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Building Healthy Distributed Systems

Erlang Factory SF

March 29, 2012

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Mark Phillips

@pharkmillups

themarkphillips.com

mark@basho.com

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What is a distributed system?

"A distributed system consists of multiple autonomous computers that communicate through a computer network.
The computers interact with each other in order to achieve a common goal." [1]

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Distributed, Scalable, Fault Tolerant

No central coordinator;
Easy to setup and operate

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Distributed, Scalable, Fault Tolerant

Horizontally Scalable;
Add commodity hardware to get more [throughput | processing | storage].

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Distributed, Scalable, Fault Tolerant

Always Available
No Single Point of Failure
Self-healing

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- Founded in 2007
- Collapsed in 2008
- “Pivoted” in 2009
- Commercial Sponsors of Riak, an Open Source, NoSQL Database
- Sells Closed Source Extensions to Riak in the form licenses

Year on Year Growth

Year on Year Growth

2009

Year on Year Growth

2009

14

Year on Year Growth

2010

2009

14

Year on Year Growth

2010

25

2009

14

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Year on Year Growth

2011

2010

25

2009

14

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Year on Year Growth

2011

60

2010

25

2009

14

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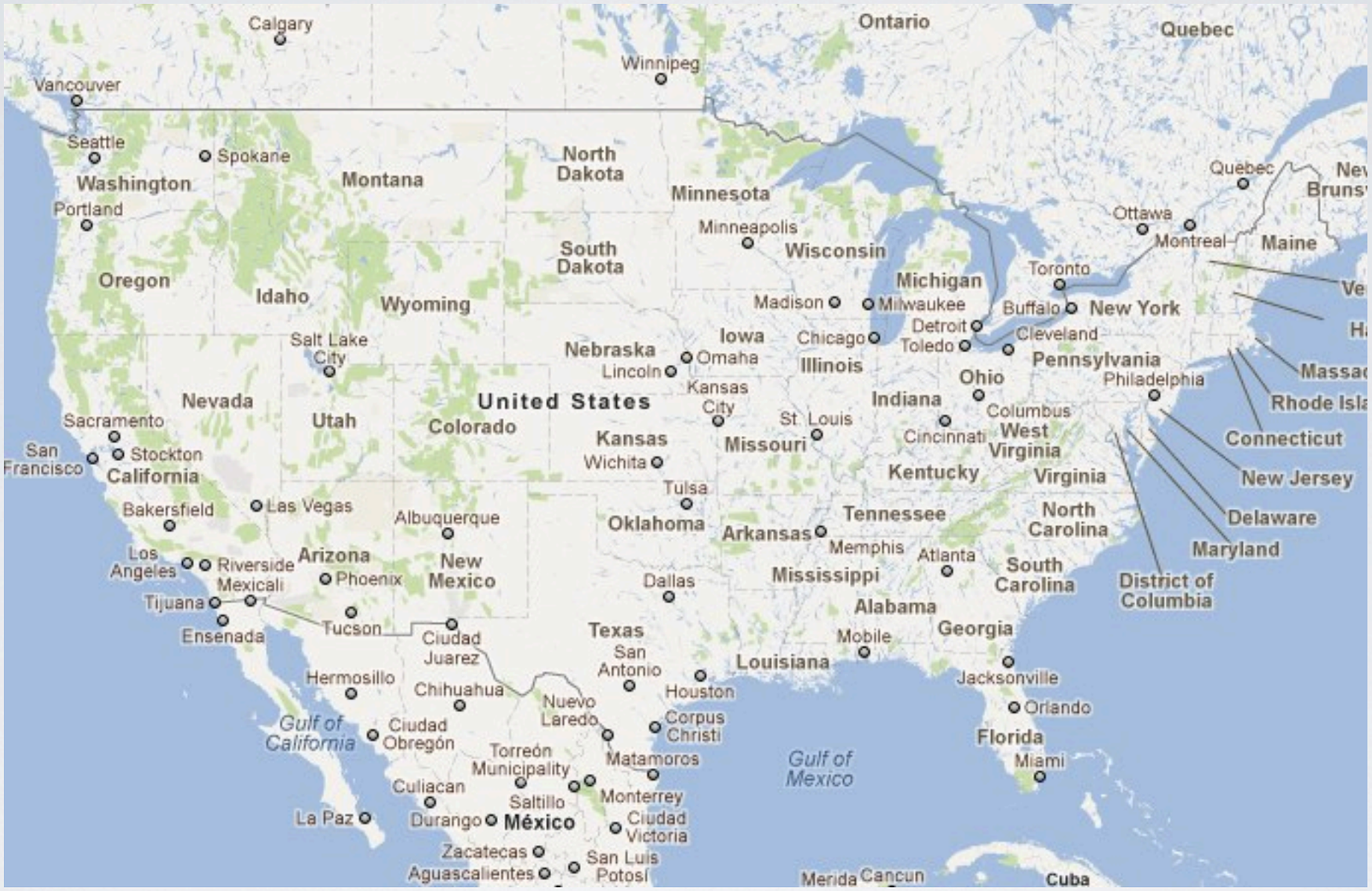
Office Locations



