

Beta

Crossing the chasm with {"no": "SQL"}

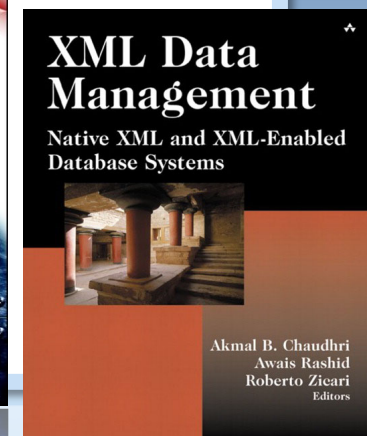
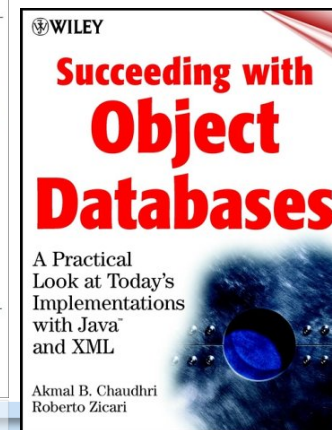
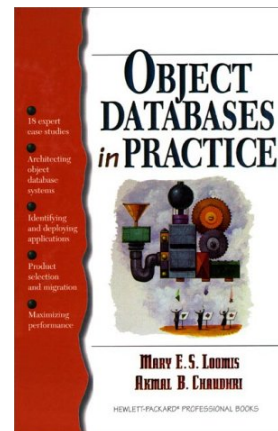
Akmal B. Chaudhri
(艾克摩 曹理)

Introduction



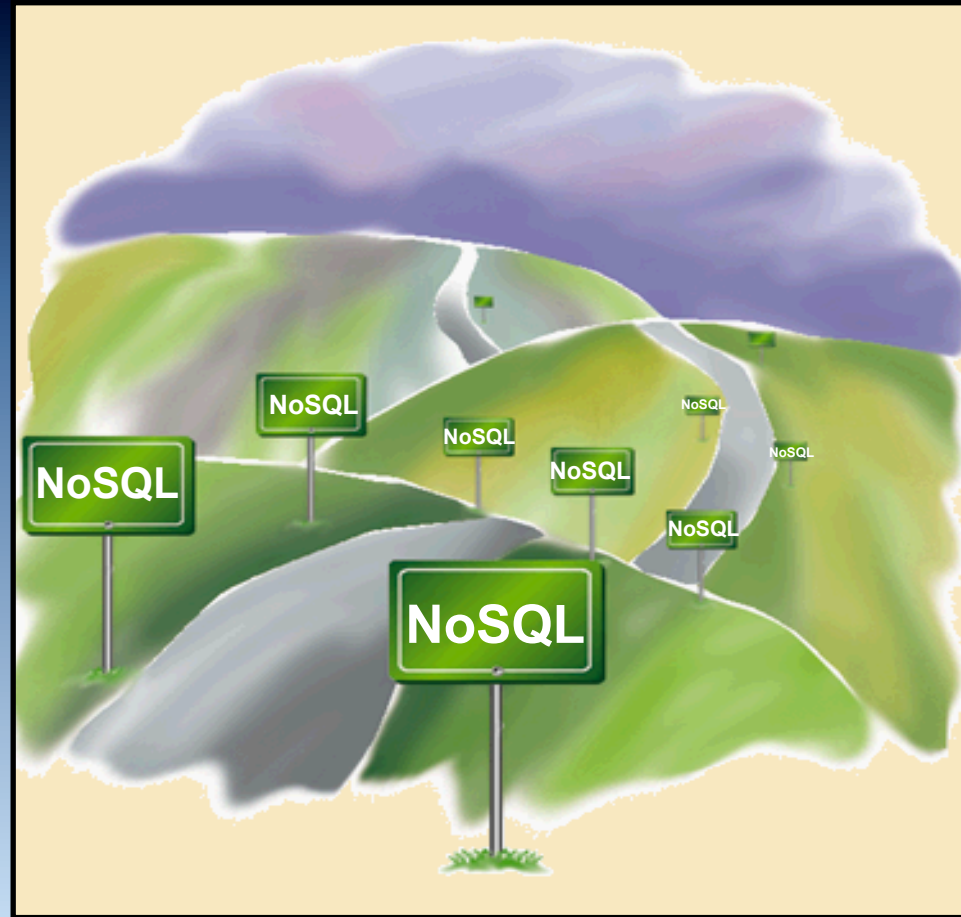
My background

- ~25 years experience in IT
 - Developer (Reuters)
 - Academic (City University)
 - Consultant (Logica)
 - Technical Architect (CA)
 - Senior Architect (Informix)
 - Senior IT Specialist (IBM)
 - TI (Hortonworks)
- Client-facing roles
 - Developers
 - Senior executives
 - Journalists
- Community outreach
- 10 books, many presentations
- Broad industry experience
- Worked with various technologies
 - Programming languages
 - IDE
 - Database Systems

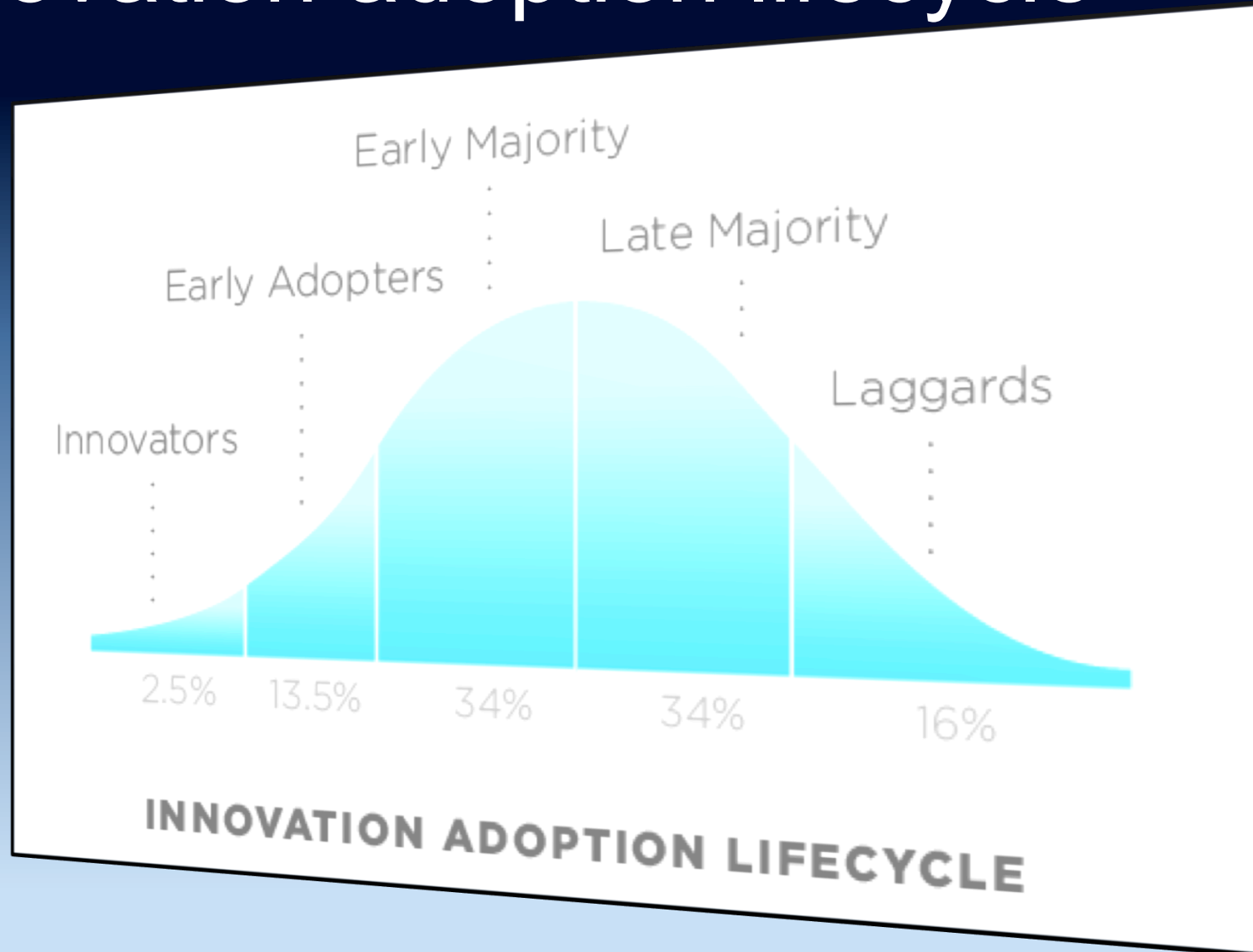




Your road leads to NoSQL?

