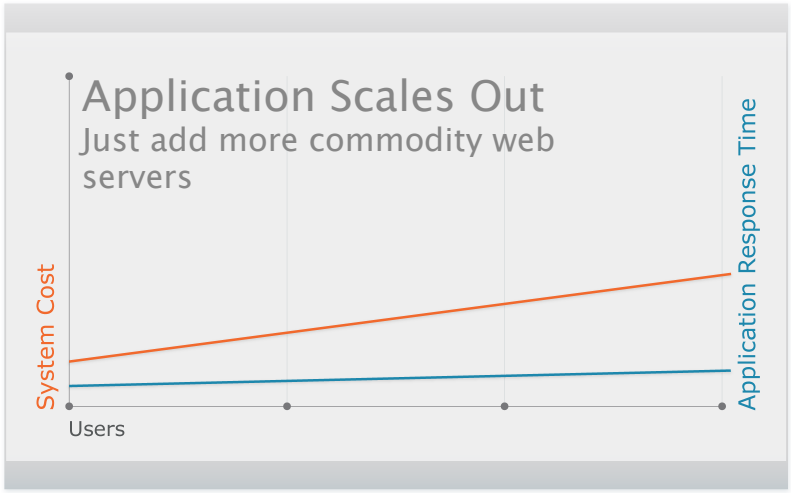


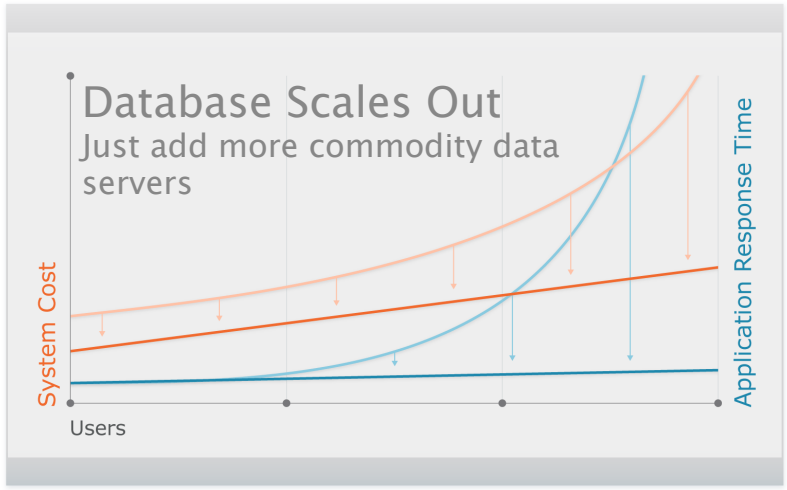
Couchbase data layer scales like application logic tier

Data layer now scales with linear cost and constant performance.



Horizontally scalable, schema-less, auto-sharding, high-performance at Web Scale





Scaling out flattens the cost and performance curves.

WHAT IS COUCHBASE?

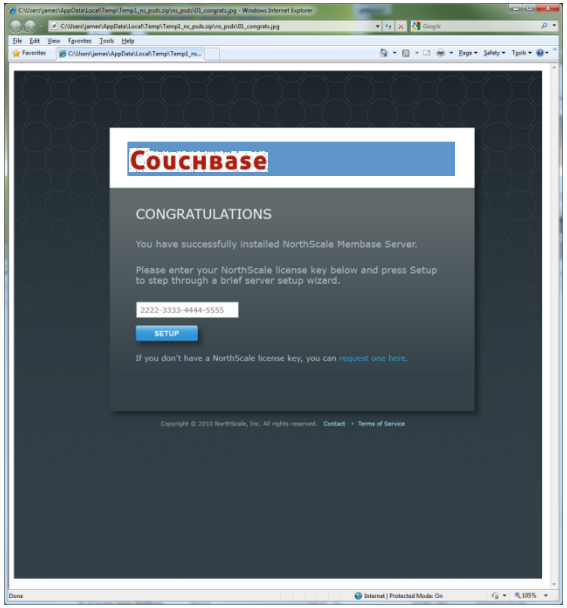
What is Couchbase?

- Multitenant Document (JSON-based) Store
- Distributed
- Fault Tolerant
  - Persistent
  - Replicated
- Schema-Free

Qualities

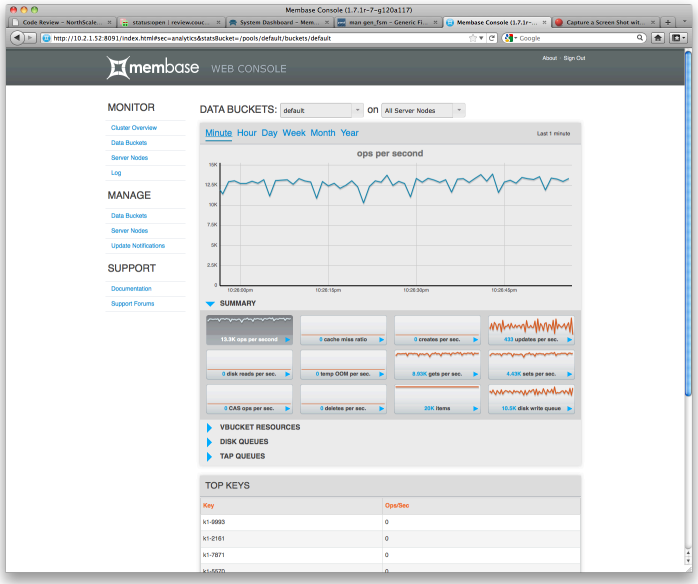
- Simple
  - memcached API
- Uniformly FAST
  - Sub-millisecond response times
  - Predictable scalability
- Elastic
  - Easy scalable

Couchbase Server is Simple, Fast, Elastic



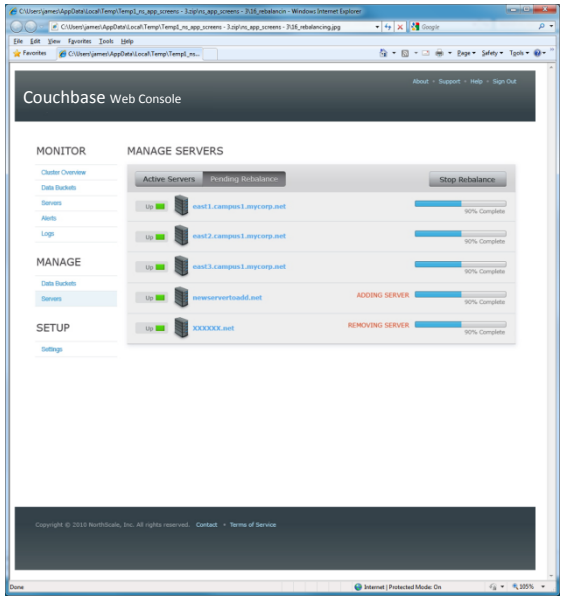
- Five minutes or less to a working cluster
  - Downloads for Windows, Linux and OSX
  - Start with a single node
  - One button press joins nodes to a cluster
- Easy to develop against
  - Just SET and GET – no schema required
  - Drop it in. 10,000+ existing applications already "speak Couchbase" (via 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

Couchbase Server is Simple, Fast, Elastic



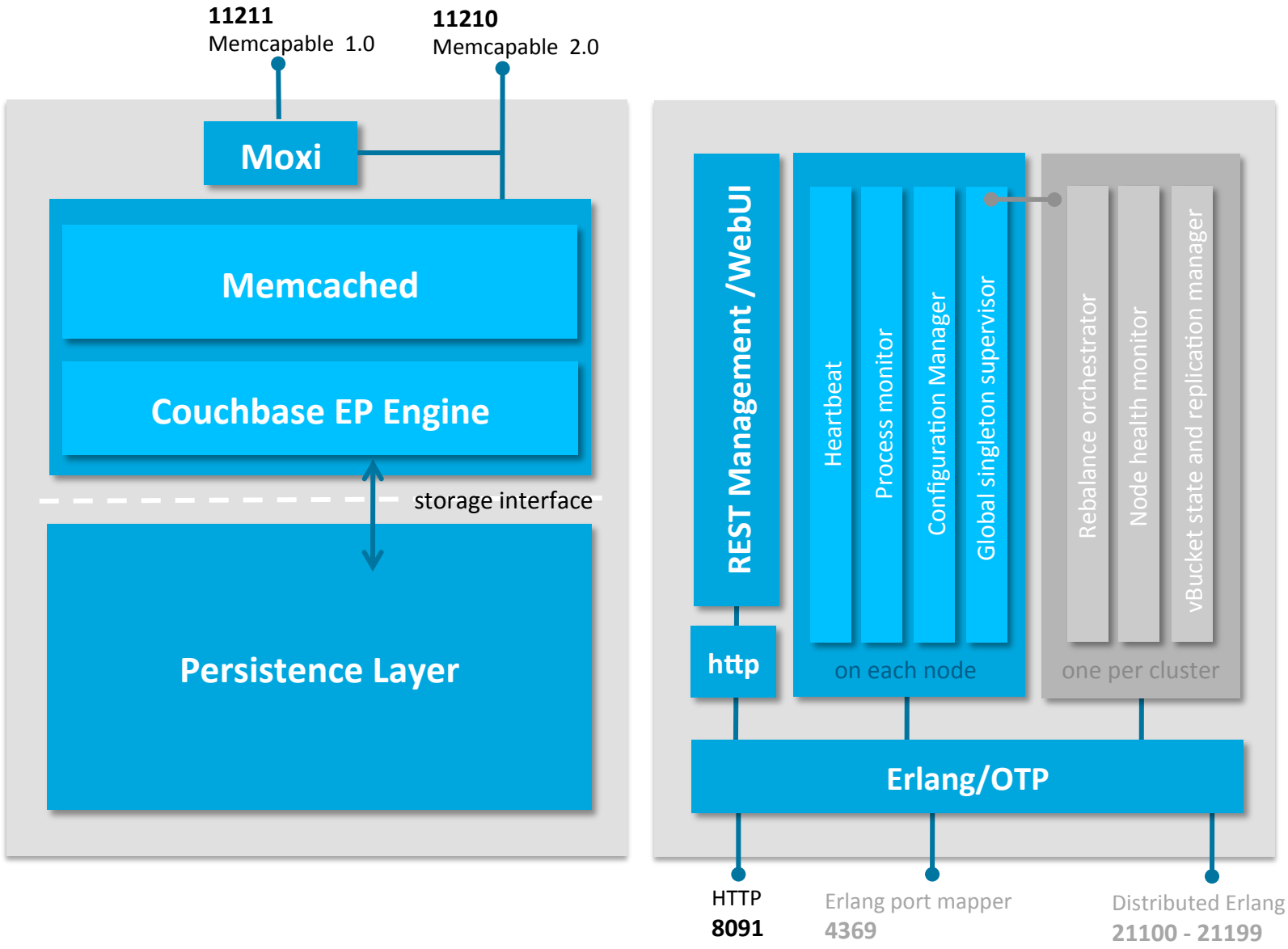
- Predictable
  - "Never keep an application waiting"
  - Quasi-deterministic latency and throughput
- Low latency
  - Built-in Memcached technology
  - Auto-migration of hot data to lowest latency storage technology (RAM, SSD, Disk)
  - Selectable write behavior – asynchronous, synchronous (on replication, persistence)
- High throughput
  - Multi-threaded
  - Low lock contention
  - Asynchronous wherever possible
  - Automatic write de-duplication