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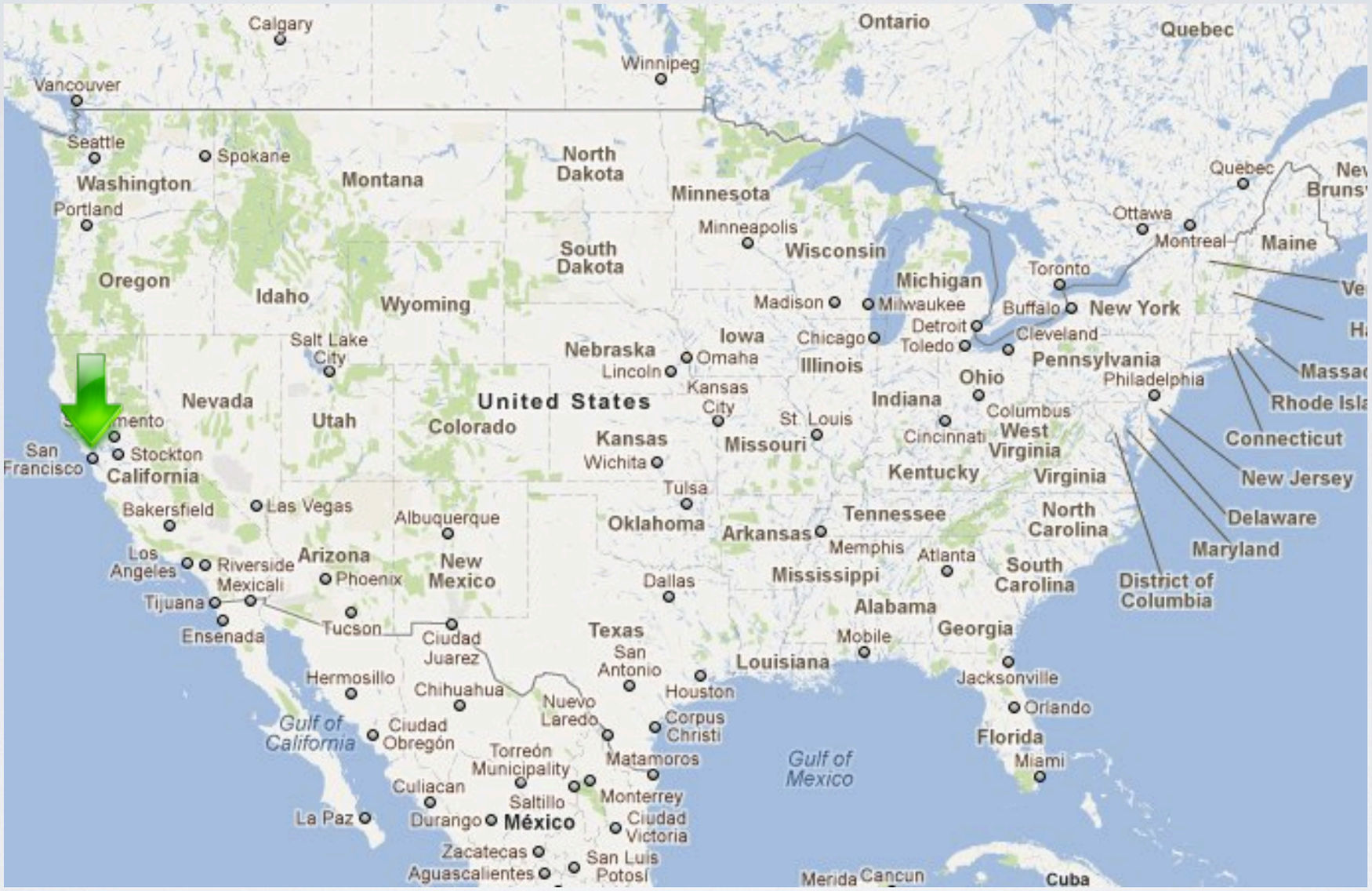
Office Locations



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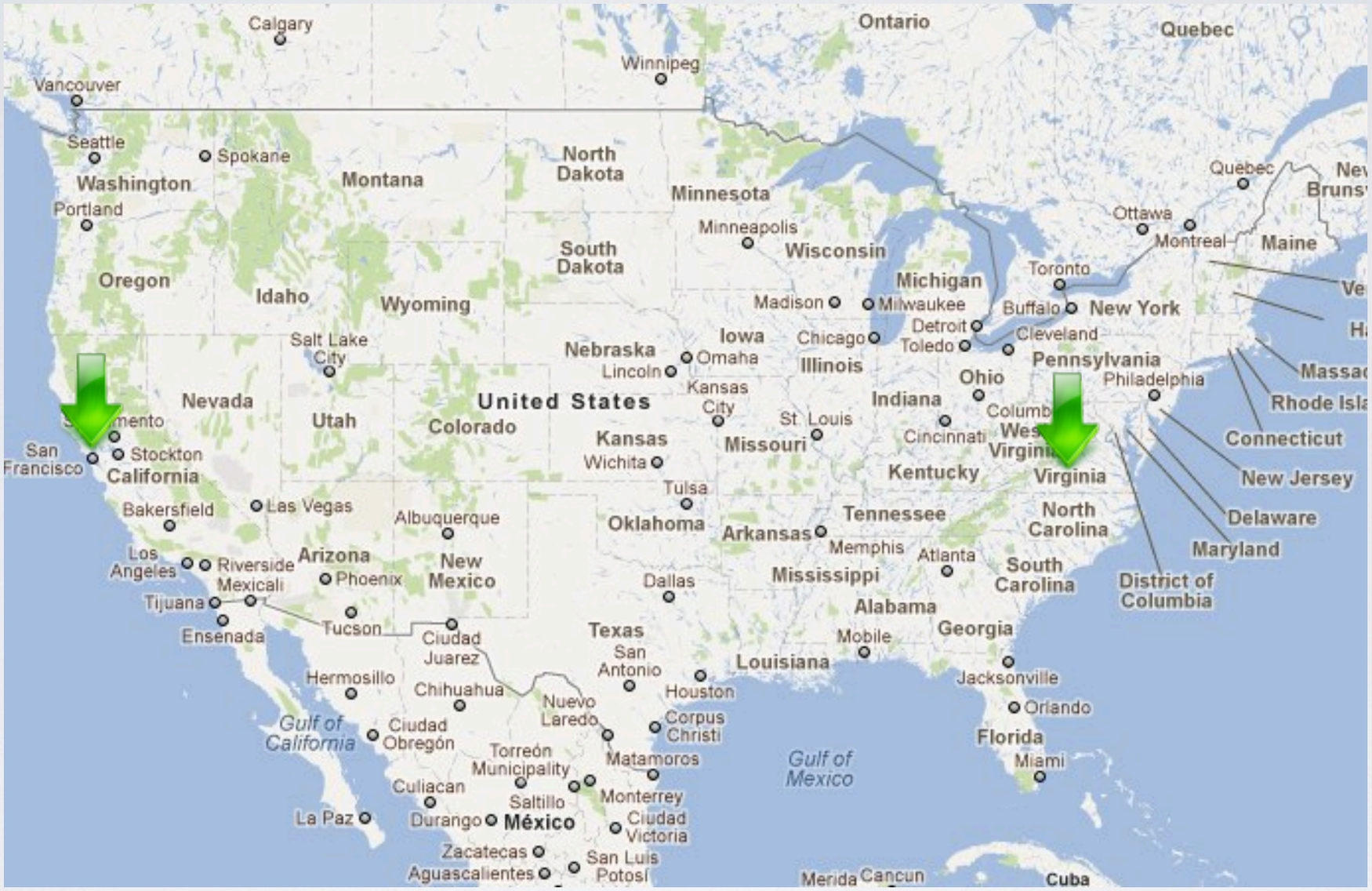
Office Locations