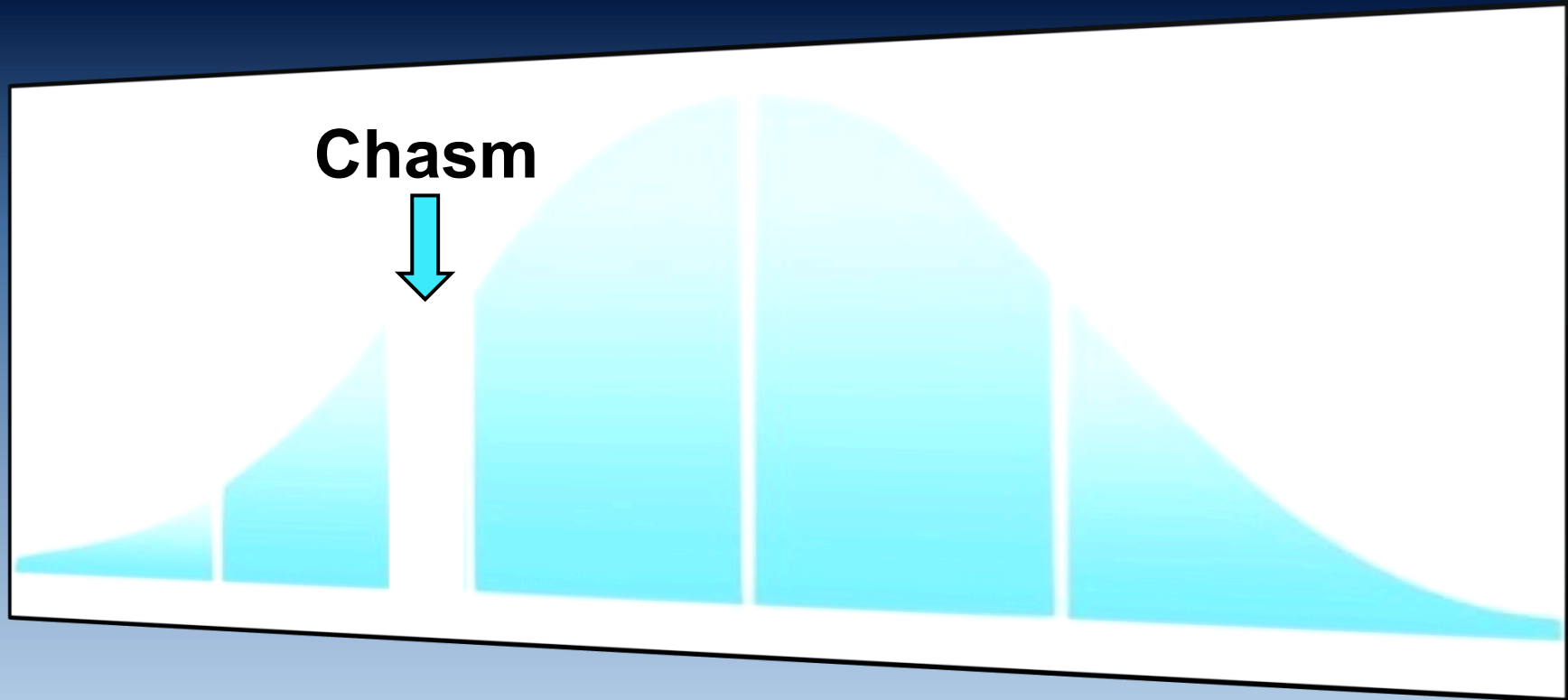


Innovation adoption lifecycle



Source: http://en.wikipedia.org/wiki/Technology_adoption_lifecycle

Crossing the chasm



Magic quadrant

LICENSED FOR DISTRIBUTION

Gartner.

Magic Quadrant for Operational Database Management Systems

21 October 2013 ID:G00251780

Analyst(s): Donald Feinberg, Merv Adrian, Nick Heudecker

[VIEW SUMMARY](#)

The operational DBMS market (formerly OLTP) is evolving dramatically, with new, innovative entrants and incumbents supporting the growing use of unstructured data and NoSQL DBMS engines. Information management leaders must understand the market implications affecting DBMS technology decisions.

Learn how Gartner can help you succeed

Become a Client now >

ACRONYM KEY AND GLOSSARY TERMS

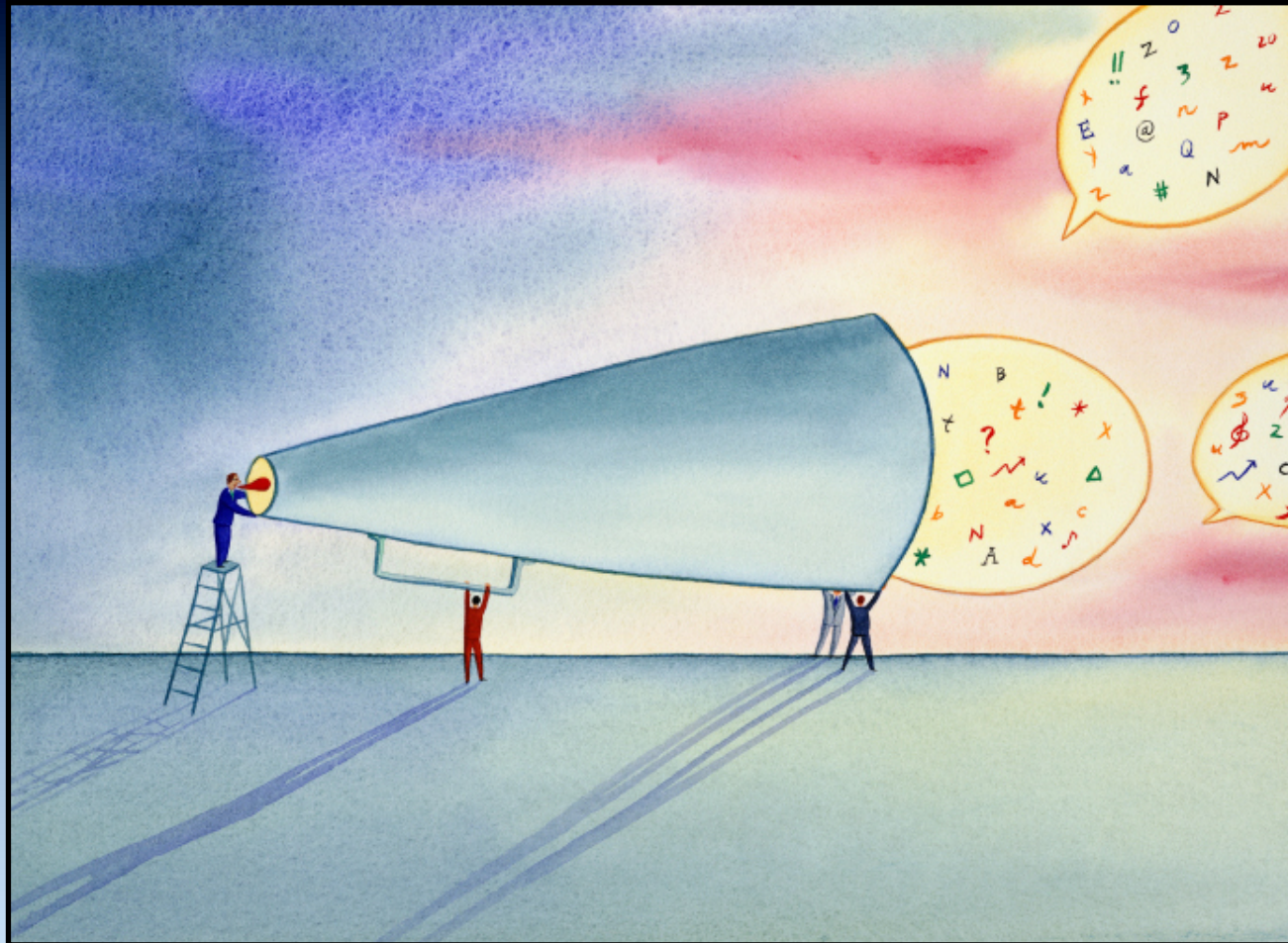
ACID	atomicity, consistency, isolation and durability
ASE	Adaptive Server Enterprise
AWS	Amazon Web Services
DBMS	database management system

Source: Gartner (October 2013)



- NoSQL
 - Products designed for “web scale”
- NewSQL
 - New SQL-based products designed to use modern hardware technologies
- OldSQL
 - Existing SQL-based products enhanced with NoSQL capabilities

NoSQL hoopla and hype



Extra! extra! ...



Extra! extra! ...



Source: Inspired by "The Next Big Thing 2012" The Wall Street Journal 27 September 2012

Extra! extra! ...



Extra! extra! ...



Extra! extra!



Source: Inspired by the movie "Airplane!" (1980)

NoSQL



History



Have you run into limitations with traditional relational databases? Don't mind trading a query language for scalability? Or perhaps you just like shiny new things to try out? Either way this meetup is for you.

Join us in figuring out why these new fangled Dynamo clones and BigTables have become so popular lately.

History in No-tation

1970: NoSQL = We have no SQL

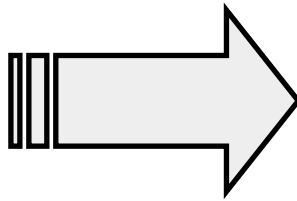
1980: NoSQL = Know SQL

2000: NoSQL = No SQL!

2005: NoSQL = Not only SQL

2013: NoSQL = No, SQL!

~~SQL~~



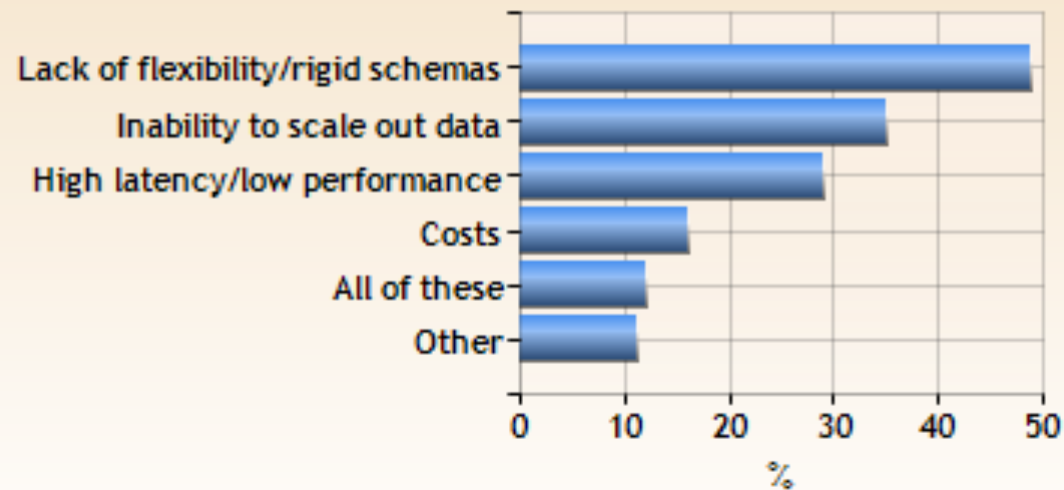
Not
Only **SQL**

Why did NoSQL datastores arise?