Couchbase Server is Simple, Fast, Elastic

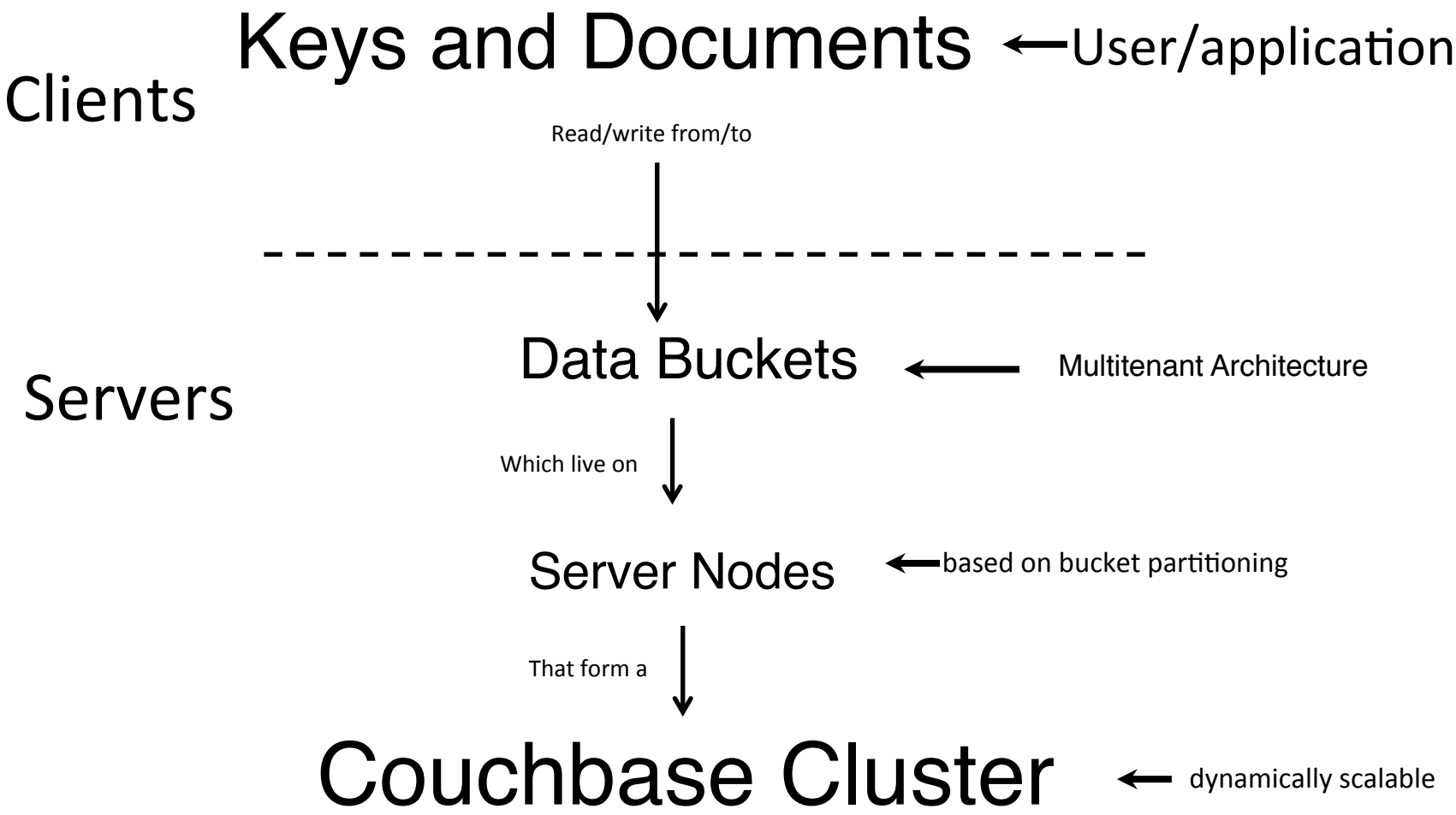


- Zero-downtime elasticity
  - Spread I/O and data across commodity servers (or VMs)
  - Consistent performance with linear cost
  - Dynamic rebalancing of a live cluster
- All nodes are created equal
  - No special case nodes
  - Clone to grow
- Extensible
  - Change feeds
  - Real-time map-reduce
  - RESTful interface for management