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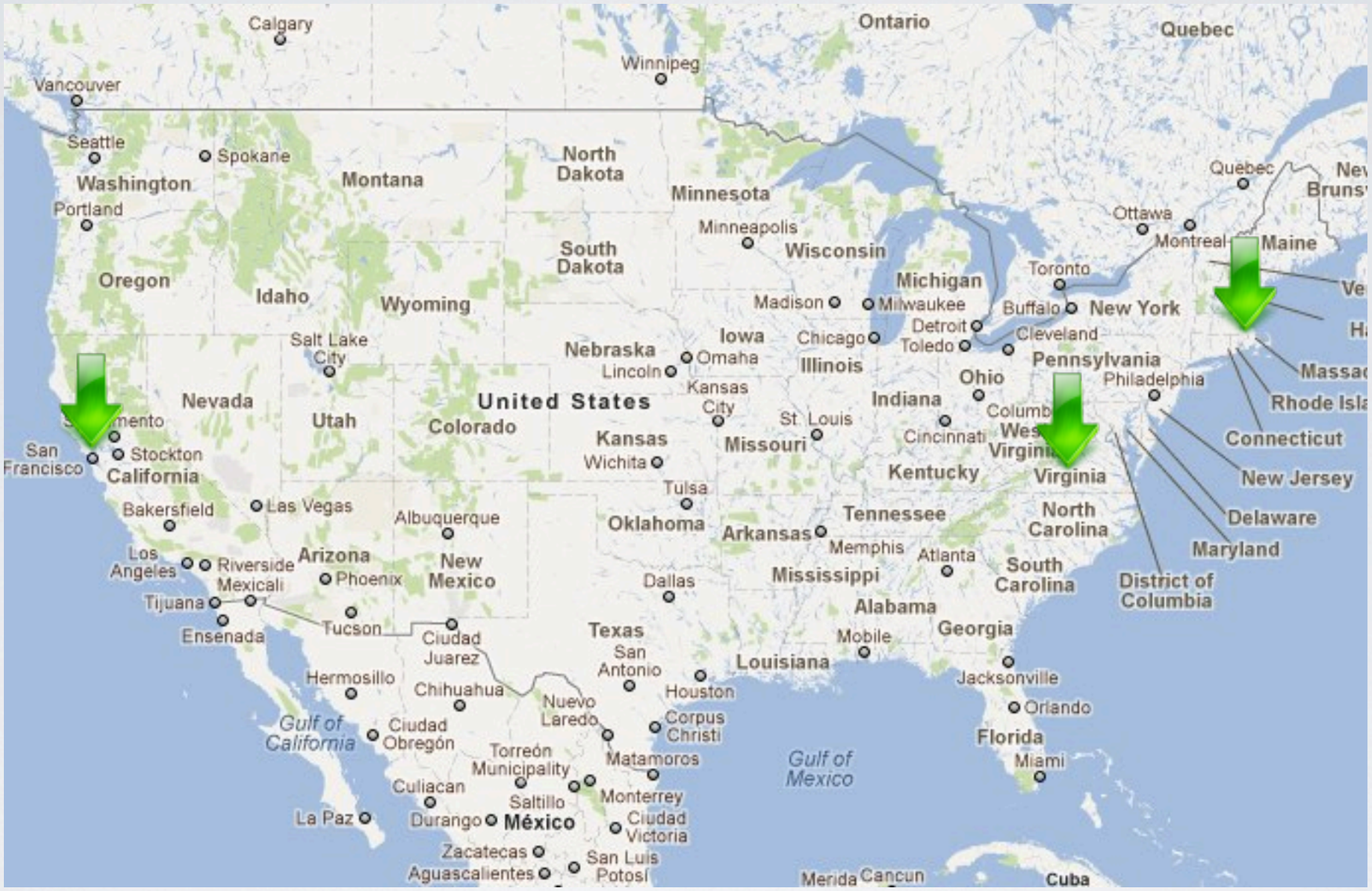
Office Locations



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Actual Employee Distribution

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What is a distributed [company]?

"A distributed [company] consists of multiple autonomous [team members] that communicate [and collaborate] through various [channels]. The [team members] interact with each other in order to achieve a common goal."

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Hiring where the talent is means we don’t sacrifice great hires for location, but it also presents various hurdles when attempting to build culture and community.