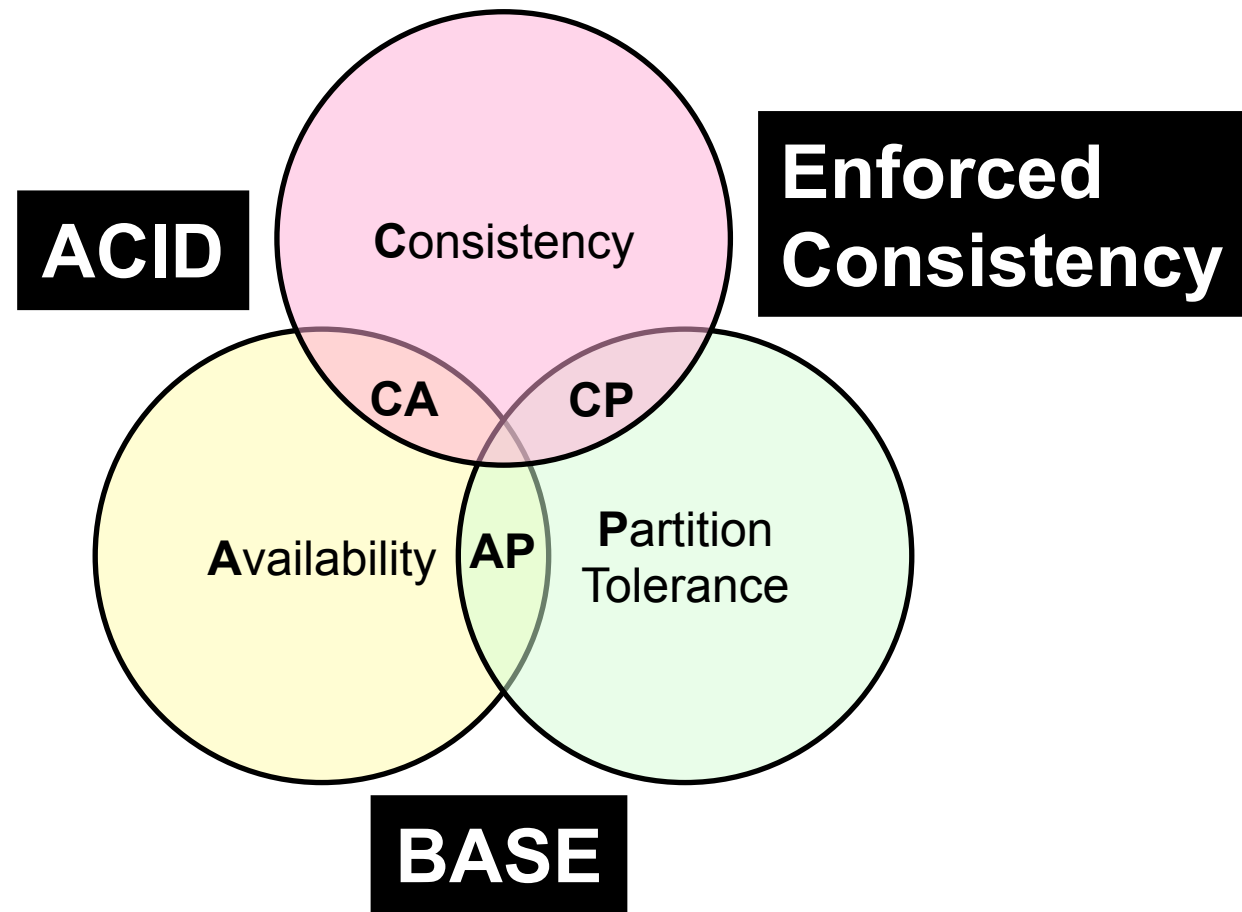
- Some applications need very few database features, but need high scale
- Desire to avoid data/schema pre-design altogether for simple applications
- Need for a low-latency, low-overhead API to access data
- Simplicity -- do not need fancy indexing -- just fast lookup by primary key

NoSQL drivers

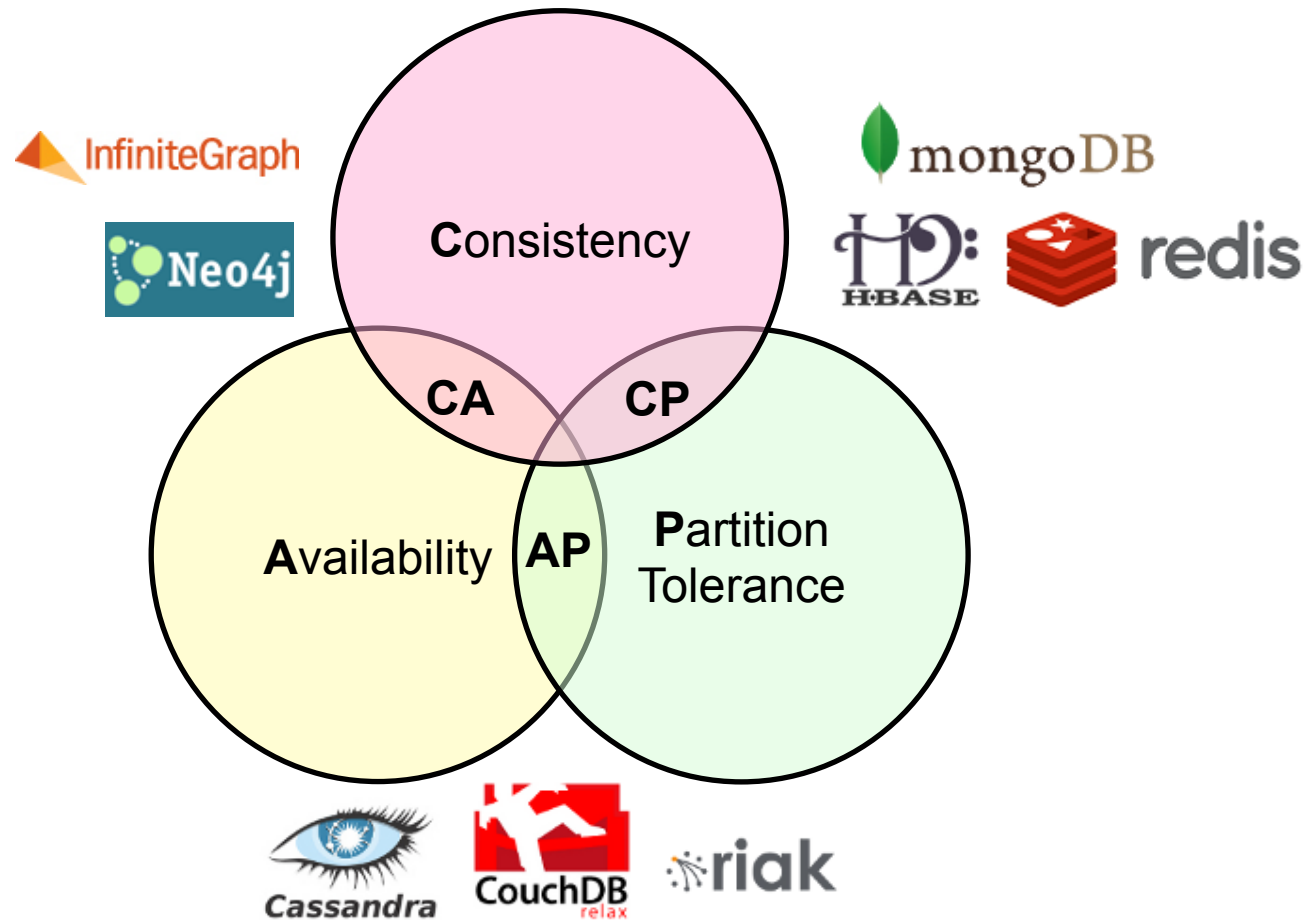
What is the biggest data management problem driving your use of NoSQL in the coming year?



Brewer's CAP "Theorem" ...



Brewer's CAP "Theorem"



ACID vs. BASE ...

- Atomicity
- Consistency
- Isolation
- Durability
- Basically Available
- Soft state
- Eventual consistency

ACID vs. BASE

ACID	BASE
<ul style="list-style-type: none">• Strong consistency• Isolation• Focus on “commit”• Nested transactions• Conservative (pessimistic)• Availability• Difficult evolution	<ul style="list-style-type: none">• Weak consistency• Availability first• Best effort• Approximate answers OK• Aggressive (optimistic)• Simpler, faster• Easier evolution