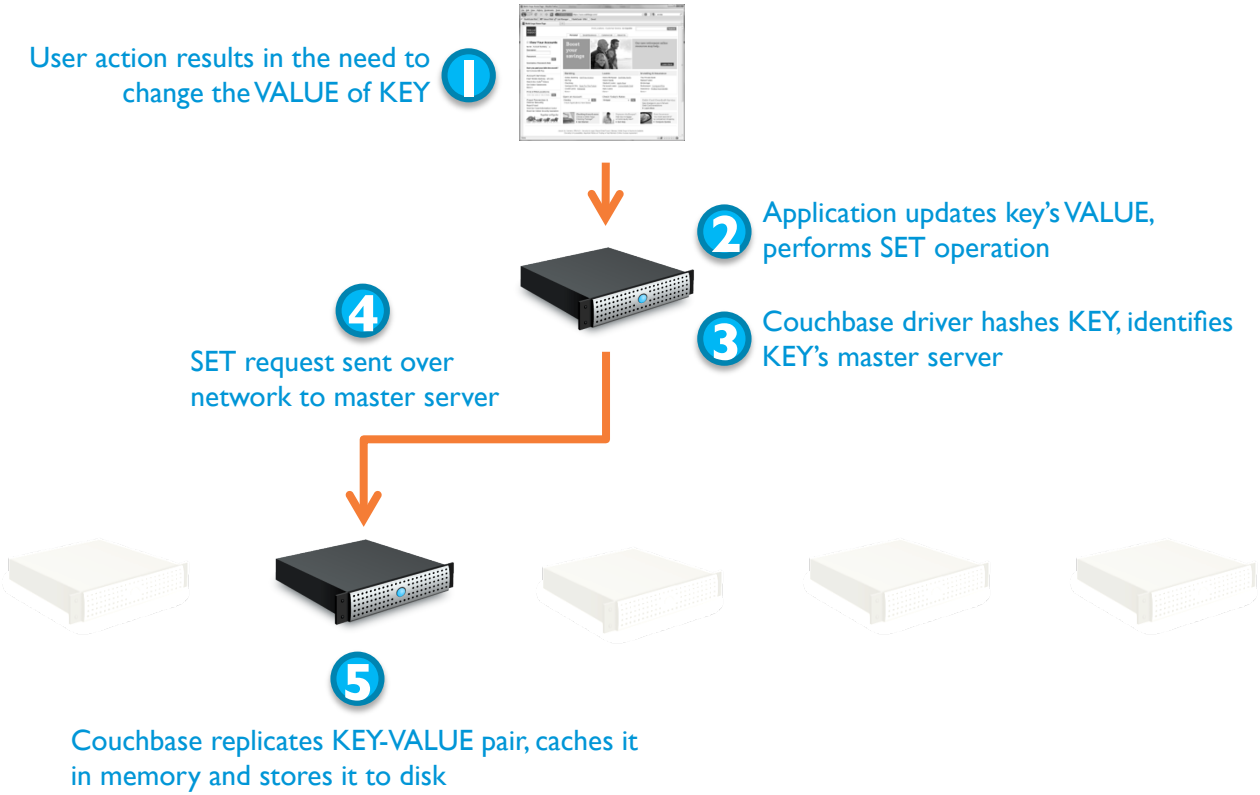
Component Architecture



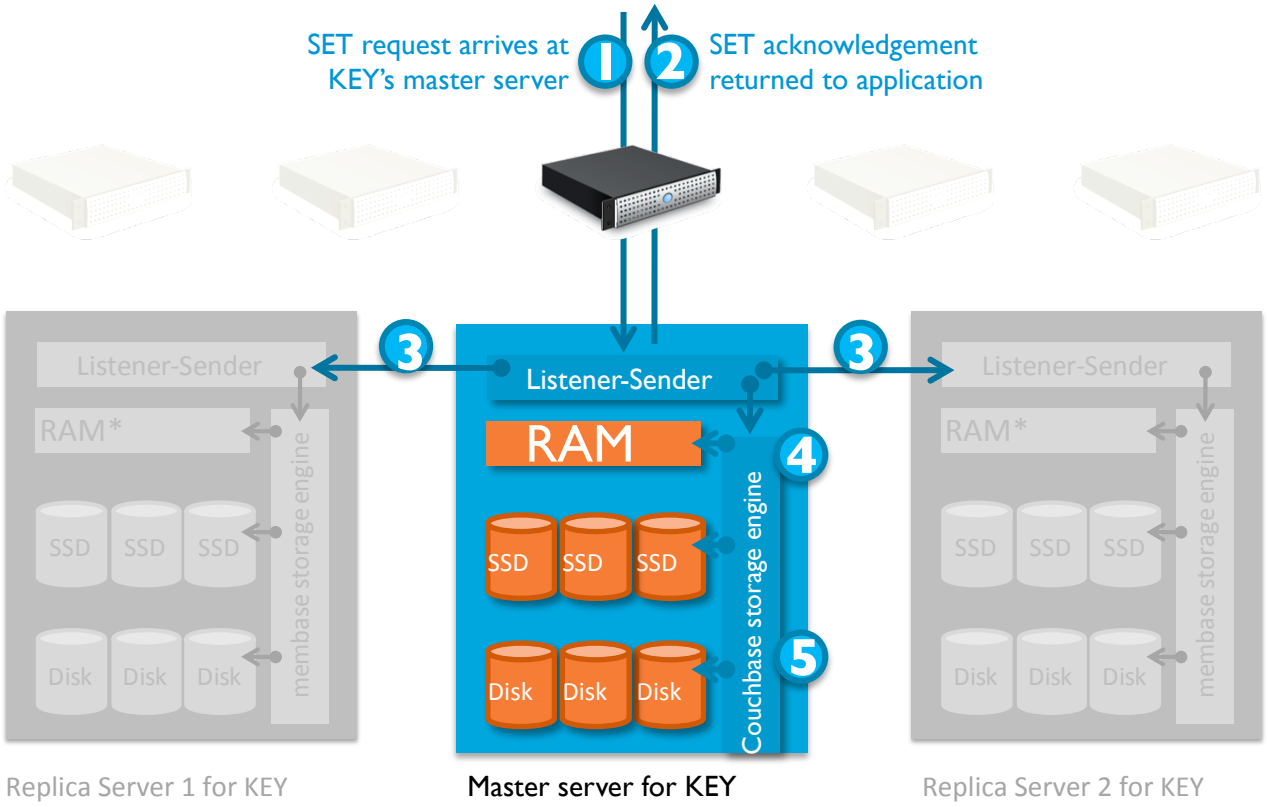
Key Concepts



Architecture

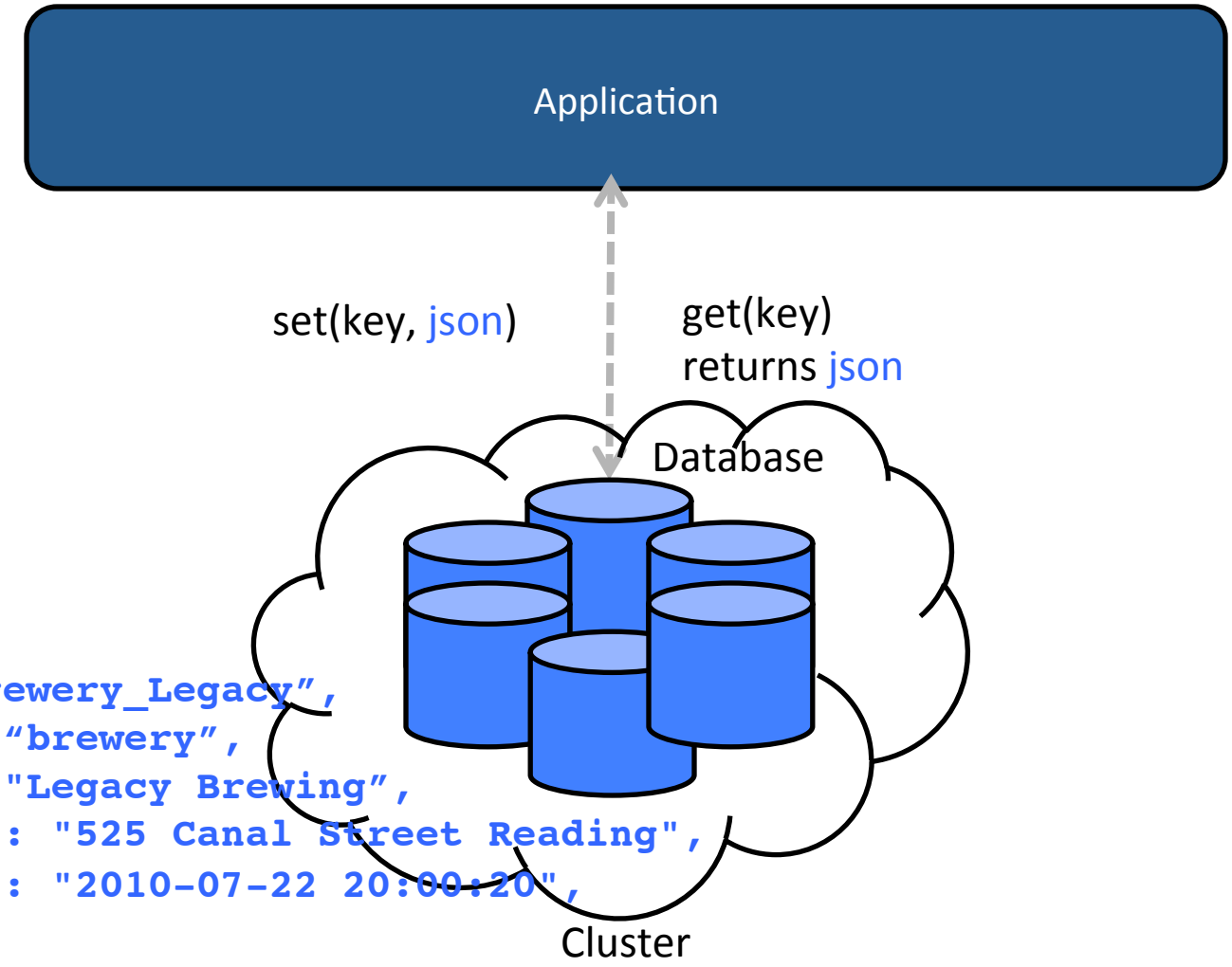


Operations workflow



Durability/HA comes first from off-node replication, fallback to disk persistence

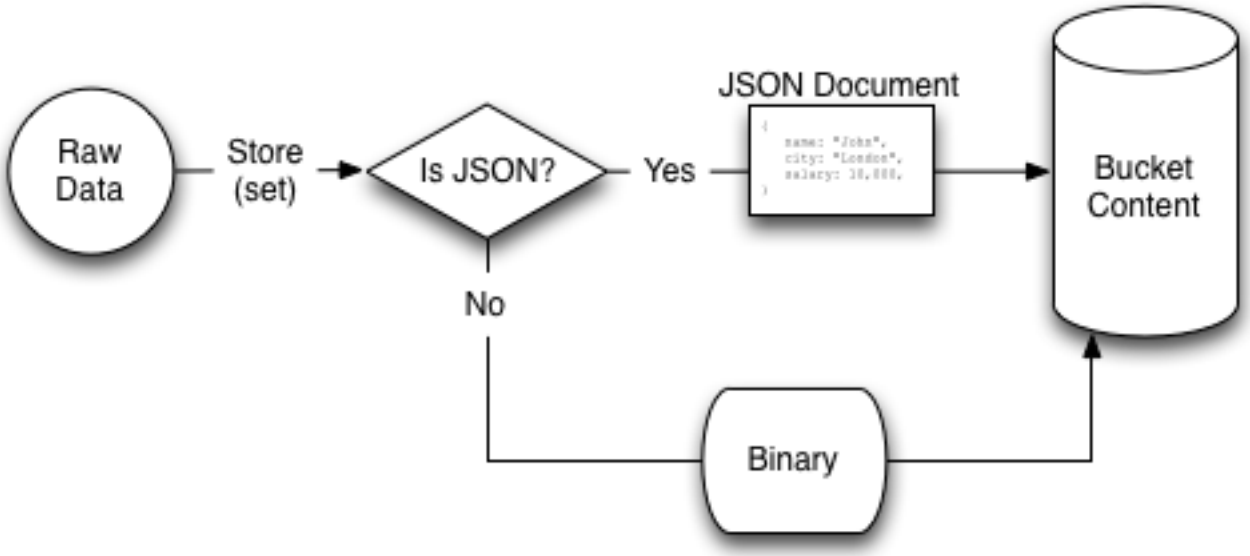
A Distributed ~~Hash Table~~ Document Store




```
{
“id": ”brewery_Legacy”,
“type” : “brewery”,
"name" : "Legacy Brewing”,
“address": "525 Canal Street Reading",
"updated": "2010-07-22 20:00:20",
}
```