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Common Goals for Basho

1. Make Basho into a Powerhouse
2. Professional Development
3. Employee Happiness
4. Deliver Exceptional Product

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Internal Communication and Collaboration

- Real-time Chat (Jabber, Camp Fire)
- Skype (or some for of video chat)
- Yammer
- GitHub
- AgileZen
- Email (sort of)
- Documentation

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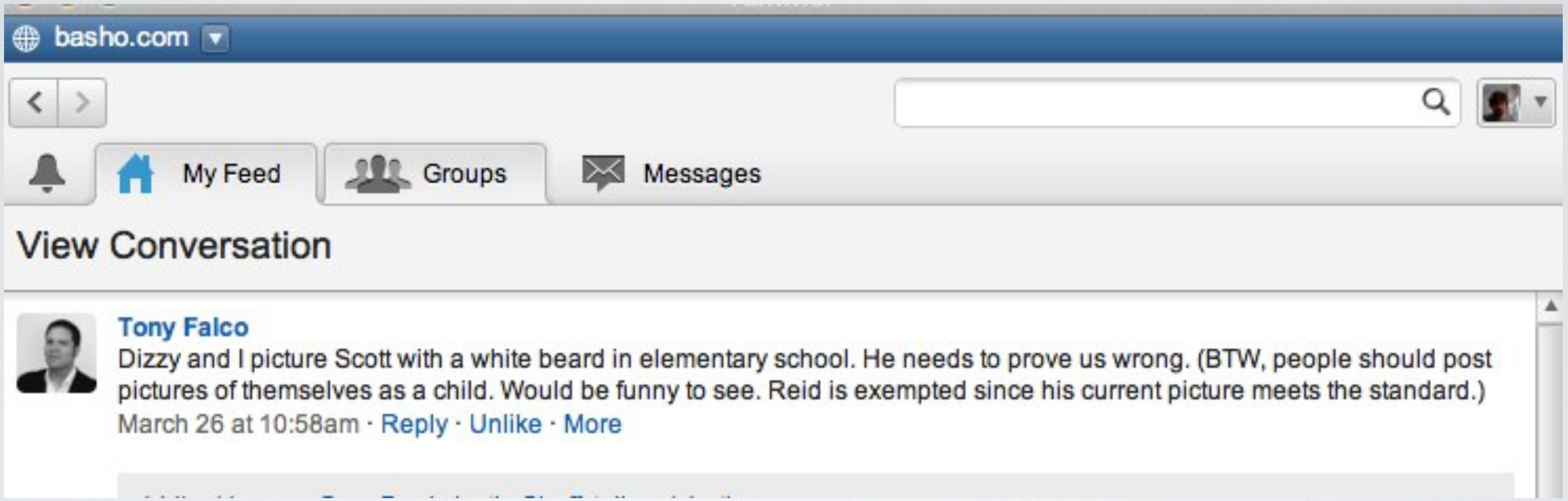
Culture:
Be Corny and Childish

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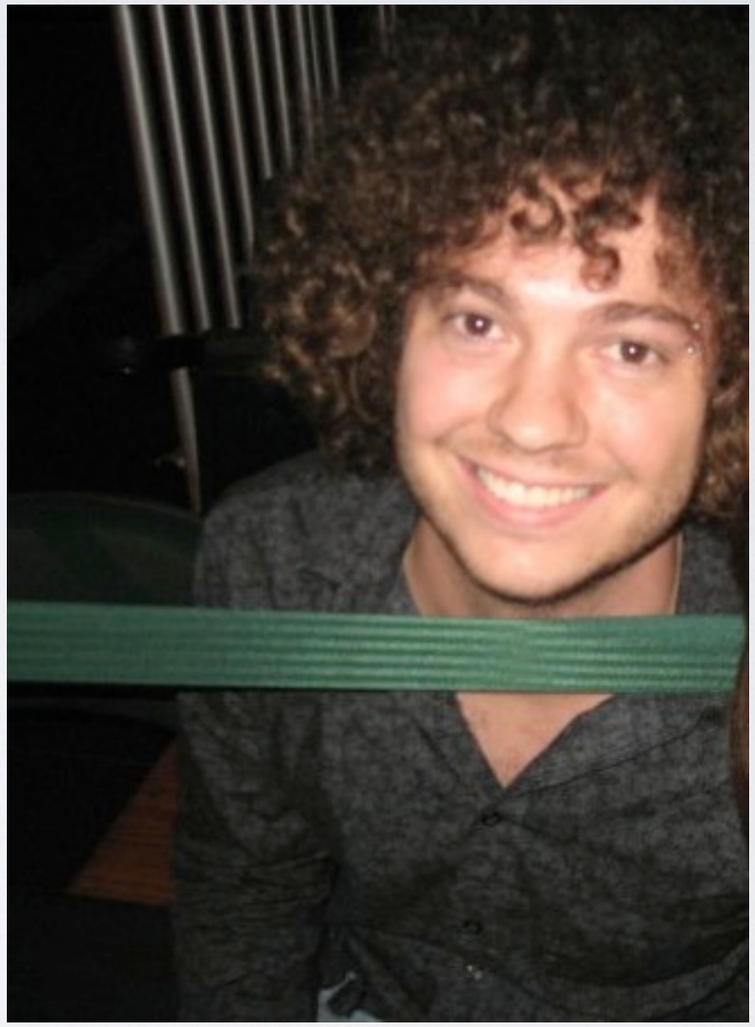


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Good Meetings

- Quarterly In-person “Summits”
- Bi-Monthly, Non-Mandatory Company All Hands
- Stands up, Scrum

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Make Documentation Part of Your Culture

- Inside Jokes
- Internal Talks
- Design Documents
- Product Ideas
- Product Feedback
- New Hire Processes
- Everything Else

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Open Source Your Code. And Use GitHub.

- Contributes Directly to Developer Happiness
- Makes Your Company's Product Better
- Great Marketing
- Use a Permissive License

"Open Source Almost Everything" (http://bit.ly/v3OMEf)

"Why Your Company Should Have a Permissive Open Source Policy" (http://bit.ly/clJyDO)

SenseiDB Home Overview Getting Started Download Contribute

Documentation

- Overview
- Getting Started
- Console Application
- Configuration
- Indexing & Gateways
- Hadoop Bootstraping
- Administration
- Clients & APIs
- Sensei clusters
- Javadoc
- BQL
- Wiki
- Glossary

SenseiDB

Open-source, distributed, realtime, semi-structured database

Powering LinkedIn homepage and LinkedIn Signal.

