You need Riak

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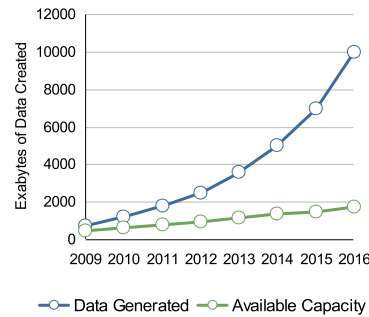
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Computing has changed

- Commodity hardware
- Concurrent access for billions of devices
- Volume of data in exabytes
- Velocity of data growth
- Variety of unstructured data types

→ Scaling Up is expensive

Addressing the Data Deluge
A Tough Storage Problem Lies Ahead

Data Creation Outpaces Growth:
According to IDC

Data Generated — Available Capacity

email backup
JSON   Audit/Compliance
Video   sensor data
Social media   bio informatics
time series
                      GRAPH
SMS   M2M
gaming   medical records
Cloud Storage search
geospatial Mobile

Most of these "new" data types are <u>unstructured</u>, semi-structured and <u>non-transactional</u>

Why Distributed Data is Critical
In New Era: Latency, Availability and Scalability Matter

Latency Matters

How one second delay could cost Amazon $1.6 Billion?

FAST COMPANY

Slowing Google by four tenths of a second costs eight million searches a day

Google

Availability Matters

Without access to data, automotive production lines shutdown in 15 minutes

AIAG

Tech managers often underestimate impact of data loss; 39% say loss would have significant costs

PC WORLD

Scalability Matters

46 million mobile apps downloaded per month from App Store

KPCB 2012

By 2020, 20 billion Things will be connected to the Internet

CISCO

More users – human and machine – are **doing more online** from more places with more apps on more devices, **generating more data** than ever before, **requiring more speed, reliability and performance**. And, the trends are only accelerating.
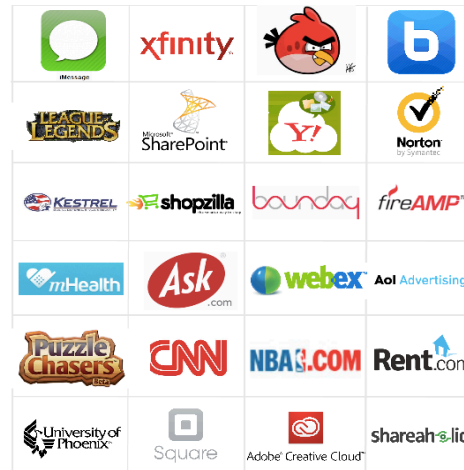
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Our Era

The Rise of Distributed Systems

Through 2014, 20% of enterprise data projects will add distributed processes into their production
    – Gartner

We Bring Amazon Technology Standards to the World

amazon.com

Dynamo: Amazon's Highly Available Key-value Store

Giuseppe DeCandia, Deniz Hastorun, Madan Jampani, Gunavardhan Kakulapati, Avinash Lakshman, Alex Pilchin, Swaminathan Sivasubramanian, Peter Vosshall and Werner Vogels

Amazon.com

ABSTRACT

Categories and Subject Descriptors

General Terms

1. INTRODUCTION

Amazon Dynamo Specifications Paper
Released October 2007

Enabled tens of millions of simultaneous users on the World's most popular e-commerce site

- Amazon has become the defacto standard for modern technology architecture
- In 2007, Amazon published the **Amazon Dynamo** paper
- Dynamo paper outlined requirements not addressable by **any commercial database**
- In 2008, inspired by Dynamo, former Akamai engineers set out to build a **distributed database** and founded Basho Technologies
- After two years of community testing, Basho released **Riak 1.0** in Sept 2011
- In March 2012, Basho launched **Riak CS**, to enter **cloud storage** software market

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An industry defining milestone was created by pioneer Amazon in 2007.

In 2007, Amazon released the Amazon Dynamo paper. It outlined the business and technical requirements to achieve reliability at massive scale for Amazon.com. The paper presented the design and implementation of Dynamo, a highly available key-value storage system that some of Amazon's core services use to provide an "always-on" experience.

To achieve reliability at massive scale, Amazon was forced to build its own data store, as traditional databases, such as Oracle or IBM DB2, were not built for Internet scale applications.

A group of Akamai engineers and executives with a distributed networking background were inspired by the Dynamo paper. They believed they could radically affect the scale of data stored on the Internet, much as they had accomplished with the Web layer at Akamai. With this goal in mind, they founded Basho in January, 2008.