A JSON-based document store

- JSON is processed specially on the server



GETTING STARTED

Installation

- RedHat – RPM
- Ubuntu – dpkg
- Windows
- Mac OS
- GUI Installer
- Unattended installation
- Quickstart once installed
- http://<hostname>:8091

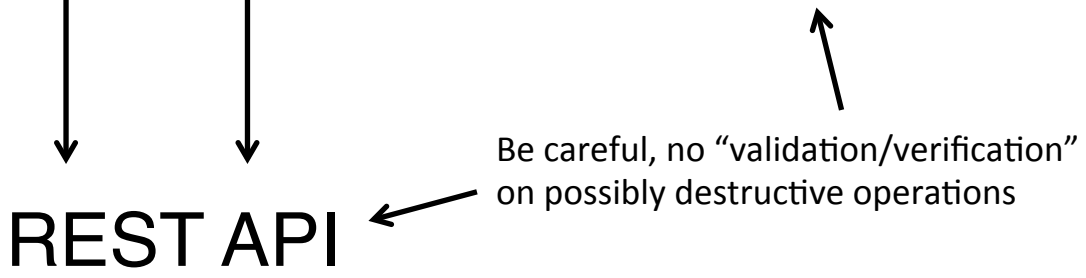
Management Tools

Web Console

- http://<IP>:8091
- JQUERY-based
- Simple/easy management/monitoring
- “pretty graphs”

CLI

- Python script: /opt/couchbase/bin/couchbase-cli
- Useful for scripting, automated management



- RESTful API (JSON)
- “Authoritative” API
- Programmatic access for management/monitoring
- Management channel for “smart” clients
- No “data” manipulation
- Documented at: http://couchbase.org/wiki/display/membase/Membase+Management+REST+API

Exercise 1a – Node Up and Running

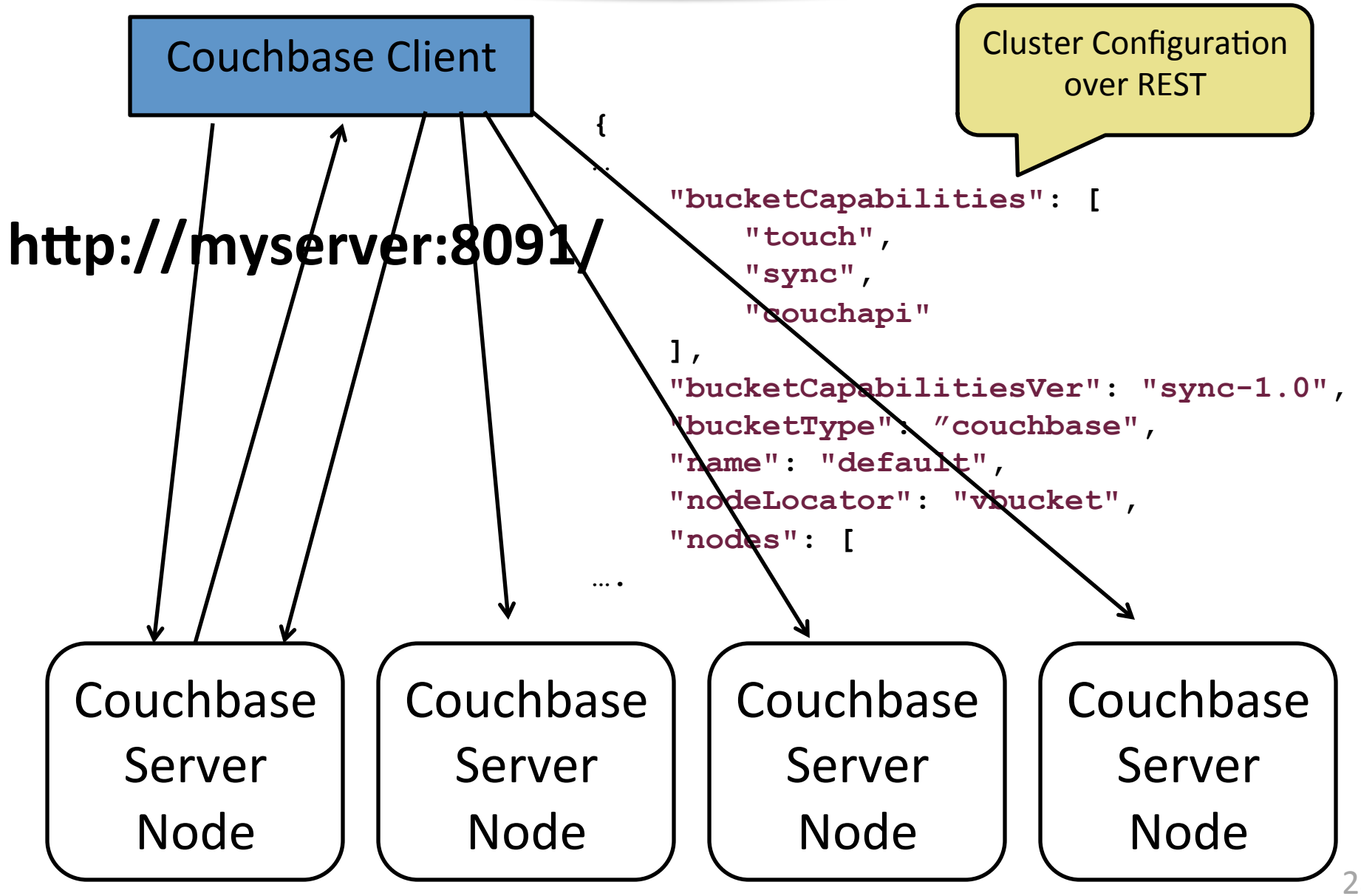
- Objective
  - to setup the Couchbase server on localhost
- Steps
  - ssh (if required) into machine
  - Install Couchbase (example):
    - rpm -i couchbase-server-enterprise_<version>.rpm
  - Launch the Web Console at
    - http://<host>:8091
  - Run the Setup Wizard and accept the defaults for each step (except the per node RAM quota for the **default** bucket in step 2, which should be lower since you will create another bucket in the next step)

COUCHBASE CLIENT INTERFACE

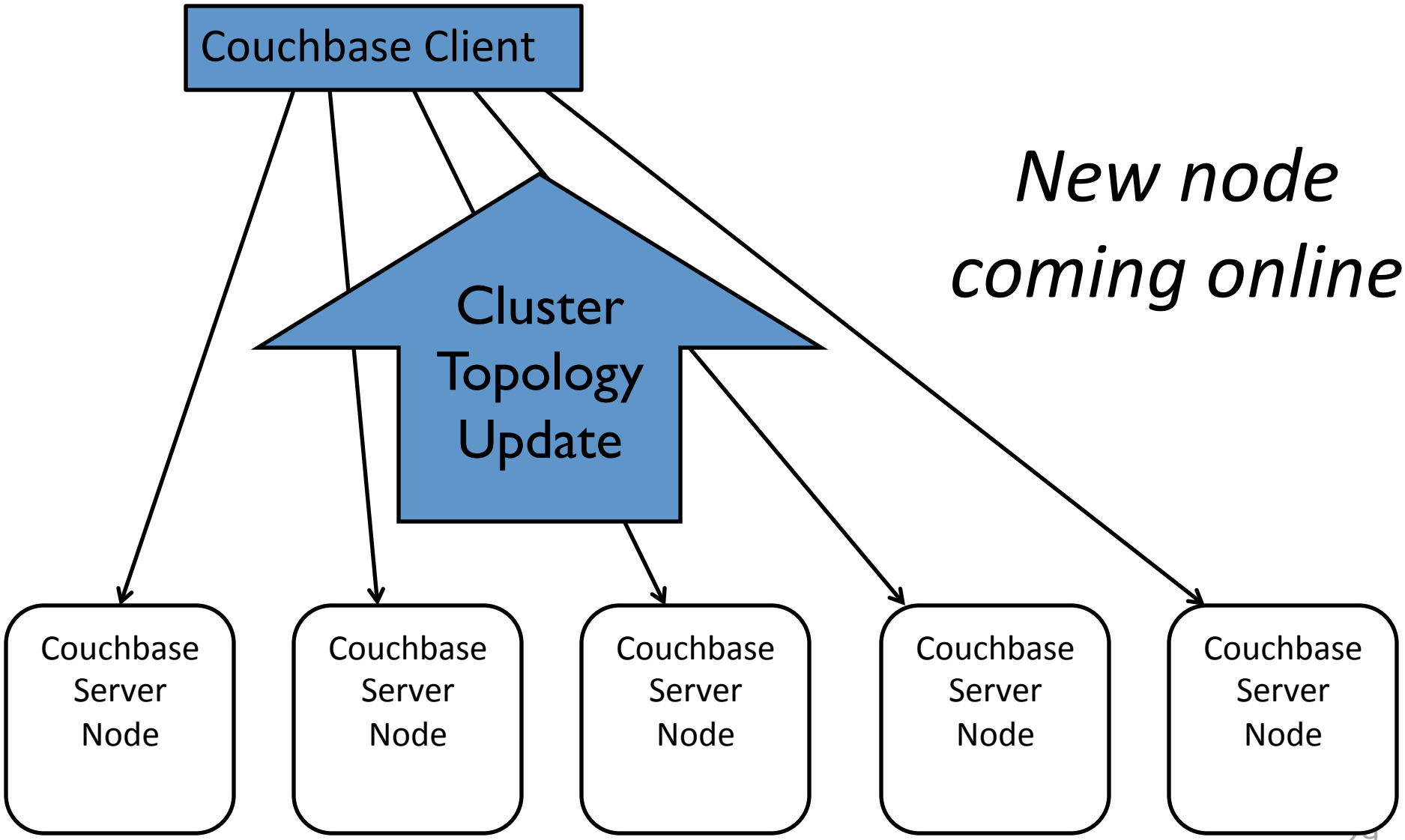
Smart Clients

- Communicate directly with cluster
- Understand cluster topology
- Automatically distribute requests to cluster nodes
- Automatically direct requests on topology changes
- Automatically direct requests during failover