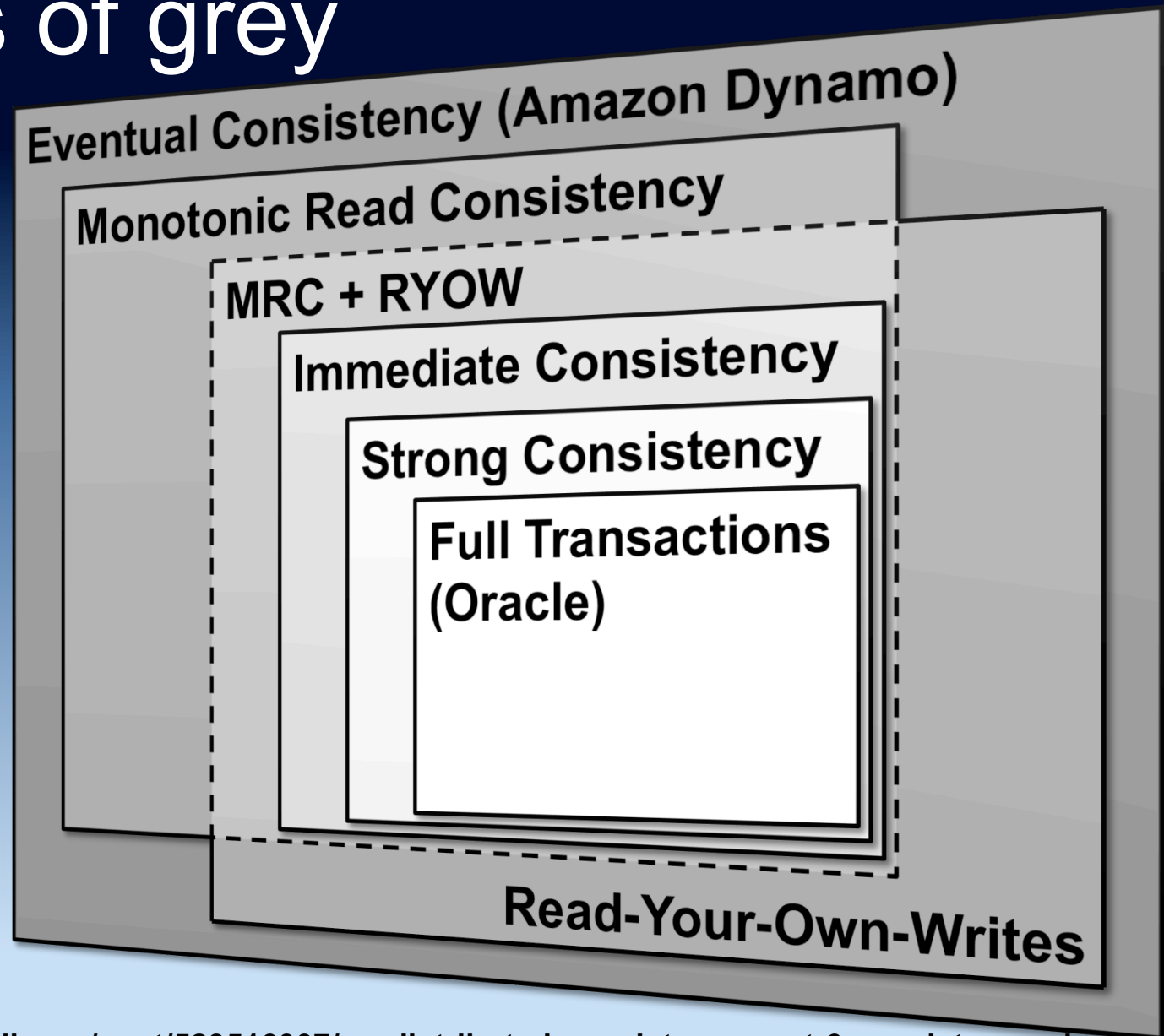
Tuneable CAP

- Examples
 - Cassandra
 - Riak

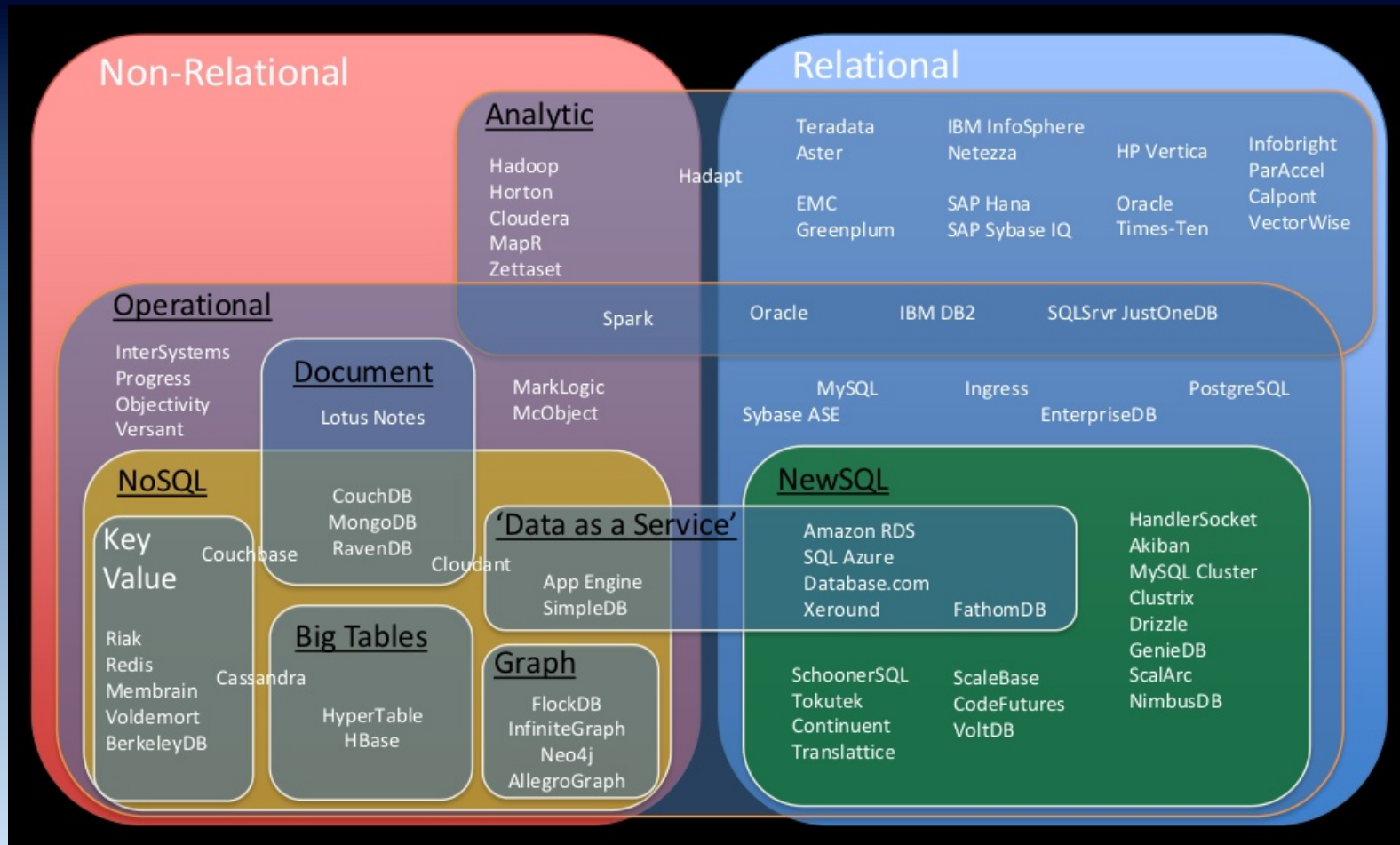




Shades of grey

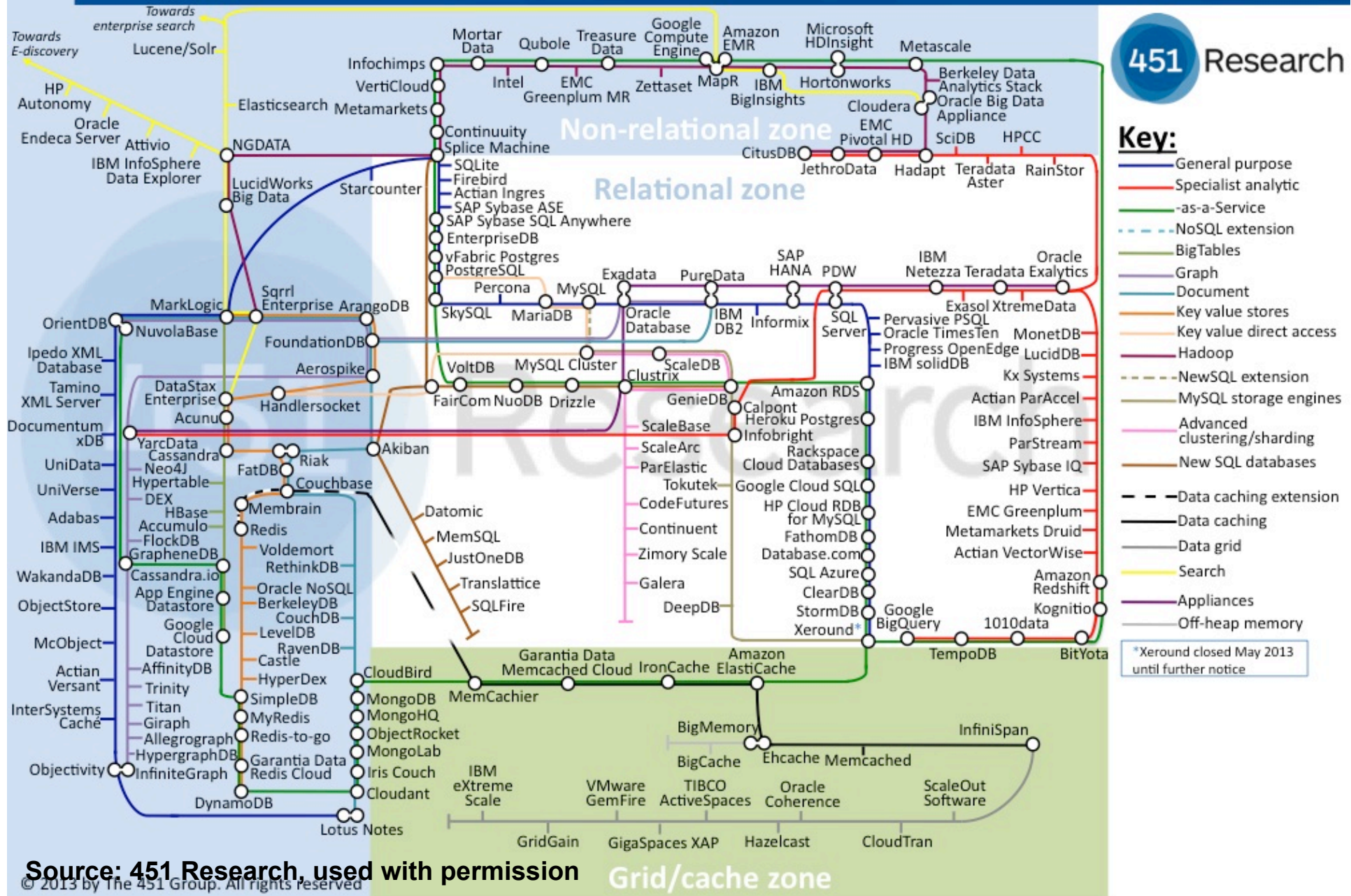


Choices, choices



Source: Infochimps, used with permission









Database Landscape Map – June 2013



Source: 451 Research, used with permission

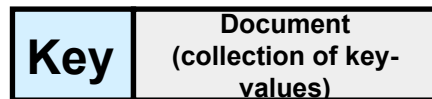
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Major categories of NoSQL ...