After nearly three years of development, 500,000+ lines of code, and two years of community testing, Basho released its first product, Riak, in September 2011. Riak is our Dynamo-inspired distributed database.

In 2011, Basho began work on its second product addressing cloud storage and paralleling Amazon's S3 cloud storage service. This compatibility makes migration from Amazon to Riak CS simple. That product, called Basho Riak CS, was selected in late 2011 by AT&T and Verizon/Terremark. It will be officially released in March for broad adoption.

About Basho
Our Mission is to Be The Leader in Distributed Systems

- Founded January 2008
- 109 employees worldwide
- Basho Makes Riak, used by some of the largest companies in the world and powering the 4th and 5th most popular mobile apps
- Headquartered in USA with regional offices in London and Tokyo
- Board members include Eric Brewer, father of the CAP Theorem
- Strategic partners include Citrix, IDC Frontier, Yahoo! Japan, and Microsoft
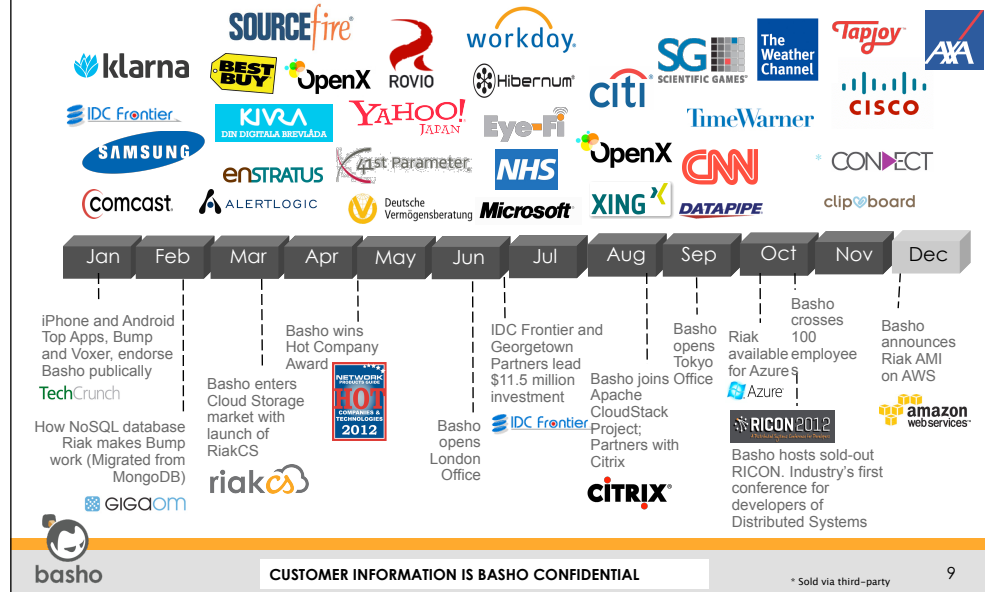
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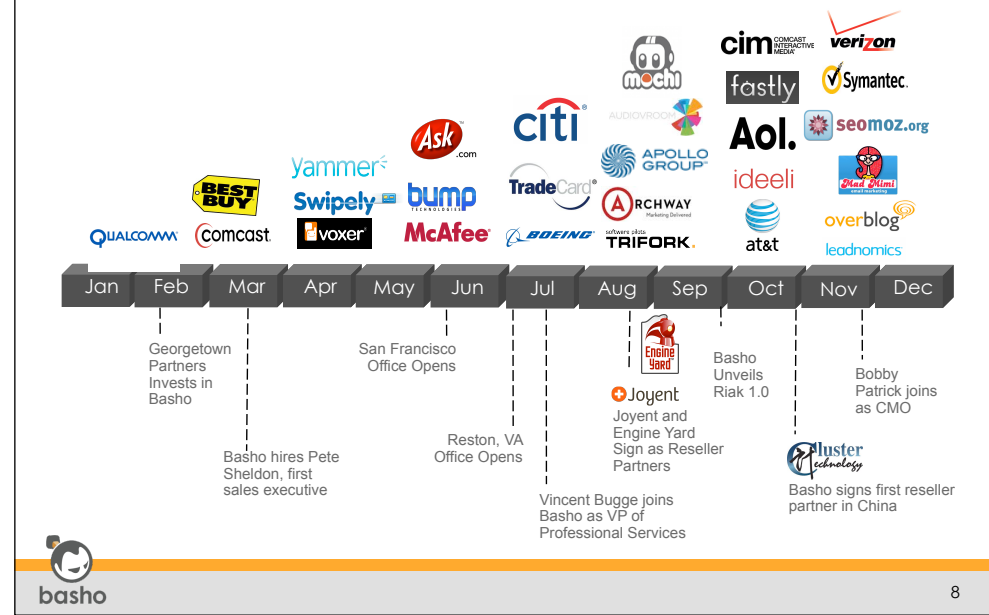
Basho picked up speed in 2011. Fueled by fresh funding from Georgetown Partners in February, the company began expanding its operations:

- Basho quickly established a sales organization, hiring Pete Sheldon, formerly of Verizon and Cybertrust, to start up Basho sales.
- In June 2011, Basho established its first non-shared office facility in San Francisco, CA
- Don Rippert, former CTO of Accenture, joined as president and CEO
- The company began establishing channel partners to expand its sales efforts, recruiting Joyent, Engine Yard and Cluster Technology in China.
- In September, Basho released the first official release of Riak at v1.0 after years of development and community testing.
- During the year, new customer adoption accelerated, culminating with great new customers, such as Symantec and Verizon in Dec.
- The company formalized a marketing organization late in the year with the recruitment of Bobby Patrick, formerly head of marketing at e-commerce leader GXS and hosting leader Digex.

Basho 2012: Momentum Year
Enterprise-Class Customer Base and Pipeline Growing

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

iPhone and Android Top Apps, Bump and Voxer, endorse Basho publically
TechCrunch

How NoSQL database Riak makes Bump work (Migrated from MongoDB)
GIGAOM

Basho enters Cloud Storage market with launch of RiakCS
riakcs

Basho wins Hot Company Award
NETWORK PRODUCTS GUIDE HOT COMPANIES & TECHNOLOGIES 2012

Basho opens London Office

IDC Frontier and Georgetown Partners lead $11.5 million investment
IDC Frontier

Basho joins Apache CloudStack Project; Partners with Citrix
CITRIX

Basho opens Tokyo Office

Riak available for Azure
Azure

Basho hosts sold-out RICON. Industry's first conference for developers of Distributed Systems
RICON 2012

Basho crosses 100 employee

Basho announces Riak AMI on AWS
amazon webservices

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* Sold via third-party

This talk is about

- Distributed Systems

- High Availability

- Non-relational databases

- High Speed / Low Latency

Distributed Systems

- Clustering
  - Make the most of multiple machines
- Trade offs:
  - Availability vs Consistency

- Start with 5 nodes
  - 3 copies of your data
  - 1 node in maintenance
  - 1 node can fail

High Availability

- Any sufficiently large system is always in a partial state of failure

- Riak 100% availability* for years
  - Across Riak versions
  - Across generations of hardware

- Masterless
  - No SPOF

* What does availability mean?
Always accepts writes
No outages for upgrades
Can survive DC/AZ outages

High Availability

enStratus: Cloud infrastructure management and monitoring company

• Replaced Oracle MySQL with Riak in 2012
• Eliminated the one big remaining single-point of failure in the enStratus environment
• Moved from relational to non-relational system required a new data model approach
• Basho.com/blog

ENSTRATUS

Non-Relational

- No Schema
- No Schema Migrations
- Supports Rapid Application Development

- No business logic in the database
- No locks
- No joins
- No referential integrity

- Riak is better for concurrent access

Non-Relational

Alert Logic
Fast-growing leading Managed Security Services Provider

• Replaced MySQL with Riak in 2012
• 35k ops/sec/server
• 5TB a day
• Data doubling every year
• 100,000s of edge endpoints
• Massive performance over MySQL
• Basho.com/blog

ALERTLOGIC

High Speed / Low Latency

- Consistent speed

- Even distribution of load

- No need for in-memory cache

High Speed / Low Latency

Best Buy: Leading electronics retailer selected Riak for bestbuy.com, including its online product catalog

• Switched from relational Oracle database to Riak for bestbuy.com performance
• Uses multi-data centre replication to ensure 100% availability
• Added 70 Amazon Web Services nodes for holiday expansion (peak load)
• Basho.com/blog