Client Setup: Getting Cluster Configuration



Client at Runtime: Adding a node



Opening a Connection

- Connect to the Cluster URI of any cluster node

```
List<URI> uris = new LinkedList<URI>();

uris.add(URI.create("http://127.0.0.1:8091/pools"));
try {
  client = new CouchbaseClient(uris, "default", "");
} catch (Exception e) {
  System.err.println("Error connecting to Couchbase: " +
e.getMessage());
  System.exit(0);
}
```

Authentication

- Buckets authenticated using SASL
- Create a ConnectionFactory, then client:

```
List<URI> baseURIs = new ArrayList<URI>();
baseURIs.add(base);
CouchbaseConnectionFactory cf = new
          CouchbaseConnectionFactory(baseURIs,
             "userbucket", "password");

client = new CouchbaseClient(cf);
```

Client Set up at a Code Level (Ruby)

```
require 'couchbase'

# Create the client instance talking to default bucket
cbc = Couchbase.new

# Connect to password protected bucket
cbc = Couchbase.new(:bucket => 'private',
                    :username => 'private',
                    :password => 's3cret')

# Connect using URL
url = "http://private:s3cret@localhost:8091/pools/default/buckets/private"
cbc = Couchbase.new(url)

# Output the value
puts cbc.get("hello")
```

Java Client Library Dependencies

- common-codecs
  - Base 64 encoding. Encoders and decoders
- jettison
  - JSON Processing
- netty
  - HTTP comet streaming
- httpcore-nio
  - High performance NIO sockets (for views)
- httpcore
  - Needed by httpcore-nio

Ruby Client Library Versions

- couchbase gem: smart client
- Server 1.8 Compatible
  - 1.0.0
  - 1.1.0 (Bugfixes and Windows support)
  - 1.1.1 (Bugfixes)
- Server 2.0 Compatible
  - 1.2.0.dp (Views)
- To install latest stable version (currently 1.1.1)

```
$ gem install couchbase
```

- To install the most recent version (like 1.2.0.dp)

```
gem install couchbase --pre
```

Exercise 2 – Set up Eclipse Project and JARs

- Objective
  - to setup the Couchbase SDK and its dependencies
- Steps
  - Import HelloCouchbase into Eclipse as a Maven project
  - Modify the pom.xml (if required) and run the project
- If you do not want to use Maven and Eclipse OR want to use your own IDE, copy the JAR files and include them in your classpath as described in

  http://www.couchbase.com/docs/couchbase-sdk-java-1.1/hello-world.html

PROTOCOL OVERVIEW

Data is stored as key/document pairs

- Key is the identifier
  - A string without spaces
  - May use separators/identifiers; for example person_93847
  - Must be unique within a bucket
- Document is pure bytestring (JSON adds more meaning)
  - No implied value or understanding on server-side (generally)
  - Integers are valid for certain operations (increment, decrement)
  - Can store strings, images, or serialized objects
  - Server will try to discern JSON from non-JSON

Metadata

- Server stores metadata with each key/value pair
  - Expiry (TTL)
  - CAS (checksum) value
  - Flags
- Expiry is used by server to delete values after the specified time
- Flags can be used to identify the data type of stored information
  - In Java, this information is used to serialize the data type of the object stored

Time To Live (TTL)

- TTL
  - Property to set expiration on the document
  - the actual value sent may either be
  - Unix time (number of seconds since January 1, 1970, as a 32-bit value
  - OR number of seconds starting from current time. number of seconds may not exceed 60*60*24*30 (number of seconds in 30 days)
  - if the number sent by a client is larger than
  - that, the server will consider it to be real Unix time value rather than an offset from current time.

Store Operations

Operation	Description
add()	Adds new value if key does not exist or returns error.
replace()	Replaces existing value if specified key already exists.
set()	Sets new value for specified key.

All sets allow for ‘expiry’ time specified in seconds:

Expiry Value	Description
Values < 30*24*60*60	Time in seconds to expiry
Values > 30*24*60*60	Absolute time from epoch for expiry

Retrieve Operations

Operation	Description
get()	Get a value.
getAndTouch()	Get a value and update the expiry time.
getBulk()	Get multiple values simultaneously, more efficient.
gets()	Get a value and the CAS value.

Update Operations

Operation	Description
append()	Appends data to an existing key.
prepend()	Prepends data to an existing key.
incr()	Increments an integer value by specified amount, default 1.
decr()	Decrements an integer value by specified amount, default 1.
replace()	Replaces an existing key/value pair.
touch()	Updates the expiry time for a given item.

Exercise 4: Connect, Store, Retrieve

- Objective
  - to learn about some of the operations supported on the Couchbase client
- Steps
  - Set up a Couchbase connection
  - Modify the program provided to use the following operations
    - set(), get(), add(), replace(), touch(), append(), prepend(), etc.
  - Try different parameters available

ASYNCHRONOUS OPERATIONS

Couchbase Java Client Asynchronous Functions

- Synchronous commands
  - Force wait on application until return from server
- Asynchronous commands
  - Allow background operation until response available
  - Operations return **Future** object
  - Useful when data on server not in-memory, or during sets/updates

Asynchronous functions

- A Typical Asynchronous call
  - An asynchronous call that returns a Future object (Non blocking)
  - Process something (in the meantime) that does not depend on the result and the result is still being computed on the server
  - Either
    - Call the **get()** method on the Future object (blocking call) OR
    - Call the **cancel()** method to cancel the operation

It's Asynchronous

- Set Operation is asynchronous

```
// Do an asynchronous set
OperationFuture<Boolean> setOp =
    client.set(KEY, EXP_TIME, VALUE);

// Do something

// Check to see if our set succeeded
// We block when we call the get()
if (setOp.get().booleanValue()) {
      System.out.println("Set Succeeded");
} else {
      System.err.println("Set failed: " +
          setOp.getStatus().getMessage());
}
```

It's Asynchronous

- Even a get can be async

```
GetFuture getOp = client.asyncGet(KEY);

// do some work

if ((getObject = getOp.get()) != null) {
    System.out.println("Asynchronous Get Succeeded: " + getObject);
} else {
    System.err.println("Asynchronous Get failed: " +
        getOp.getStatus().getMessage());
}
```

It's Asynchronous (in Ruby)

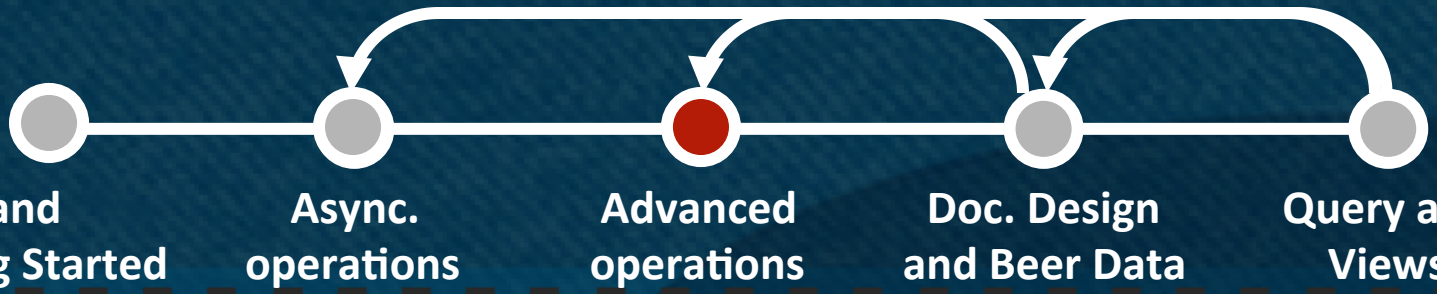
- Set Operation

```
# Simple set
client.set("key", "value")

# Set with options
client.set("key", "value", :ttl => 30, :flags => 0x100)

# Asynchronous set (like node.js does it. reactor pattern)
client.run do |c|
 # schedule operation with callback
 c.set("key", "value") do |result|
   if result.success?
     puts result.cas
   else
     puts result.error # the exception object
   end
 end
end
```