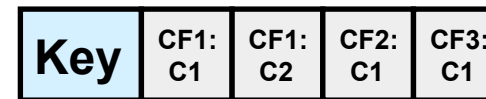
Type	Examples
Document store	 CouchDB  mongoDB
Column store	 Cassandra  HBASE
Key-value store	 redis  riak
Graph store	 InfiniteGraph  Neo4j

Major categories of NoSQL

Document store



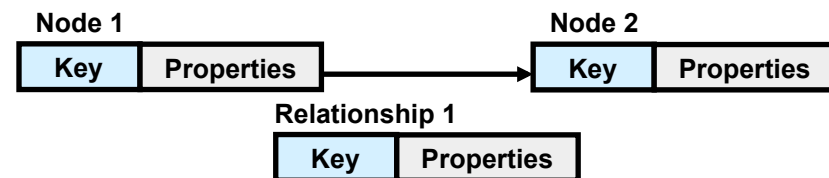
Column store

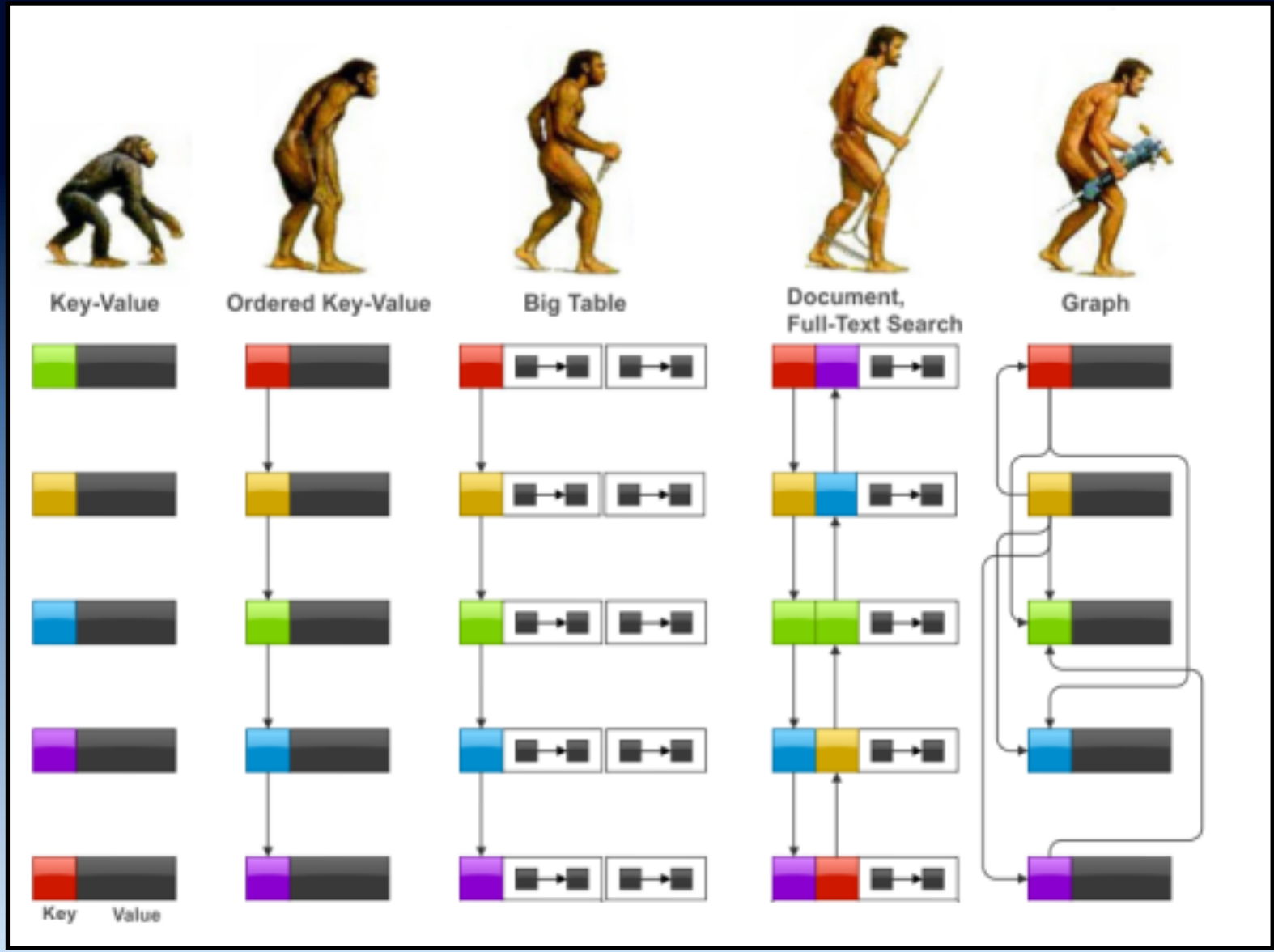


Key-value store



Graph store





Source: Ilya Katsov, used with permission

NoSQL alternatives

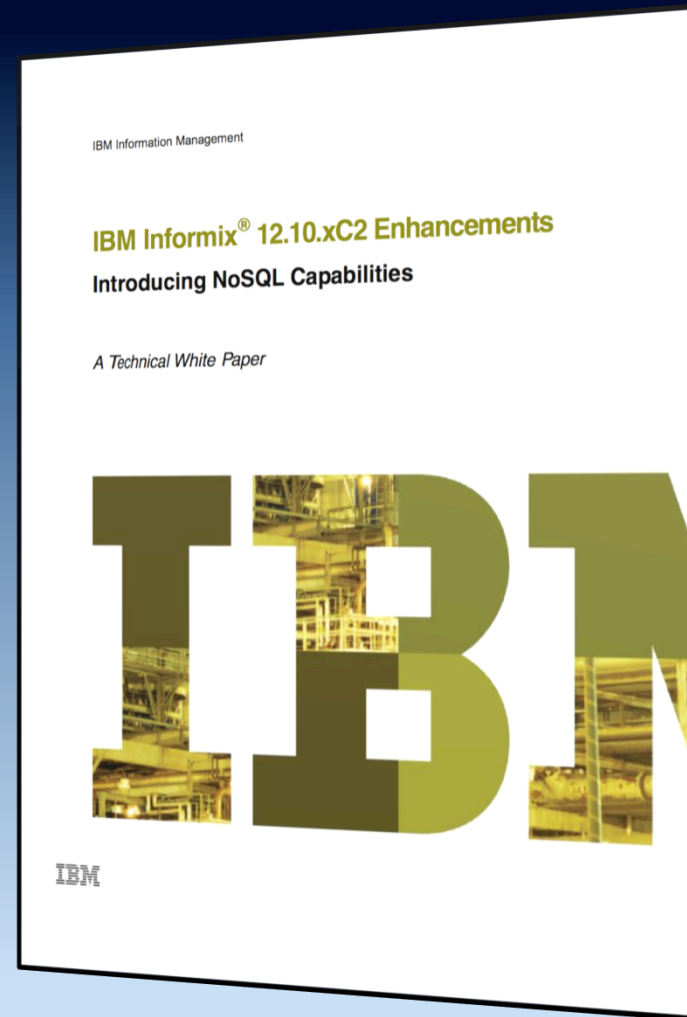


NewSQL

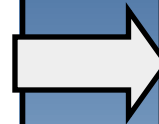
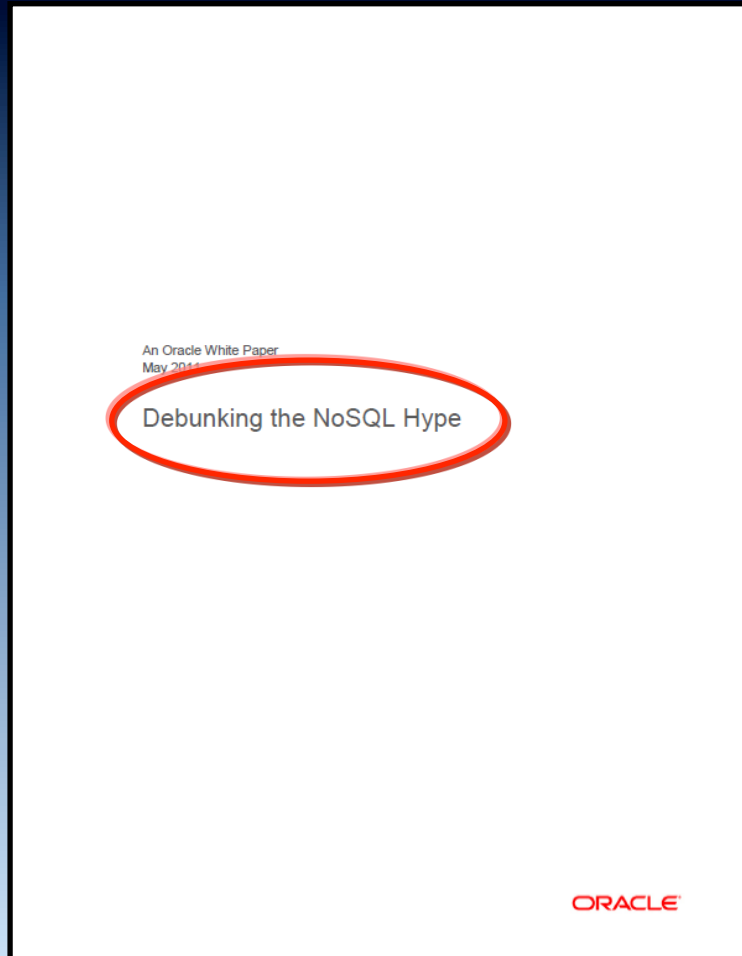
- Today, new challenges and requirements
 - “Web changes everything”
- Need more OLTP throughput
- Need real-time analytics
- ACID support
- Preserve SQL
 - Automatic query optimization
- Preserve investment
 - Existing skills and tools

Relational

- Vendors adding NoSQL capabilities
 - Documents (JSON)
 - Linked data (RDF)