Some Features:

- Full-text search
- Fast realtime updates
- Structured and faceted search
- Fast key-value lookup
- High performance under concurrent heavy update and query volumes
- Hadoop integration

Get started »

Y **Hacker News** new | threads | comments | ask | jobs | submit pharkmillups (411) | logout

SenseiDB: Open-source, distributed, realtime, semi-structured database (senseidb.com)

150 points by thomas11 5 days ago | flag | comments

add comment

untog 5 days ago | link

I can't speak for SenseiDB itself, but I think that LinkedIn deserves a lot of credit for the technology they have been open sourcing in the last few months. Fantastic to see.

reply

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Hiring Should Not Happen In A Vacuum

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Poor Culture Rots a Company from within and Lessens its Resiliency

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Company Fault Tolerance

- New CEO + Massive Growth = New Challenges
- Our System is Constantly Improving

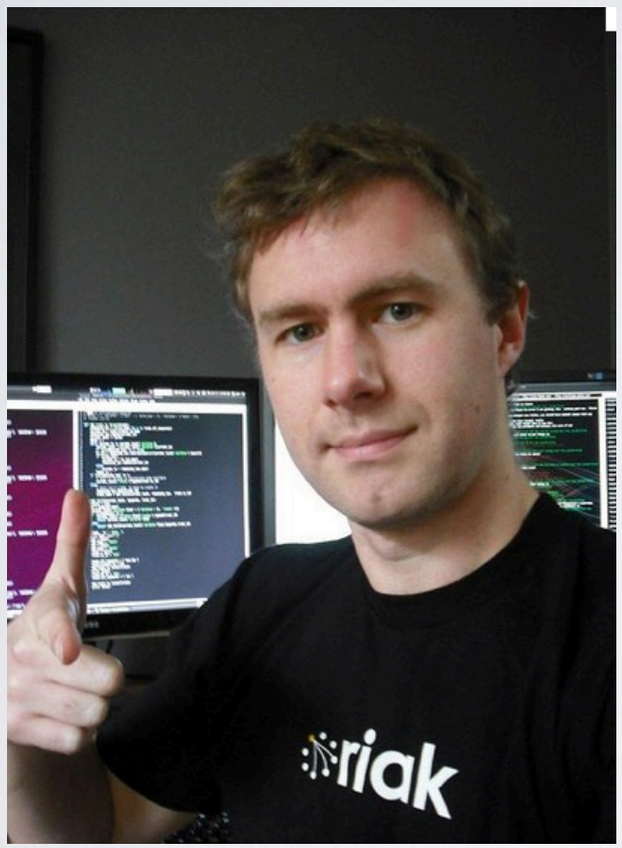
Planned Growth

2012

1**

riak

Community



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What is a distributed [community]?

"A distributed [community] consists of multiple autonomous [members] that communicate [and collaborate] through various [channels]. The [members] interact with each other in order to achieve a common goal."

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Why Build A Community?

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Grassroots Marketing, Branding, Awareness:

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Code Contributions
and Bug Fixes :

180

names in our
THANKS file

1600

hours contributed from
Oct 2010 - Sept 2011

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Support:

stackoverflow.com/questions/8989297/riak-search-giving-me-not-found-error-for-available-data

But when I do this, I get a no found error.

Is there something I'm missing? Am I supposed to do something to the bucket to make it searchable?

I'd appreciate some assistance.

Thanks in advance.

nosql | riak | riak-search

link | edit | flag

edited **yesterday**

asked **2 days ago**
Chuck Ugwuh
362 ●1 ●7
75% accept rate

1 Answer

active | oldest | **votes**

1

Well, firstly, the above URL is using Riak Search and not the secondary indexes. The URL to query a secondary index is in the form of:

```
/buckets/<bucket>/index/<fieldname_bin>/query
```

You form a secondary index by adding metadata headers when creating a record through the cURL interface. Client libraries for different languages will generate this for you.

Back to your specific question, though. Did you use the search-cmd tool to install an index for the test_1 bucket? If you did, did you have data in the bucket before doing so? Riak Search will not retroactively index your data. There are a few ways available to do so, but both are time-consuming if this is just an experimental app.

If you don't have much data, I suggest you re-enter it after setting up the index. Otherwise, you need to add secondary index or process it through the search API a[illegible]ata. It'll take time, but it's what is available through Riak now.

Does not work for Basho!

Hope this helps.

link | edit | flag

edited **yesterday**

answered **yesterday**
Srdjan Pejic
2,214 ●1 ●7 ●9

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Revenue:

75%

of new customers in
2011 came from the
Open Source Community

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Importance of Community for Community Members

- Working, Quality Code
- Recognition and Praise
- Desire to Contribute
- Jobs (whether they like it or not)
- Skills Acquisition

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Communication and Collaboration in a Distributed [Community]

- IRC
- Mailing List
- Twitter
- Riak Recap
- Meetups
- Q & A Sites
- Blogs
- Books
- Conferences
- Actual Meetings
- GitHub
- Drinking

Riak Recap

Riak Recap for November 23 – 27

1. Version 0.0.2 of resourceful-riak is out.
   → Code and details here
2. Basho CTO Justin Sheehy will be speaking about Riak at the Twin Cities NoSQL Meetup next week in Richfield, MN.
   → Details and registration here
3. Jeremy Walworth released a Password Vault that uses Riak as the backing store.
   → Code here on GitHub
4. Basho Team Members Steve Vinoski and Justin Sheehy collaborated with Kresten Krab Thorup and Debasish Ghosh on a short paper called "Programming language impact on the development of distributed system".
   → Definitely worth the read
5. We are doing office hours this Thursday at BashoWest in San Francisco.
   → Details here
6. Q - Are people running riak natively on osx (for development) or running on a vm that matches production? (from kenperkins via #riak)
   A - Anyone? (We had a similar thread on the list several months back about this but I figured it couldn't hurt to open it up to more discussion.)