DevOps Friendly

- Scaling +/- nodes is fast and simple

- Backup is easy and zero-impact

- Monitoring is easy

- Flexible topology
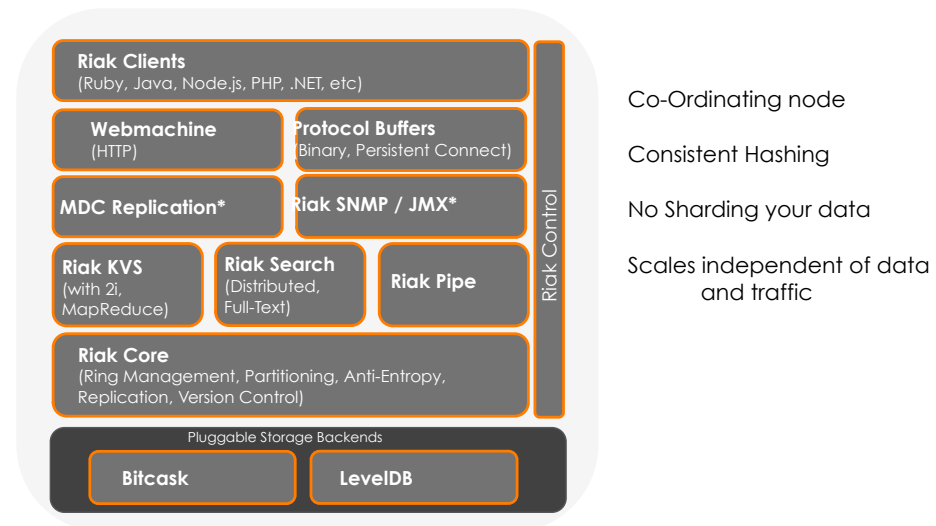
- Riak Control GUI

- Puppet/Chef/Fabric

DevOps Friendly

Mad Mimi: Large email marketing service provider with over 100,000 customers
- Replaced MySQL to scale quickly and easily without manual sharding
- Riak currently stores nearly 5 billion keys, and adds between 10-20 million keys each day
- Gained 100% availability since moving to Riak
- Uses Riak Secondary Indexing to make retrieving data easier and faster than with MySQL
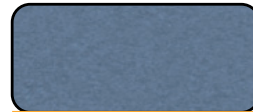- Basho.com/blog

Riak Architecture

Riak Clients
(Ruby, Java, Node.js, PHP, .NET, etc)

Webmachine
(HTTP)

Protocol Buffers
(Binary, Persistent Connect)

MDC Replication*

Riak SNMP / JMX*

Riak KVS
(with 2i,
MapReduce)

Riak Search
(Distributed,
Full-Text)

Riak Pipe

Riak Core
(Ring Management, Partitioning, Anti-Entropy,
Replication, Version Control)

Riak Control

Pluggable Storage Backends

Bitcask

LevelDB

Co-Ordinating node

Consistent Hashing

No Sharding your data

Scales independent of data
and traffic

Basho Family of Products
Basho's Distributed Systems Technologies

	EnterpriseDS	**riak**cs
Open Source Distributed Database	**Commercial Distributed Database**	**Distributed Cloud Storage Platform**
· Always-available, scalable, low-cost NoSQL database	· Adds multi-data center replication & Basho 24x7 support	· Expands with multi-tenancy, large object support, metering and Amazon S3 API
· Over 35,000 Downloads per Month	· Enables Secondary Search and MapReduce Clusters	· Enables public and private cloud storage
· Thousands of users worldwide	· Requires commercial contract and secure download	· Developer trial license available
· Version 1.0 unveiled September 2011	· Version 1.3 coming January 2013	
McAfee *BOEING*	**COMCAST**	**IDC Frontier** **at&t**

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Yahoo! JAPAN Cloud Storage
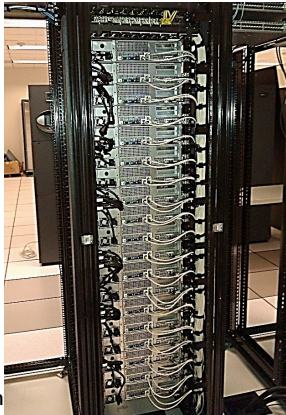
Powered by Riak CS

Yahoo! Japan Launches Amazon S3 Competitor for Japan market – January 2013

Riak CS 'in the Cloud'
AT&T's Largest Cloud Platform and Growing

+T BSS/OSS & Service Orchestration

+T Network Orchestrator

SilverLining is AT&T's Largest cloud today

AT&T Additions
- IRSCP
- Model Driven Management
- Capacity Mgmt driven by Application SLAs
- Configuration
- Monitoring