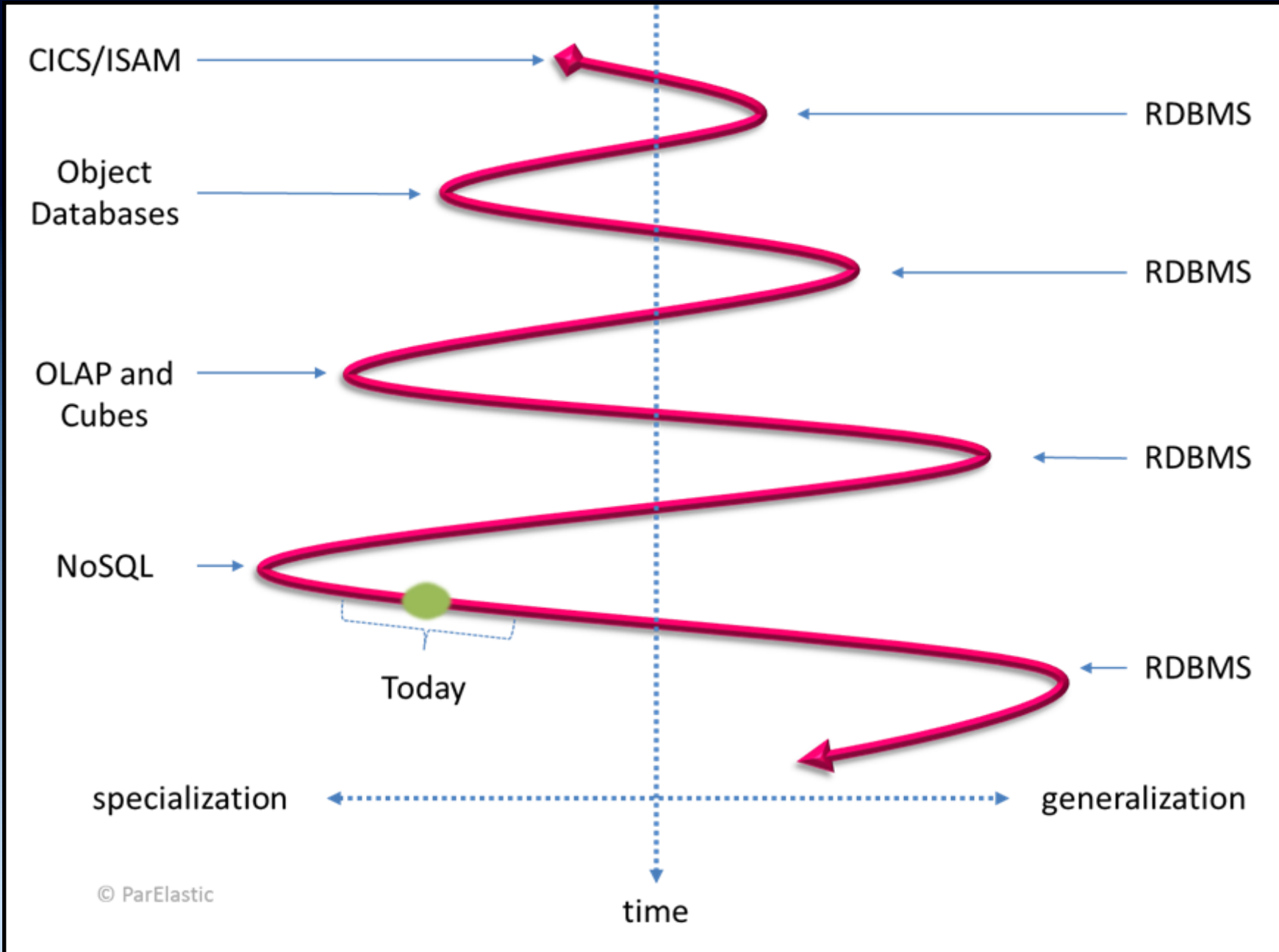


What about Oracle?



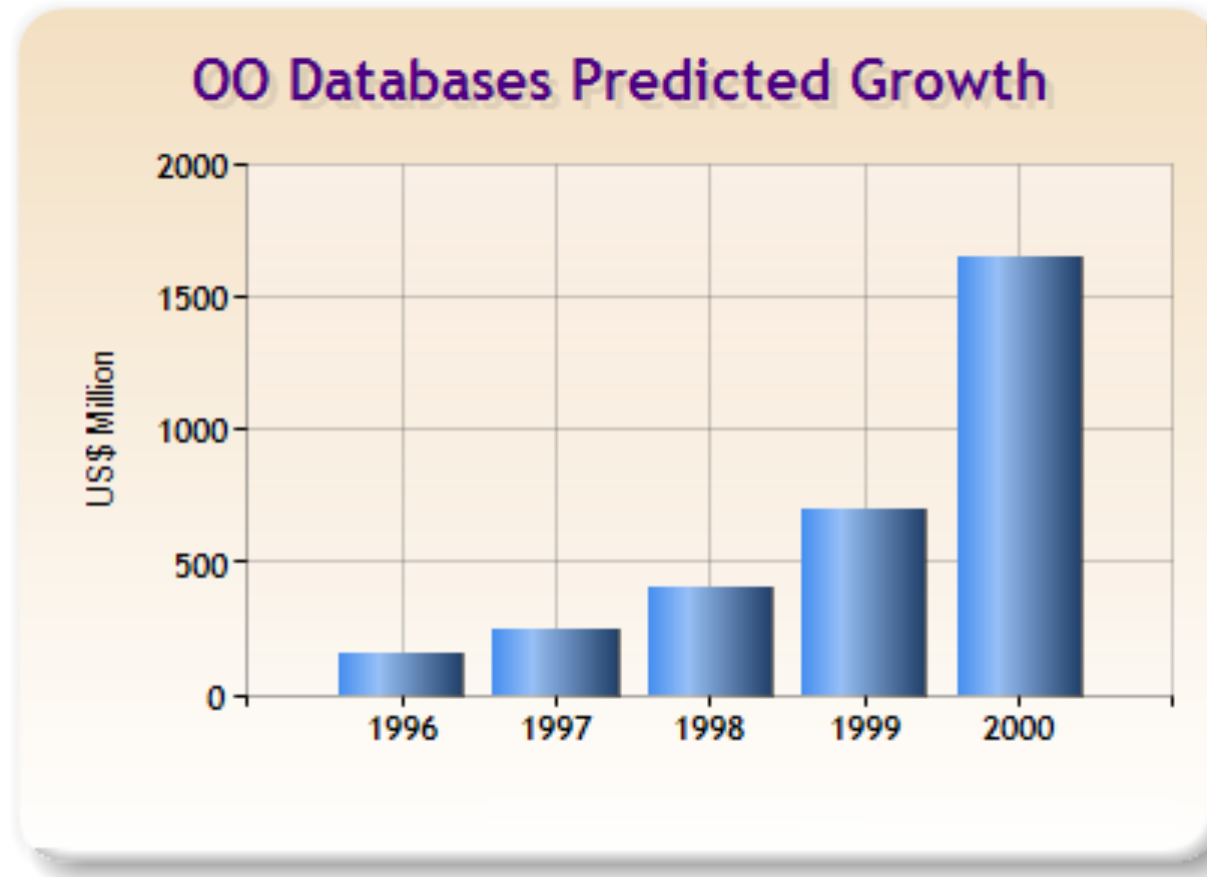
History repeats
itself





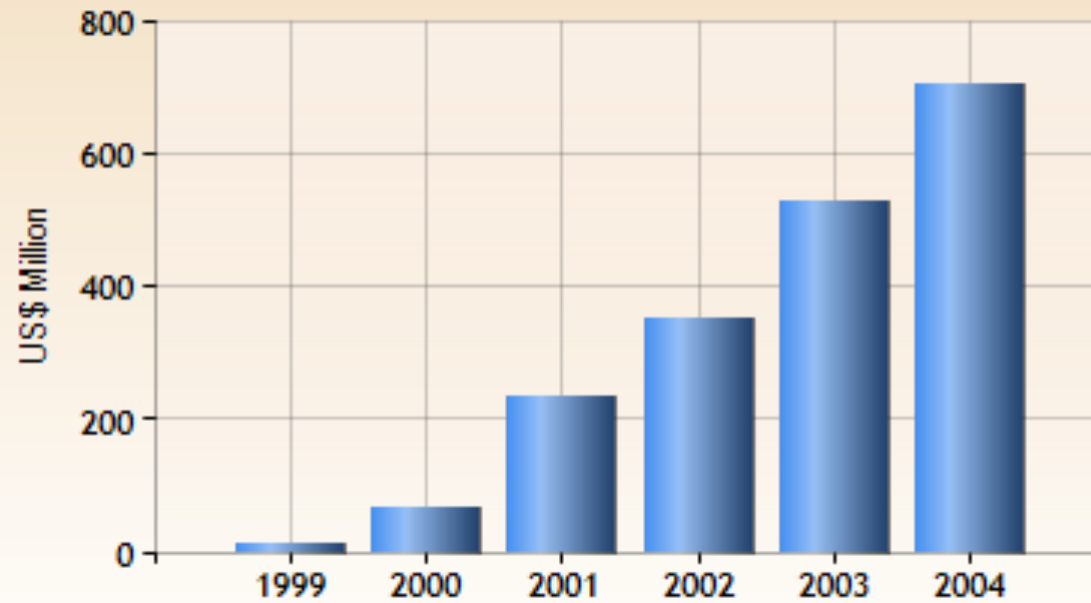
Source: ParElastic, used with permission

20 years ago



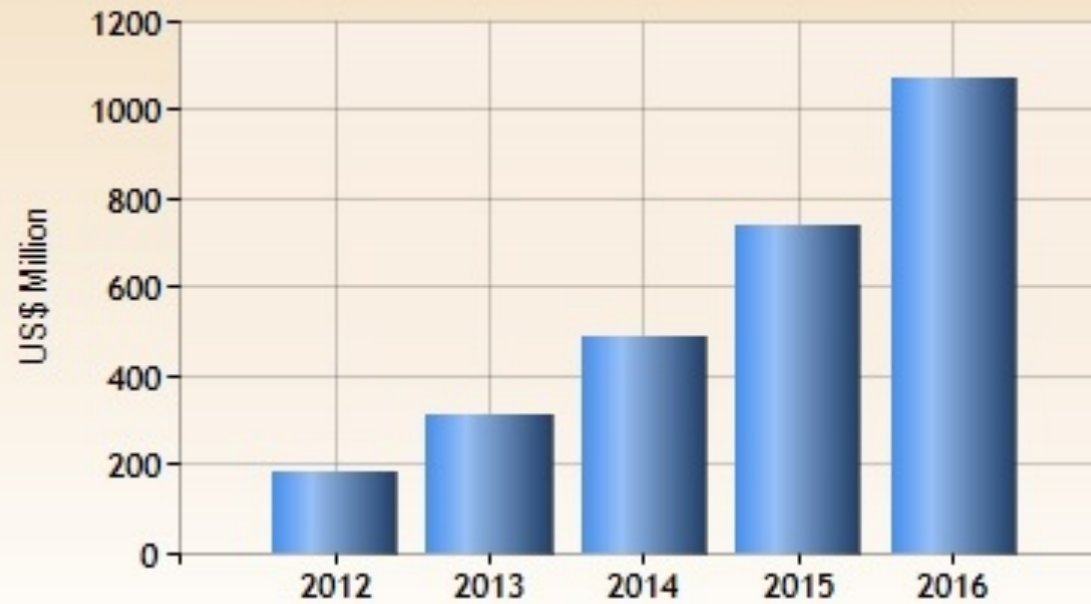
10 years ago

XML Databases Predicted Growth



Today

NoSQL Databases Predicted Growth



Object vs. Relational



Source: Inspired by comments from Esther Dyson during the 1990s

XML vs. Relational



Source: Inspired by <https://webpace.utexas.edu/curtispe/NatConf/tam2005.html>

NoSQL vs. Relational



Source: Inspired by <http://www.slideshare.net/mongodb/webinar-the-opex-business-plan-for-nosql/> and <http://www.slideshare.net/lj101197/couchbase-overview033113long/>

But ...



But ...