Bugs/Issues

1. New/Reopened
   → None :)
2. Closed/Patched
   → 1293: webmachine_router:remove_resource/1 function_clause error when using predicate funs
   → 1294: Riak Java Client pb config builder copy from bug

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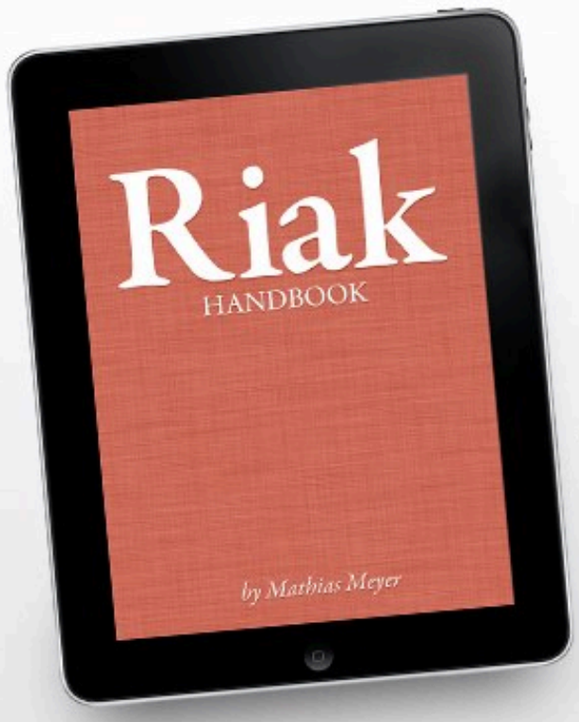
Books

Your data is invaluable.
Master using Riak to make sure it's always there when you need it.
Availability is not an option, it's a requirement.



BUY NOW only $29

Available as PDF, ePub and for Kindle, DRM-free!

→ *Download a free PDF sample*

http://riakhandbook.com/

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Meetups and Drinking

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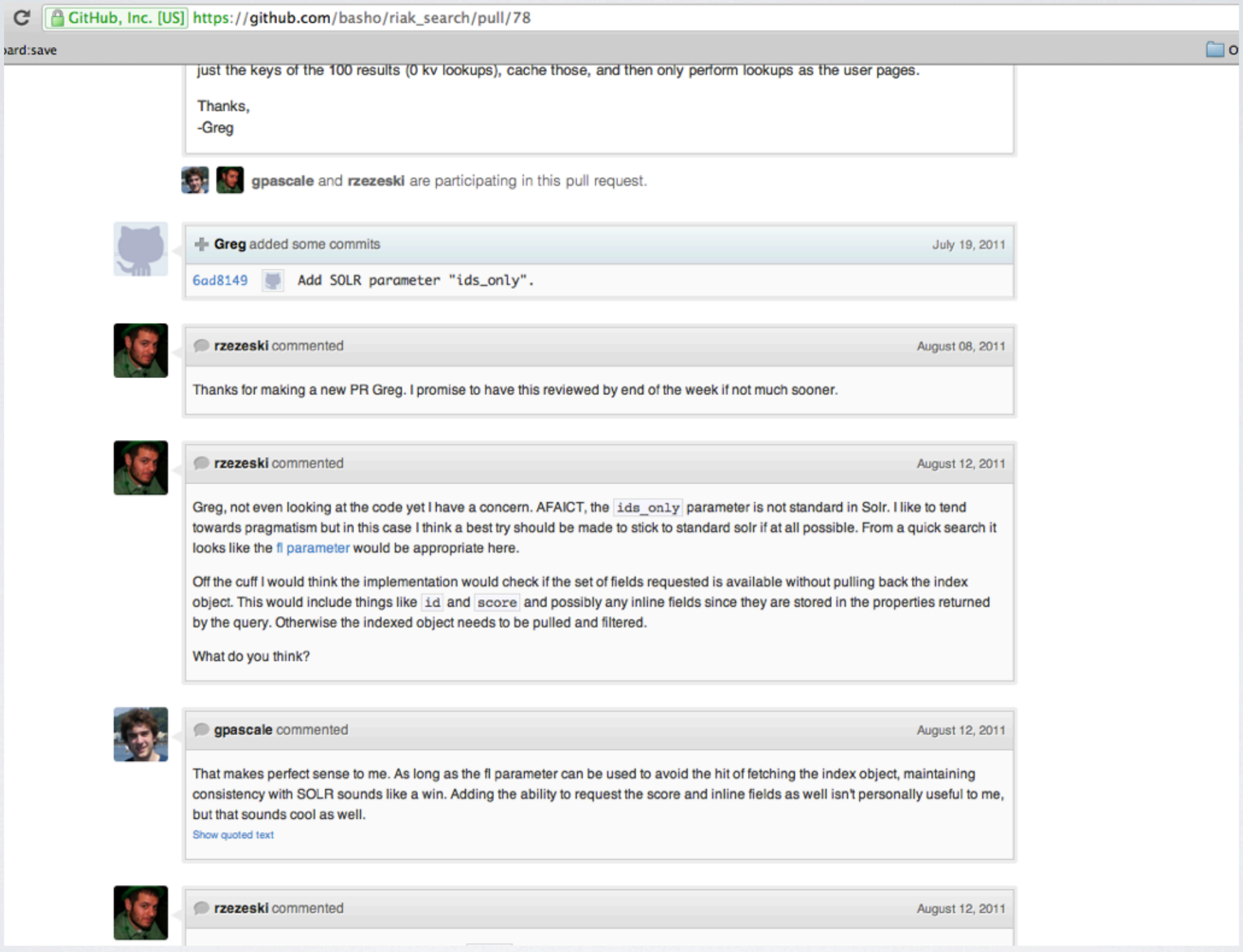
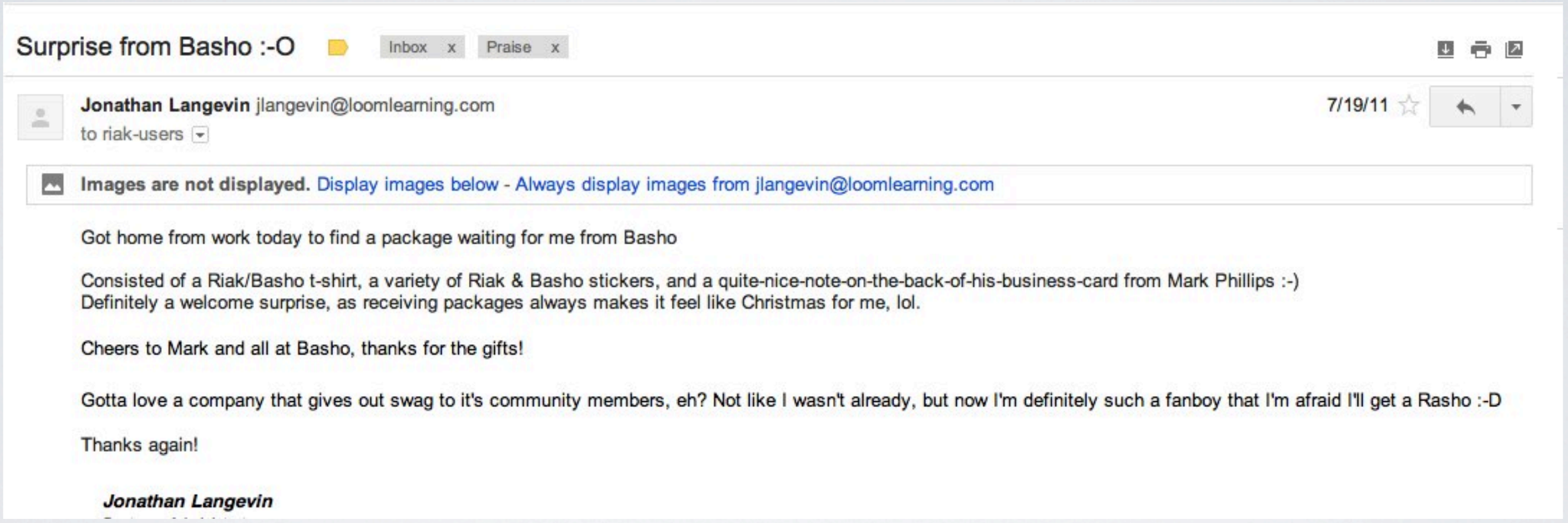
GitHub