Exercise 5: Asynchronous Operations

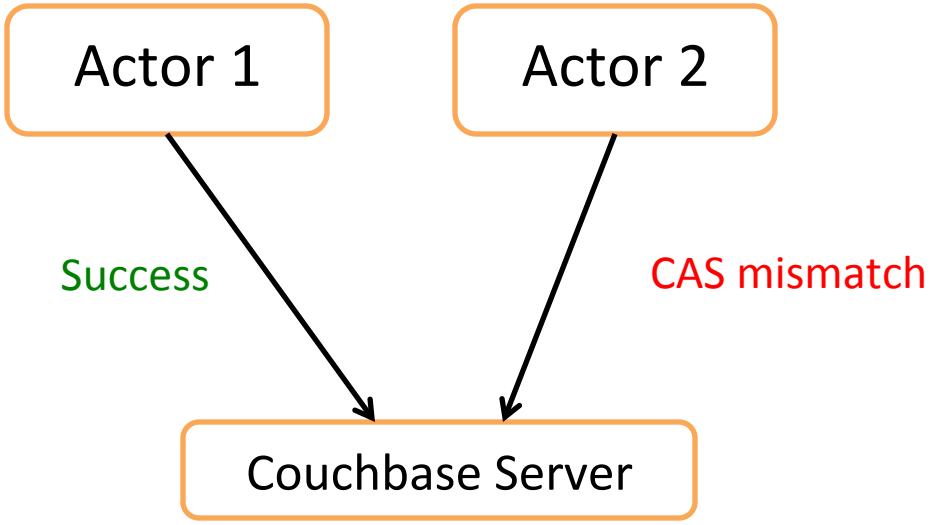
- Objective
  - to learn about some of the asynchronous operations supported on the Couchbase client
- Steps
  - Set up a Couchbase connection
  - Modify the program provided to use the following operations
    - asyncGet(), set(), delete(), etc.
    - Use the return Future value
    - Try different parameters available

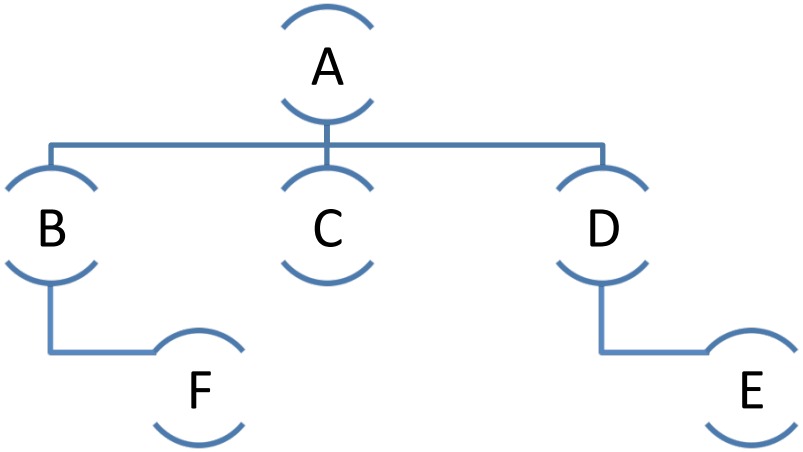
CONCURRENCY



Distributed System Design: Concurrency Controls

- Compare and Swap Operations
  - Often referred to as “CAS”
  - Optimistic concurrency control
  - Available with many mutation operations, depending on client.
- Get with Lock
  - Often referred to as “GETL”
  - Pessimistic concurrency control
  - Locks have a short TTL
  - Locks released with CAS operations
  - Useful when working with object graphs





Check and Set/Compare and Swap (CAS)

- Uses checksum to validate a change to a value:
  - Client gets key and checksum (cas_token)
  - Client updates using key and checksum
  - If checksum doesn't match, update fails
- Client can only update if the key + checksum match
- Used when multiple clients access the same data
- First client updates with checksum
- Subsequent client updates fail without the right checksum
- Use `CASMutation` and `CASMutator` for higher level of abstraction

CAS Operation

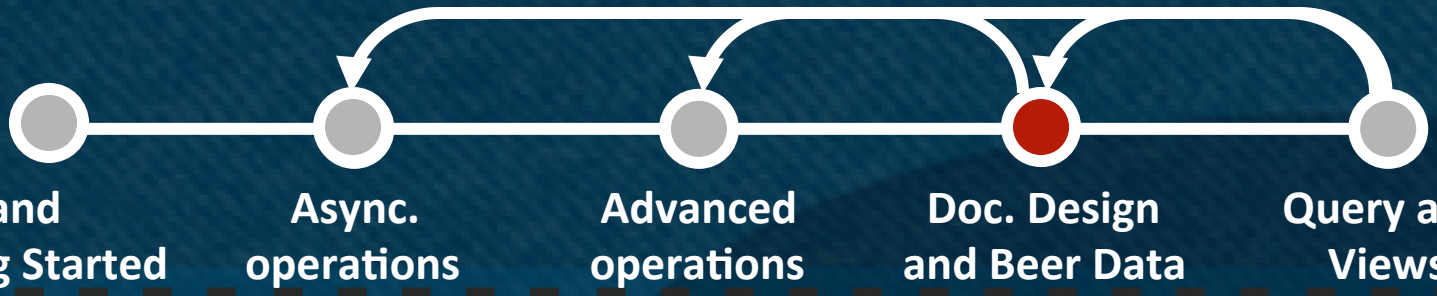
- CAS Example

```
CASValue<Object> casv = client.gets(KEY);
Thread.sleep(random.nextInt(1000)); // a random workload

// Wake up and do a set based on the previous CAS value
Future<CASResponse> setOp =
        client.asyncCAS(KEY, casv.getCas(), random.nextLong());

// Wait for the CAS Response
try {
  if (setOp.get().equals(CASResponse.OK)) {
    System.out.println("Set Succeeded");
  } else {
    System.err.println("Set failed: ");
  }
}
…
```

Exercise 7a: Concurrency Operations

- Objective
  - to learn about Concurrency operations supported on the Couchbase client
- Steps
  - Set up a Couchbase connection
  - Use the following operations
    - gets() and aynchCAS() to demonstrate contention between two separate clients

INTRODUCING DOCUMENTS



A JSON Document

```
{
      “id": "beer_Hoptimus_Prime",
      “type”: “beer”,
      "abv": 10.0,
      "brewery": "                ng Co.",
      "category":              can Ale",
      "name": "Hoptimus Prime",
      "style": "Imperial or Double India Pale Ale",
}
```

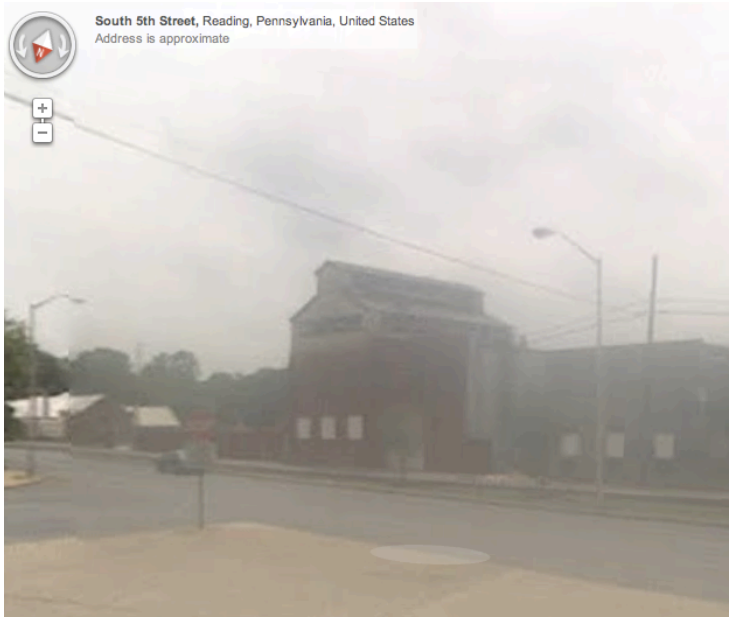
The primary key

The type information

A float

Other Documents and Document Relationships

```
{
      “id": "beer_Hoptimus_Prime",
      “type” : “beer”,
      "abv": 10.0,
      "brewery": ”brewery_Legacy_Brewing_Co",
      "category": "North American Ale",
      "name": "Hoptimus Prime",
      "style": “Double India Pale Ale”
}
```




```
{
      “id": ”brewery_Legacy_Brewing_Co”,
      “type” : “brewery”,
      "name" : "Legacy Brewing Co.",
      "address": "525 Canal Street
Reading, Pennsylvania, 19601 United
States",
       "updated": "2010-
     "latitude": -75.928
     "longitude": 40.325725
}
```

Afterthought

Simplicity of Document Oriented Datastore

- Schema is optional (schema evolves with the app.)
  - Technically, each document has an implicit schema
  - Extend the schema at any time!
    - Need a new field? Add it. Define a default for similar objects which may not have this field yet.
    - These changes to the schema (as the application evolves) can be tracked by a version number or other fields (as needed)
- Data is self-contained
  - Documents more naturally support the world around you, the data structures around you
- Model data for your App/Code instead for the Database

Adding a Document: Observations and Considerations

- Observations
  - Conversion to document was very simple, many JSON options
  - Flexible schema: Did not need to add the latitude and longitude to every record
  - Flexible schema: Can add the brewery detail later
- Considerations
  - Use a "type" field for high level filtering on object types
  - Why use a particular key/_id : **"beer_My_Brew"**
  - Should I have a TTL?

Common Questions when Adopting Couchbase

Q: What if I need to fetch referenced documents?

A: Simply get them one after another or use another View.

Q: How can I update just a small portion of a document?

A: The best approach is to keep the document model live in your application, then use CAS operations to store modified documents. The Ruby sample application has a good example.

Q: I currently use serialized objects with memcached or Membase, can I do this still with Couchbase Server?

A: Absolutely! Everything previously supported and used is still there. JSON offers advantages with heterogenenous platform support and preparing for Couchbase 2.0 views.