Riak ... We're talking about nearly a year of learning.^[1]

Things I wish I knew about MongoDB a year ago^[2]

I am learning Cassandra. It is not easy.^[3]

[1] <http://productionscale.com/blog/2011/11/20/building-an-application-upon-riak-part-1.html>

[2] <http://snmaynard.com/2012/10/17/things-i-wish-i-knew-about-mongodb-a-year-ago/>

[3] <http://planetcassandra.org/blog/post/datstax-java-driver-for-apache-cassandra>

Reasons for OODB failure ...

- Relational “dies hard”
 - Tremendous investment in SQL skills and tools
 - Comfort factor
 - Nobody got fired for buying Relational
- Relational customers waited for OO support
 - ... or OO support simply not required
 - Growth in Object-Relational mapping and ORDBs
- Mismatch between OODBs and corporate data stores

Reasons for OODB failure ...

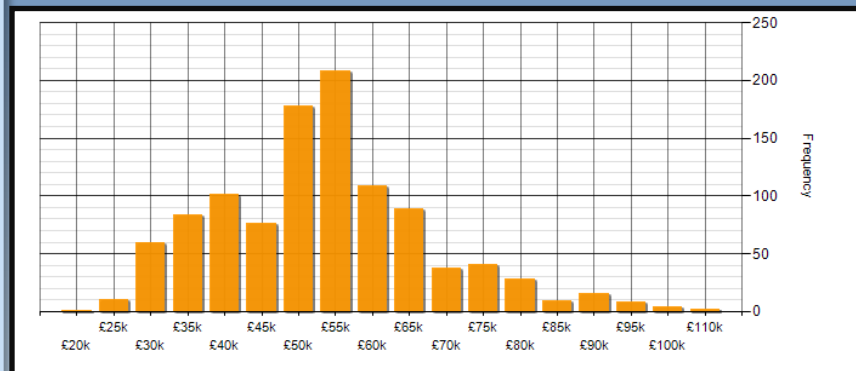
- Internal issues
 - Preferred database supplier
 - New developments postponed due to Y2K
- Proprietary query interfaces
- Poor standards support
- Lack of tools
- Lack of expertise
- Long-term risks

Market analysis

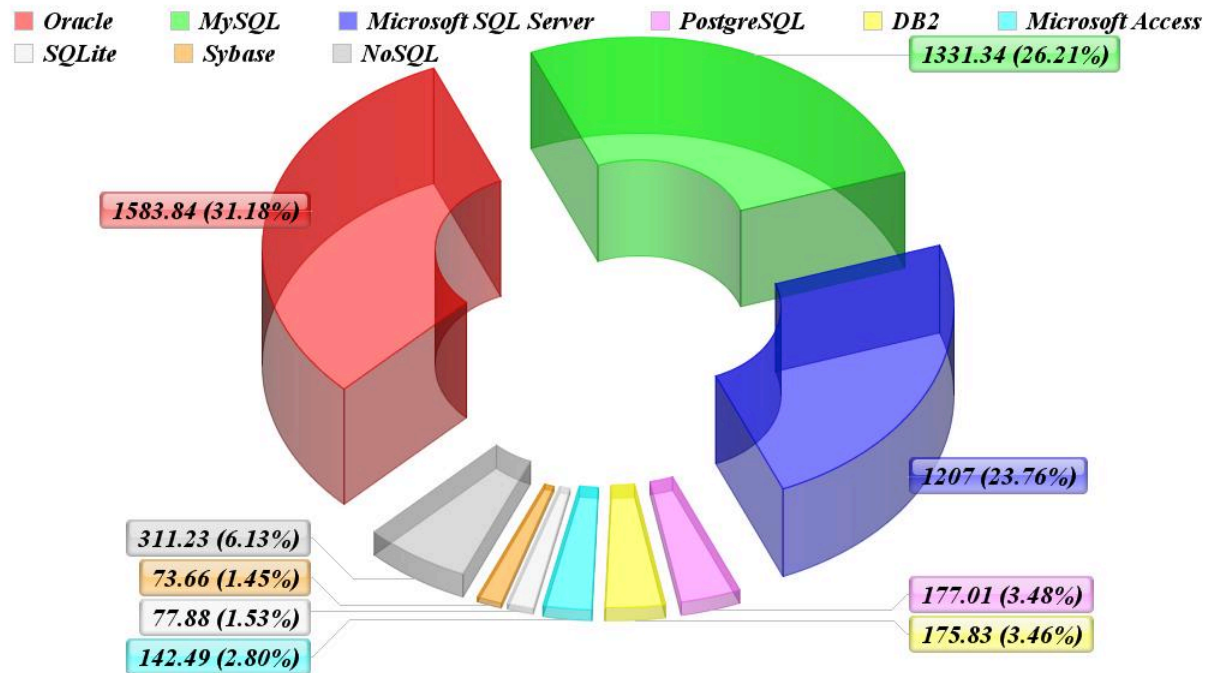


NoSQL jobs in the UK

- Database and Business Intelligence
 - MongoDB (901)
 - Cassandra (363)
 - Redis (292)
 - HBase (146)
 - CouchDB (141)
 - Hive (130)
 - Couchbase (120)

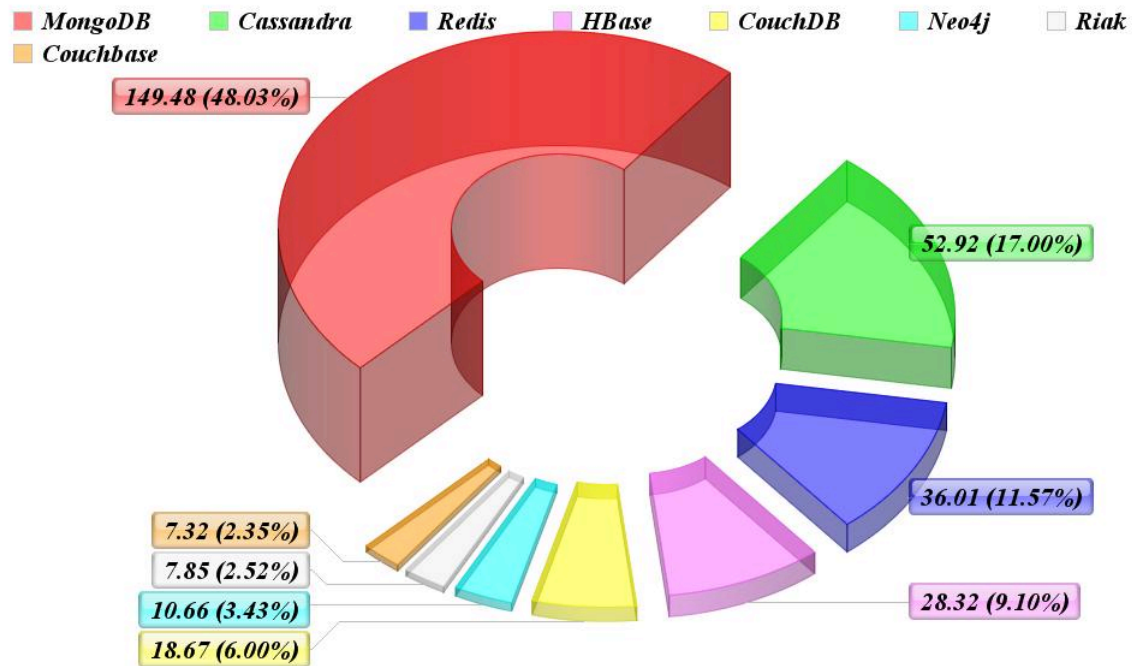


DB-Engines ranking ...



Source: <http://db-engines.com/en/ranking/> (October 2013)

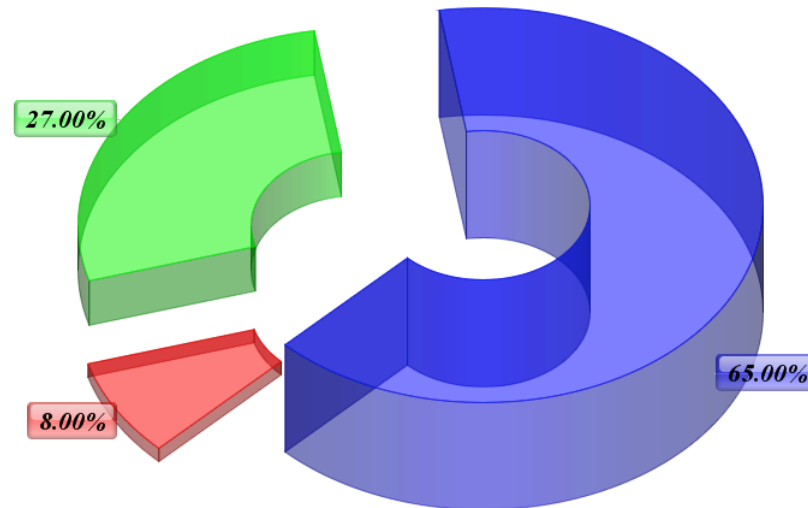
DB-Engines ranking



Source: <http://db-engines.com/en/ranking/> (October 2013)

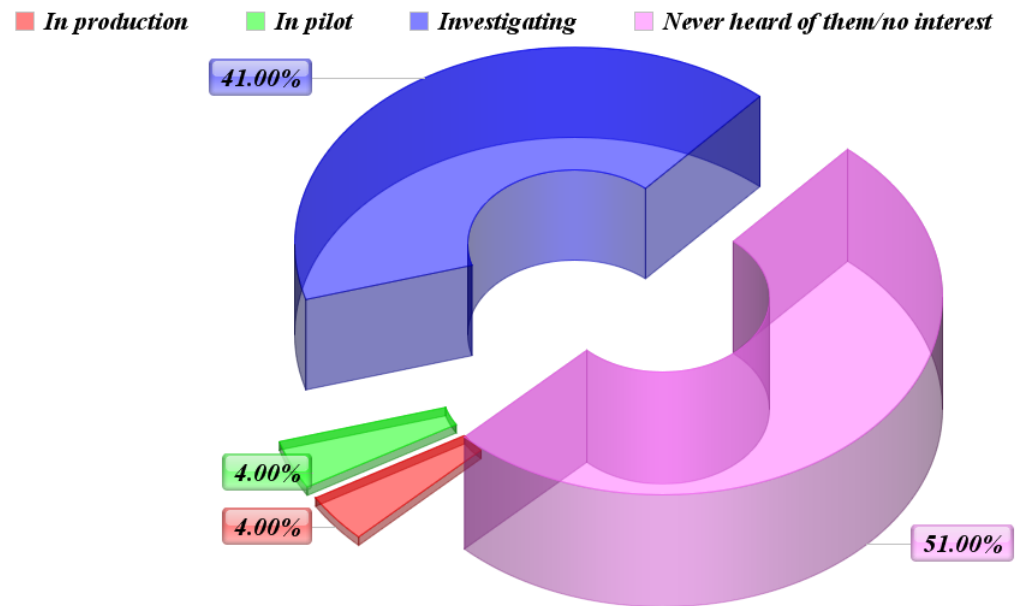
NoSQL in enterprise apps

■ *Currently using* ■ *Actively/potentially considering* ■ *Not likely to consider*



Source: "Cloud Software: Where Next?" InformationWeek August 2013

Use of NoSQL products



Source: "State of Database Technology 2013" InformationWeek April 2013

Future directions

- Internal polyglot support
- Multi-model systems
- Google F1-inspired systems
 - “Can you have a scalable database without going NoSQL? Yes.”
- Further support for NoSQL in Relational
- DBaaS
- Orchestrate.io
 - “The Next Big Thing”?