Give Things Away



Surprise from Basho :-O Inbox x Praise x

Jonathan Langevin jlangevin@loomlearning.com
to riak-users

7/19/11

Images are not displayed. Display images below - Always display images from jlangevin@loomlearning.com

Got home from work today to find a package waiting for me from Basho

Consisted of a Riak/Basho t-shirt, a variety of Riak & Basho stickers, and a quite-nice-note-on-the-back-of-his-business-card from Mark Phillips :-)
Definitely a welcome surprise, as receiving packages always makes it feel like Christmas for me, lol.

Cheers to Mark and all at Basho, thanks for the gifts!

Gotta love a company that gives out swag to it's community members, eh? Not like I wasn't already, but now I'm definitely such a fanboy that I'm afraid I'll get a Rasho :-D

Thanks again!

Jonathan Langevin

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Build Communities Regardless

admazely / resourceful-riak

Watch | Fork | 12

Code | Network | Pull Requests 0 | Issues 1 | Stats & Graphs

Browse Issues | Milestones

Search: Issues & Milestones... | New Is

← Back to issue list | Issue

Indexzero opened this issue January 11, 2012

Awesome. Awesome to the max.

No one is assigned | No milestone

Not really an issue, but just wanted to say stuff like this makes writing Open Source software worthwhile :)

Open

1 comme

Labels

Indexzero and **kesla** are participating in this issue.

kesla commented — January 11, 2012

Hey, thanks! What a nice first issue!

The bindings are still quite immature (no support for relationships, for example) but I plan the develop them as we use resoureful in more and more different places of our application.

Community Fault Tolerance

Severe problems when adding a new node

Aphyr aphyr at aphyr.com
Fri Oct 28 11:31:43 EDT 2011

- Previous message: Severe problems when adding a new node
- Next message: Severe problems when adding a new node
- **Messages sorted by:** [date] [thread] [subject] [author]

I was waiting for Basho to write an official notice about this, but it's been three days and I really don't want anyone else to go through this shitshow.

1.0.1 contains a race condition which can cause vnodes to crash during partition drop. This crash will kill the entire riak process. On our six-node, 1024 partition cluster, during riak-admin leave, we experienced roughly one crash per minute for over an hour. Basho's herculean support efforts got us a patch which forces vnode drop to be synchronous; leave-join is quite stable with this change.

https://issues.basho.com/show_bug.cgi?id=1263

I strongly encourage 1.0.1 users to avoid using riak-admin join and riak-admin leave until this patch is available.

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riak

voxer®

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What is a distributed system?

"A distributed system consists of multiple autonomous computers that communicate through a computer network.
The computers interact with each other in order to achieve a common goal."

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{

- a database
- a key/value store
- distributed
- fault-tolerant
- scalable
- Dynamo-inspired
- used by startups
- used by FORTUNE 100 companies
- written (primarily) in Erlang
- pronounced “REE-awk”
- not the right fit for every project and app

1000s of Deployments

comcast

clipboard

Swipely

bump
TECHNOLOGIES

seomoz.org

ideeli

Joyent
Cloud Computing

dotCloud

voxer

Aol.