Exercise 10: Loading Beer and Brewery Data

- Objective
  - Loading the Beer Data into Couchbase so that it can be used in the sample App.
- Steps
  - Set up a Couchbase connection
  - Use Gson libraries to load the Beers (beers.json will be provided) and Breweries (breweries.json) into Couchbase
  - View the Key and Value using the admin console on the server
  - Modify the schema to add a field(s) and view the Key and Value on the server

THE VIEW AND QUERY API

Couchbase Server 2.0: Views

- Views can cover a few different use cases
  - Simple secondary indexes (the most common)
  - Aggregation functions
    - Example: count the number of North American Ales
  - Organizing related data

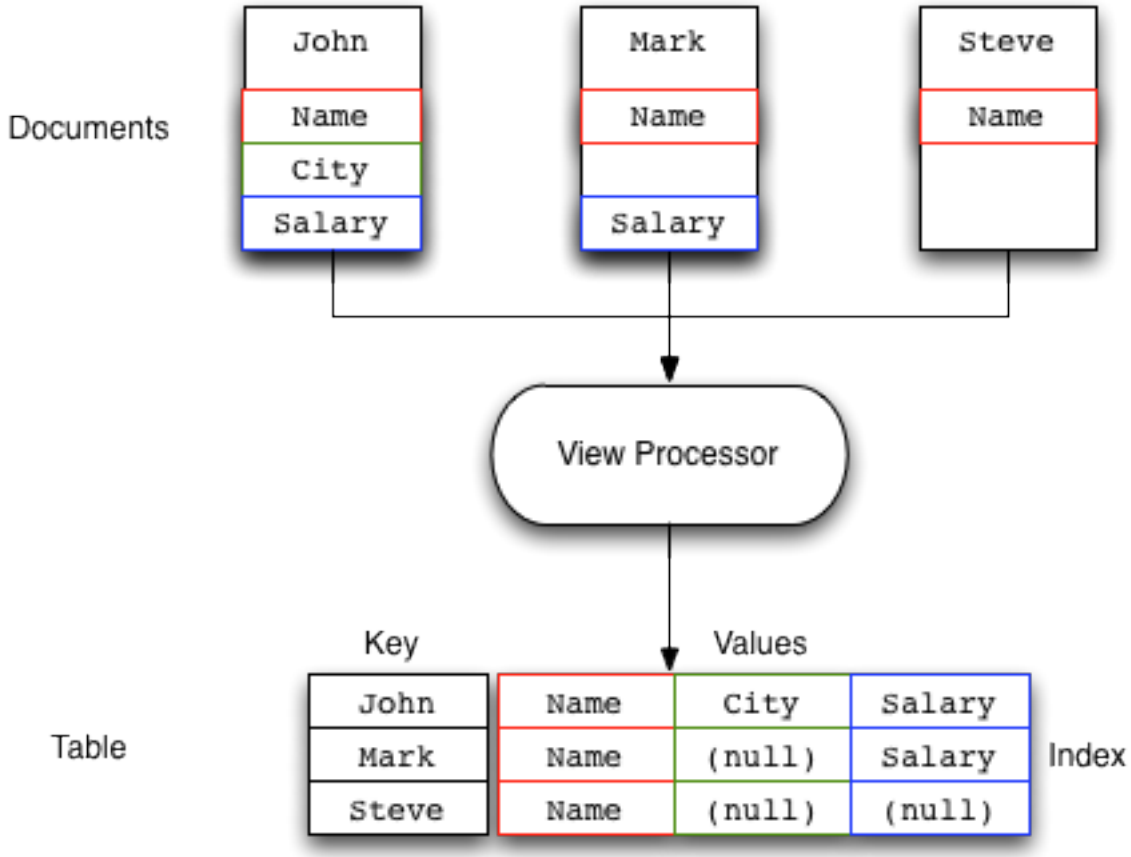
Secondary Indexing and Views

UserId	Message	Type	date
<User-1>	Hello London	Message	Mon Mar-19 09:02:02
<User-2>	Hello Berlin	Message	Mon Mar-19 10:03:05
<User-3>	Hello Rome	Message	Mon Mar-19 10:05:06
<User-3>	Hello Zurich	Message	Mon Mar-19 10:06:08
<User-3>	Hello Paris	Message	Mon Mar-19 10:06:09
<User-4>	Hello Amsterdam	Message	Mon Mar-19 10:07:03
<User-5>	Hello Madrid	Message	Mon Mar-19 10:11:01

All JSON documents of Type Message since Mon Mar-19 10:00:00

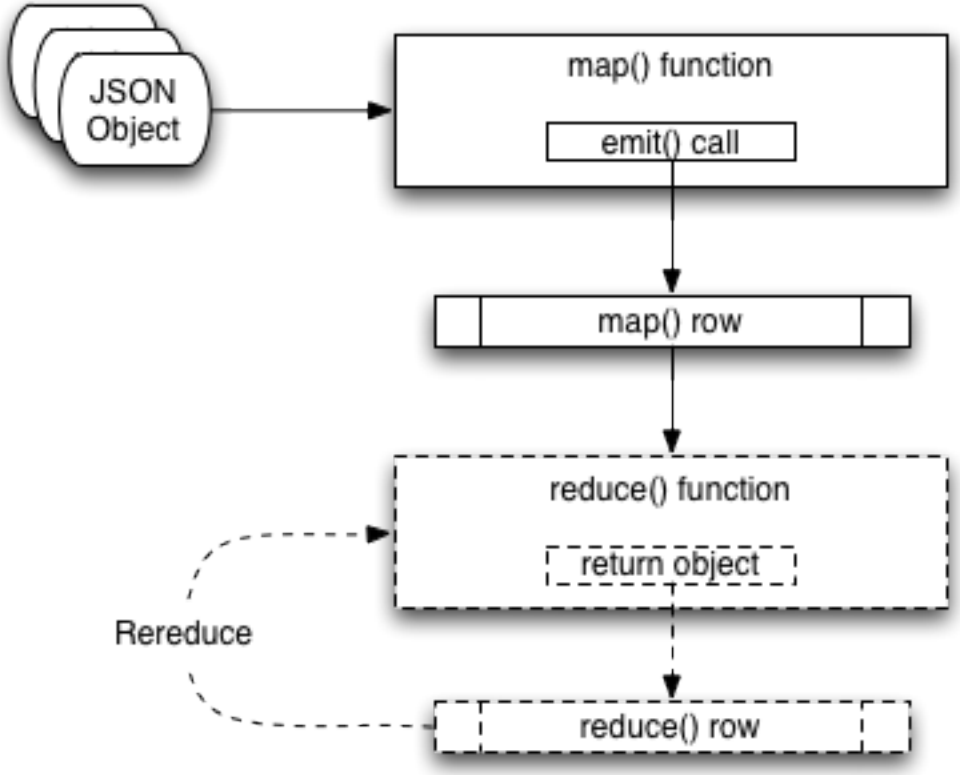
What are Views?

- Extract fields from JSON documents and produce an index of the selected information



View Creation using incremental Map/Reduce

- map function creates a mapping between input data and output
- reduce function provides a summary (such as count, sum, etc.)



Views – adapting to changing schemas

- Original JSON document

```
{ "email" : "rags@acm.org", "name" : "Rags Srinivas" }
```

- View

```
function(doc) {
    emit([doc.name, doc.email], null);
}
```

- New JSON document

```
{ "email" : "rags@acm.org", "first" : "Rags", "last" :
"Srinivas" }
```

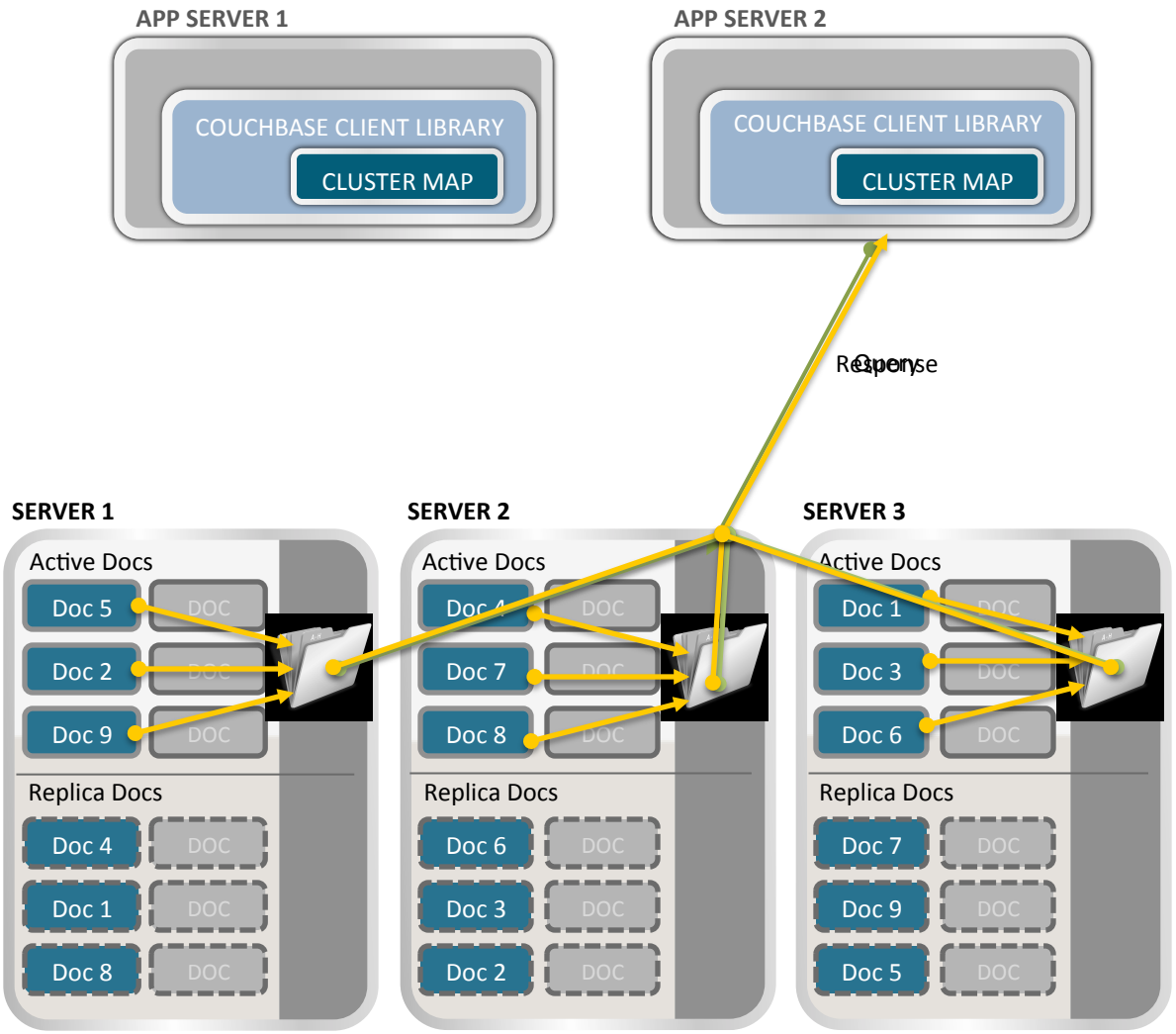
- New View

```
function(doc) {
if (doc.name != null) {
     emit([doc.name, doc.email], null);
} else {
    emit([doc.last + "," + doc.first, doc.email], null);
}
```