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mHealth Platform-as-a-Service

at&t

- AT&T unveiled mHealth at DevSummit in January 2012
- Building a Platform-as-a-Service ecosystem connecting developers, apps and devices
- 3rd Party Devices include Withings, FitBit and MyZeo
- Key values stored in Riak include Users, Tokens, Applications, and Health Metrics
- HIPAA and HL7 compliant

Clinical care teams, insurance companies, pharmacists, employers will benefit from a more holistic view of someone's current state of health.
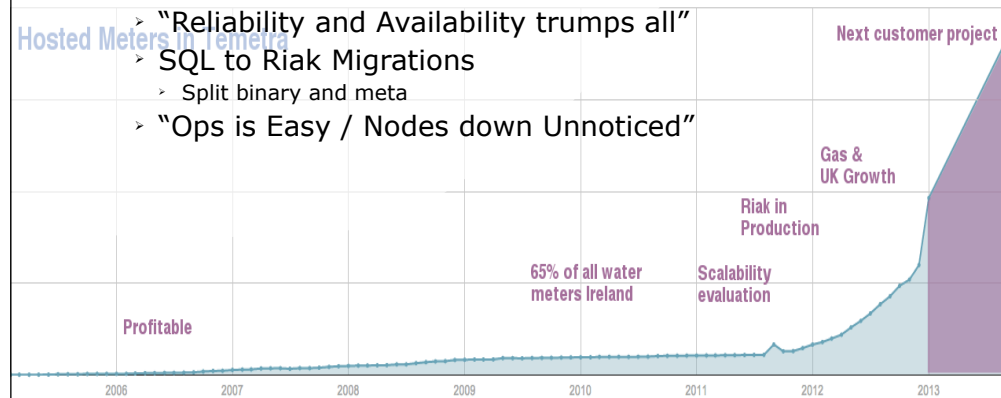
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Cloud–Based Meter Management
Basho in Utilities and Smart Metering

temetra

- ➢ Internet delivered MDM with revenue-critical data
  - ➢ Final Repository for all Meter Readings
- ➢ Mobile Devices, Back Office Users
- ➢ "Reliability and Availability trumps all"
- ➢ SQL to Riak Migrations
  - ➢ Split binary and meta
- ➢ "Ops is Easy / Nodes down Unnoticed"

Hosted Meters in Temetra

Next customer project

Gas &
UK Growth

Riak in
Production

65% of all water
meters Ireland

Scalability
evaluation

Profitable

2006   2007   2008   2009   2010   2011   2012   2013

Mobile Walkie-Talkie App

Voxer – Serious Scale with Text, Audio and Video
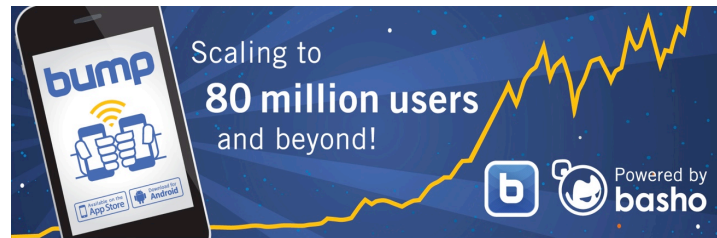

- Switched to Riak in April 2011
- #4 most popular Apple App Store *behind Facebook, Skype and Twitter*

- Scaled 10x between Nov 2011 and Jan 1, 2012
- Over 100 nodes today supporting 2 billion operations / day
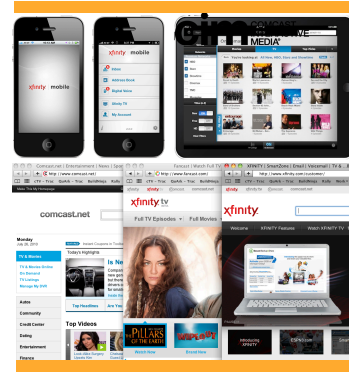- Growing by 5 TB every day

Mobile-to-Mobile Content Store

- Switched to Riak in August 2011
- #7 Most Downloaded iPhone App

- 800 million pieces of structural data in Riak, including Photos, Chats, and Contact Cards.
- 10 million active users
- 77 million downloads to date

Video Delivery Platform
Comcast – Riak Expands from One Project to the Next

- Originally used Amazon S3; challenged by latency
- Deployed Riak initially to store user related data for DVRs
- Expanded Riak to manage streaming premium content and remote DVR controls for xfinitytv.comcast.net, as well as XfinityTV iPhone and Android
- In 1Q12, Riak launched to support Comcast StreamPix. Comcast's new product against Netflix
- Expanded to multi-data center in Q112

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Comcast on NoSQL: "A KV store is flat out simpler to use and manage than comparable, more general RDBMS technologies, i

Comcast on Operations with Riak: "On a day–to–day basis, other than figuring out how much capacity we want to add, we have no Riak administrator— we don't need one."