formspring

yammer

BOEING

cim COMCAST INTERACTIVE MEDIA

VIBRANT

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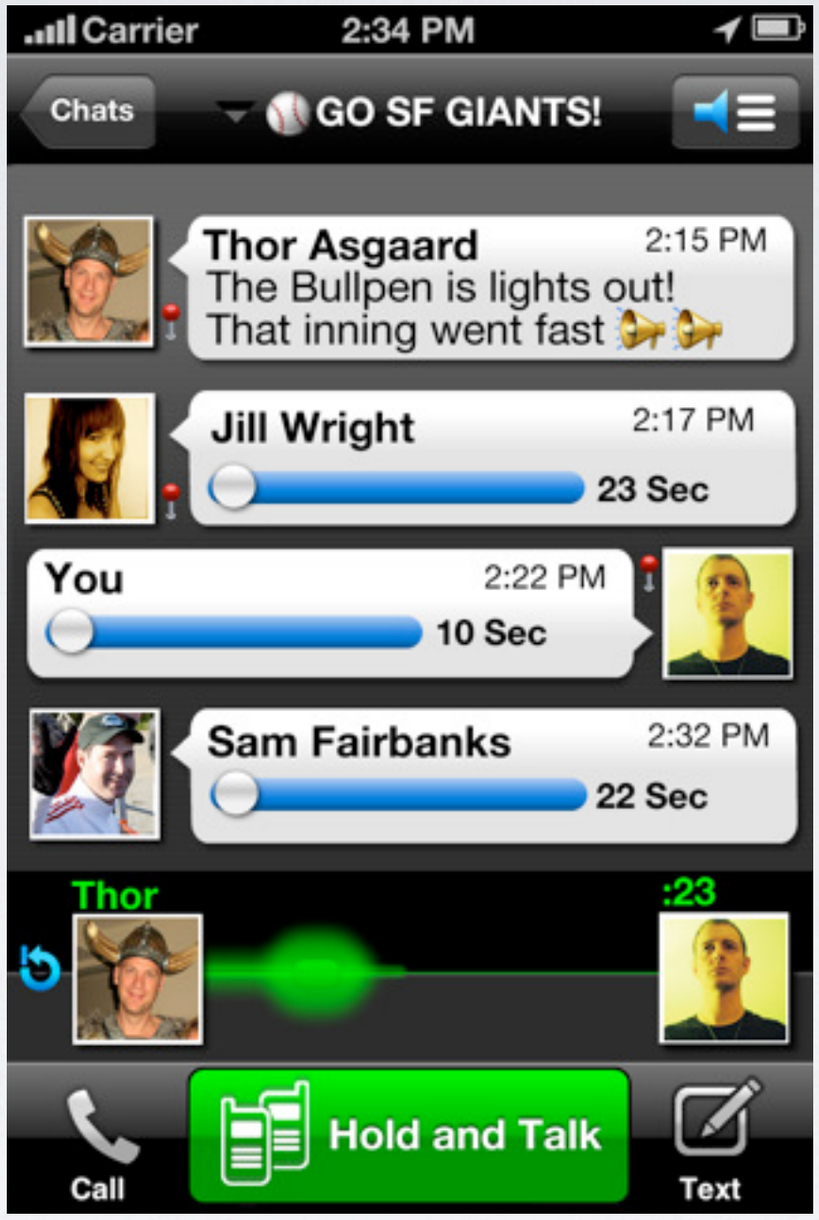
Carrier
2:34 PM
Chats
GO SF GIANTS!
Thor Asgaard
2:15 PM
The Bullpen is lights out!
That inning went fast
Jill Wright
2:17 PM
23 Sec
You
2:22 PM
10 Sec
Sam Fairbanks
2:32 PM
22 Sec
Thor
:23
Call
Hold and Talk
Text

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Common Goals for Voxer's System

1. Serve and Receive App Traffic
2. Perform Queries When Needed
3. Don't Go Down
4. Scale Out to Meet Demand
5. Low, Consistent Response Times

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Voxer's Initial Riak Cluster Stats (Oct 2011)

- 11 Riak Nodes
- Modest Data Set Size (100s of Gs)
- ~20,000 Peak Concurrent Users
- ~4,000,000 Daily Total Requests

Then something happened...

Walkie Talkie App Voxer Is Going Viral On iPhones And Androids, Trending On Twitter

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AT&T
22:53
Categories
Social Networking
Top Paid
Top Free
Release Date
Twitter, Inc.
Twitter
INSTALLED
1017 Ratings
LinkedIn Corporation
LinkedIn
INSTALLED
454 Ratings
Cold Brew Labs
Pinterest
FREE
76236 Ratings
Voxer LLC
Voxer Walkie-T...
INSTALLED
3814 Ratings
Facebook, Inc.
Facebook
INSTALLED
Featured
Categories
Top 25
Search
Updates
7

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Voxer's Current Riak Cluster Stats

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Voxer's Current Riak Cluster Stats

- >40 Node Cluster for User Data

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Voxer's Current Riak Cluster Stats

- >40 Node Cluster for User Data
- >40 Node Cluster to serve app traffic

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Voxer's Current Riak Cluster Stats

- >40 Node Cluster for User Data
- >40 Node Cluster to serve app traffic
- ~1TB/day of user data being added daily

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Voxer's Current Riak Cluster Stats

- >40 Node Cluster for User Data
- >40 Node Cluster to serve app traffic
- ~1TB/day of user data being added daily
- 100,000s of concurrent users at peak

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Voxer's Current Riak Cluster Stats

- >40 Node Cluster for User Data
- >40 Node Cluster to serve app traffic
- ~1TB/day of user data being added daily
- 100,000s of concurrent users at peak
- Went from 11 to about 80 nodes in a month

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Voxer's Current Riak Cluster Stats

- >40 Node Cluster for User Data
- >40 Node Cluster to serve app traffic
- ~1TB/day of user data being added daily
- 100,000s of concurrent users at peak
- Went from 11 to about 80 nodes in a month
- At one point adding three nodes/day

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Voxer's Fault Tolerance

- Have lost a lot of nodes in production
- TCP Incast Problem [2]
- LevelDB merge issues
- Lots of other shit went wrong

but it's still running :)

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"Scalability is the ability of a system, network, or process, to handle growing amount of work in a capable manner or its ability to be enlarged to accommodate that growth."[3]

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Present System Health Dictates Future Ability to Scale

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Distributed
[Companies | Communities | Systems]
are all susceptible to downtime.

credit: http://blogs.ajc.com/jeff-schultz-blog/files/2009/06/closedsign.png

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Capacity Plan or Perish

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Everything Is Distributed Now

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Questions?

Mark Phillips

@pharkmillups

themarkphillips.com

mark@basho.com

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References

1. http://en.wikipedia.org/wiki/Distributed_computing
2. http://www.snookles.com/slf-blog/2012/01/05/tcp-incast-what-is-it/
3. http://en.wikipedia.org/wiki/Scalability