Views – Details

- Views
  - All the views within a design document is incrementally updated when the view is accessed (lazily by default)
  - The entire view is recreated if the view definition has changed
  - Views can be conditionally updated by specifying the stale argument to the view query
  - The index information stored on disk consists of the combination of both the key and value information defined within your view.
  - During a view query, the index information for the given view query on *all* the vBuckets within the cluster is collated and returned to the client.

Indexing and Querying



- Indexing work is distributed amongst nodes
  - Large data set possible
  - Parallelize the effort
- Each node has index for data stored on it
- Queries combine the results from required nodes

THE QUERY API

Query APIs

```
// map function
function (doc) {
  if (doc.type == "beer") {
     emit(doc._id, null);
  }
}

// Java code
Query query = new Query();

query.setReduce(false);
query.setIncludeDocs(true);
query.setStale(Stale.FALSE);
```

View APIs with Ruby

```
// map function
function (doc) {
  if (doc.type == "beer") {
     emit(doc._id, null);
  }
}

# Ruby code
ddoc = client.design_docs["beers"]
ddoc.views           #=> returns list of views ["beers"]
view = ddoc.beers(:include_docs => true)
view.each do |beer|
  beer.id
  beer.key                  # the key part of emit()
  beer.value      # the value part of emit()
  beer.doc                  # only if called with :include_docs
end

# key, value and doc fields are in native ruby form, i.e.
# deserialized JSON
```

THE VIEW API


Intro. and Getting Started
Async. operations
Advanced operations
Doc. Design and Beer Data
Query and Views

View APIs with Java

```
// map function
function (doc) {
  if (doc.type == "beer") {
     emit(doc._id, null);
  }
}

// Java code
View view = client.getView("beers", "beers");

ViewResponse result = client.query(view, query);

Iterator<ViewRow> itr = result.iterator();

while (itr.hasNext()) {
    row = itr.next();
    doc = (String) row.getDocument();
    // do something
}
```

Querying in Development/Production modes

- Querying modes
  - Development/Production modes
  - Production environment involves processes
- How to set it
  - In Java, with the properties file, command line or `System.setProperty()`

Querying in Development/Production modes (Ruby)

- Querying modes
  - Development/Production modes
  - Production environment involves processes
- How to set it
  - In the ruby client quering development views not much different from production. For example we have design documents "_design/breweries" (production) and "_design/dev_breweries" (development):

```
client = Couchbase.new(:environment => :development)
client.design_docs.count    #=> 2, because all docs visible
client.design_docs["dev_breweries"].nil?   #=> false
client = Couchbase.new(:environment => :production)
client.design_docs.count    #=> 1, because development docs hidden
client.design_docs["dev_breweries"].nil?   #=> true
```

USING THE APIS

Querying with Java – Descending Order

```
// map function
function (doc) {
  if (doc.type == "beer") {
     emit(doc.abv, null);
  }
}

// Java code
View view = client.getView("beers", "beers_by_abv");

Query query = new Query();

query.setReduce(false);
query.setIncludeDocs(true);
query.setStale(Stale.FALSE);
Query.setDescending(true);
```

Querying with Ruby – Descending Order

```
// map function
function (doc) {
  if (doc.type == "beer") {
     emit(doc.abv, null);
  }
}

# Ruby code
ddoc = client.design_docs["beers"]
view = ddoc.beers_by_abv(:include_docs => true,
                         :descending => true)
docs = view.fetch
```

Implementing a Inner Left Join

- An example
  - "Join" the beers and breweries data based on brewery Id.
- Steps
  - Define a view for one of the data documents (or table)
  - Access the view on the first document
  - Iterate over the rows
  - For each row
    - Access another view using the "foreign key" i.e. brewery ID on the second document
    - Iterate over the rows

Implementing a Join

```
View view2 = client.getView("breweries", "breweries");

Query query2 = new Query();
query2.setIncludeDocs(true);
query2.setStale(Stale.FALSE);

// Set the brewery Id and get the brewery details
query2.setKey(beer.breweryId);

ViewResponse result2 = client.query(view2, query2);

Iterator<ViewRow> itr2 = result2.iterator();

while (itr2.hasNext()) {
    row2 = itr2.next();
    doc = (String) row2.getDocument();
    // do something
}
```

Querying with Ruby – Custom View Key

```
ddoc = client.design_docs["breweries"]

view1 = ddoc.breweries(:include_docs => true,
                       :key => beer.brewery_id)
doc1 = view.fetch.first

# or

view2 = ddoc.breweries(:include_docs => true)
doc2 = view.fetch(:key => beer.brewery_id).first
```

Querying with Java – Custom View Key Range

```
View view2 = client.getView("breweries", "breweries");

Query query2 = new Query();
query2.setIncludeDocs(true);
query2.setStale(Stale.FALSE);

// Set the brewery Id and get the brewery details
query2.setRange(beer.breweryId, beer.breweryId);

ViewResponse result2 = client.query(view2, query2);

Iterator<ViewRow> itr2 = result2.iterator();

while (itr2.hasNext()) {
    row2 = itr2.next();
    doc = (String) row2.getDocument();
    // do something
}
```

Querying with Ruby – Custom View Key Range

```
ddoc = client.design_docs["breweries"]
view = client.breweries(:include_docs => true,
                        :start_key => beer1.brewery_id,
                        :end_key => beer2.brewery_id)
view.each do |brewery|
  # do something with brewery
end
```

Querying with Ruby – Use filter (Multi-get)

```
ddoc = client.design_docs["breweries"]
view = client.breweries(:include_docs => true,
          :body => {:keys => ["key1", "key2"]})

view.each do |brewery|
  # do something with brewery
end
```

More info at the CouchDB wiki (it isn't documented on Couchbase docs yet)
http://wiki.apache.org/couchdb/HTTP_view_API#Querying_Options

Querying with Java – Custom Reduce

```
// map function
function(doc) {
  if (doc.type == "beer") {
    if(doc.abv) {
      emit(doc.abv, 1);
    }}}

//reduce function
_count

// Java code
View view = client.getView("beers", "beers_count_abv");
query.setGroup(true);

while (itr.hasNext()) {
    row = itr.next();
    System.out.println(String.format("%s: %s”,
        row.getKey(), row.getValue()));
}
```

Querying with Ruby – Custom Reduce

```
// map function
function(doc) {
  if (doc.type == "beer") {
    if(doc.abv) {
      emit(doc.abv, 1);
    }
  }
}

//reduce function
_count

# Ruby code
ddoc = client.design_docs["beers"]
view = ddoc.beers_count_abv(:group => true)
view.each do |row|
  puts "#{row.key}: #{row.value}"
end
```

Exercise 14a: Listing Beer and Brewery Data

- Objective
  - Listing the Beer and Brewery Data using Views
- Steps
  - Setup Views on the server (in development) for listing Beer and Brewery Data
  - Write a program to
    - Set up a Couchbase connection
    - Use the views to display the data and try different options
    - Shutdown the connection

Exercise 14b: Implementing a Join

- Objective
  - Implementing a left inner join
- Steps
  - Use the views setup earlier
  - Write a program to
    - Set up a Couchbase connection
    - Use the views to implement an inner left join using the brewery Id
    - Shutdown the connection

RESOURCES AND SUMMARY

Resources, Summary and Call For Action

- Couchbase Server Downloads
  - http://www.couchbase.com/downloads-all
  - http://www.couchbase.com/couchbase-server/overview
- Views
  - http://www.couchbase.com/docs/couchbase-manual-2.0/couchbase-views.html
- Developing with Client libraries
  - http://www.couchbase.com/develop/java/current
- Couchbase Java Client Library wiki – tips and tricks
  - http://www.couchbase.com/wiki/display/couchbase/Couchbase+Java+Client+Library

THANKS - Q&A