Jonathan Moore
Technical Fellow Comcast Interactive Media

Product Information Repository

Best Buy – Multi-Center Replication for Availability

- Best Buy selected Riak to be the an on-line product catalog for bestbuy.com and retail stores
- 2 Million SKUs stored in Riak
- Accessed by 30 internal applications, such as customer service enterprise returns app
- Integrates with 3rd Party APIs to Amazon.com and Pricegrabber.com
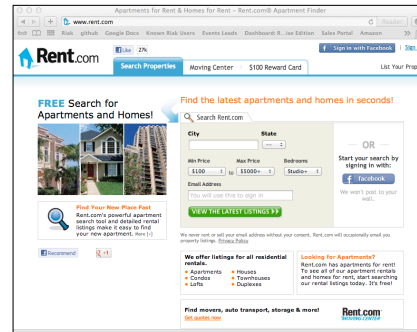- Increasing geographic diversity implementing Riak's Multi-Data Center replication in 1Q12

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Mirror of Riak is available at code.bestbuy.com.

Riak Powering The Interest Graph

Primedia is a property search web site and search engine.

Primedia uses **Riak** as the database to house, **personalized** consumer **searches**. Riak provides Primedia with a **fast read/ write** capability to fully capture search criteria and enable a per consumer interest graph.

Summary

Riak is:

- Distributed
- Highly Available
- Schemaless
- Fast and Scalable
- Developer Friendly
- Ops Friendly

What We are Working On

Riak v1.3 release this week:

- Active Anti-Entropy: automatic, self-healing properties that repair entropy on an ongoing basis.
- Improved Riak Enterprise's multi-datacenter replication performance: more TCP connections and easier configuration.
- Improved graphical user experience.
- Expanded IPv6 support.
- Improved MapReduce.
- Simplified log management.

The 1st Distributed Systems Conference

RICON Europe

London

Launch Q2

October

RICON

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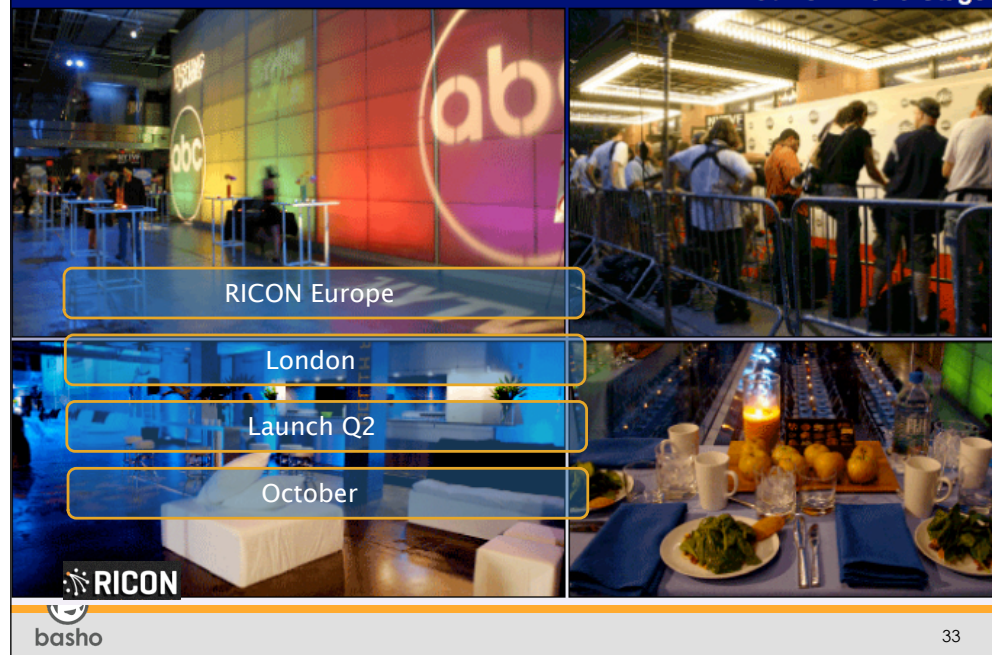
Do you need Riak?

- Request a Tech Talk for your team
    - bit.ly/RiakTechTalk

Questions?

Feedback to @_stu_