Contact details




Find me on ...

 <http://www.linkedin.com/in/akmalchaudhri>

 <http://twitter.com/akmalchaudhri>

 <http://www.quora.com/Akmal-Chaudhri>

 <http://www.facebook.com/akmal.chaudhri>

 [http://plus.google.com/
105126255575427189842/](http://plus.google.com/105126255575427189842/)

 <http://www.slideshare.net/VeryFatBoy/>

 <http://www.youtube.com/VeryFatBoyVideos/>



Akmal B. Chaudhri
firstname.lastname@live.com




```
{"thank": "You"}
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Resources



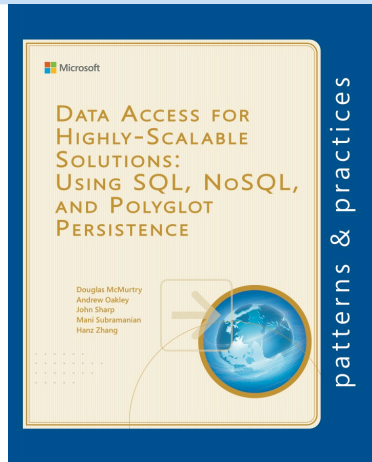
History

- First NoSQL meetup
 - <http://nosql.eventbrite.com/>
 - <http://blog.oskarsson.nu/post/22996139456/nosql-meetup>
- First NoSQL meetup debrief
 - <http://blog.oskarsson.nu/post/22996140866/nosql-debrief>
- First NoSQL meetup photographs
 - <http://www.flickr.com/photos/russss/sets/72157619711038897/>

Web sites

- NoSQL Databases and Polyglot Persistence: A Curated Guide
 - <http://nosql.mypopescu.com/>
- NoSQL: Your Ultimate Guide to the Non-Relational Universe!
 - <http://nosql-database.org/>

Free books ...



- Data Access for Highly-Scalable Solutions: Using SQL, NoSQL, and Polyglot Persistence
 - <http://www.microsoft.com/en-us/download/details.aspx?id=40327>

Free books ...

The Little MongoDB Book
by Karl Seguin

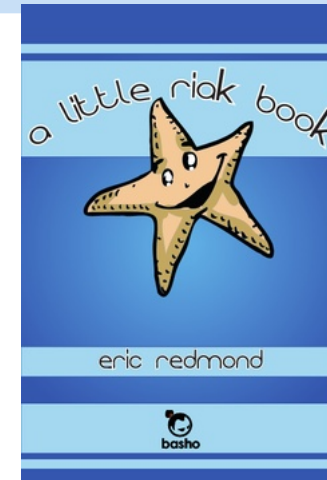
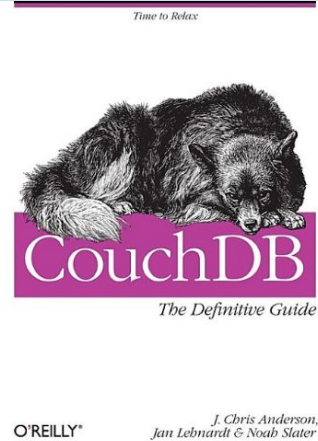


The Little Redis Book
by Karl Seguin



- The Little MongoDB Book
 - <http://openmymind.net/2011/3/28/The-Little-MongoDB-Book/>
- The Little Redis Book
 - <http://openmymind.net/2012/1/23/The-Little-Redis-Book/>

Free books ...



- CouchDB: The Definitive Guide
 - <http://guide.couchdb.org/>
- A Little Riak Book
 - <http://littleriakbook.com>

Free books



DATADOG

- Understanding The Top 5 Redis Performance Metrics
 - <http://info.datadoghq.com/top-5-redis-performance-metrics-ebook>

Free training



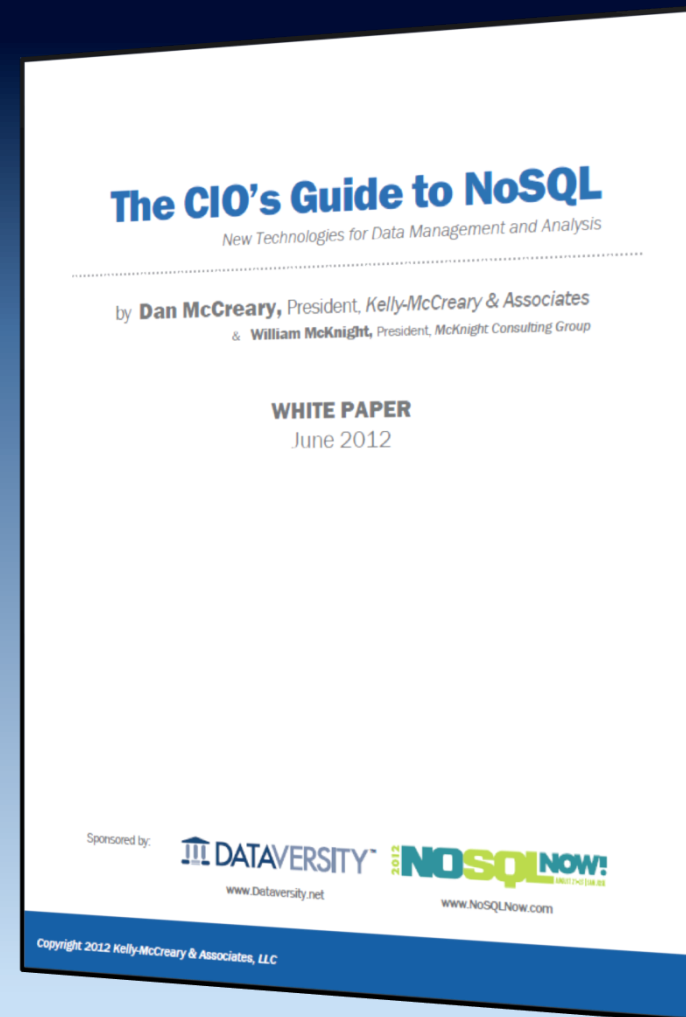
- Free courses on MongoDB
 - <https://education.mongodb.com/>
- Free courses on Cassandra
 - <https://datastaxacademy.elogiclearning.com/>

Articles and reports

- Saying Yes to NoSQL
 - http://www.nofluffjuststuff.com/s/magazine/NFJS_theMagazine_Vol3_Issue3_May2011.pdf
- The State of NoSQL
 - <http://www.infoq.com/articles/State-of-NoSQL/>
- D. Feinberg, M. Adrian and N. Heudecker (2013) Magic Quadrant for Operational Database Management Systems, *Gartner*, ID:G00251780, 21 October 2013
 - <http://www.aerospike.com/only-visionary-in-gartner-mq-2013/>

White papers

- The CIO's Guide to NoSQL
 - <http://documents.dataversity.net/whitepapers/the-cios-guide-to-nosql.html>



Product selection ...

- 101 Questions to Ask When Considering a NoSQL Database
 - <http://highscalability.com/blog/2011/6/15/101-questions-to-ask-when-considering-a-nosql-database.html>
- 35+ Use Cases for Choosing Your Next NoSQL Database
 - <http://highscalability.com/blog/2011/6/20/35-use-cases-for-choosing-your-next-nosql-database.html>

Product selection

- NoSQL Options Compared: Different Horses for Different Courses
 - <http://www.slideshare.net/tazija/nosql-options-compared/>
- NoSQL Data Modeling Techniques
 - <http://highlyscalable.wordpress.com/2012/03/01/nosql-data-modeling-techniques/>
- Choosing a NoSQL data store according to your data set
 - <http://00f.net/2010/05/15/choosing-a-nosql-data-store-according-to-your-data-set/>

Short product overviews ...

- Picking the Right NoSQL Database Tool
 - <http://blog.monitis.com/index.php/2011/05/22/picking-the-right-nosql-database-tool/>
- NoSQL Databases -- A Look at Apache Cassandra
 - <http://blog.monitis.com/index.php/2011/05/24/nosql-databases-a-look-at-apache-cassandra/>
- The NoSQL Databases -- A Look at HBase
 - <http://blog.monitis.com/index.php/2011/05/31/the-nosql-databases-a-look-at-hbase/>

Short product overviews ...

- A Look at Some NoSQL Databases -- MongoDB, Redis and Basho Riak
 - <http://blog.monitis.com/index.php/2011/06/06/a-look-at-some-nosql-databases-mongodb-redis-and-basho-riak/>
- Picking the Right NoSQL Database, Part 4 -- CouchDB and Membase
 - <http://blog.monitis.com/index.php/2011/06/17/picking-the-right-nosql-database-part-4-couchdb-and-membase/>

Short product overviews

- Cassandra vs MongoDB vs CouchDB vs Redis vs Riak vs HBase vs Couchbase vs Neo4j vs Hypertable vs Elasticsearch vs Accumulo vs VoltDB vs Scalaris comparison
 - <http://kkovacs.eu/cassandra-vs-mongodb-vs-couchdb-vs-redis/>
- vsChart.com
 - <http://vschart.com/list/database/>

Case studies ...

- Real World NoSQL: HBase at Trend Micro
 - <http://gigaom.com/cloud/real-world-nosql-hbase-at-trend-micro/>
- Real World NoSQL: MongoDB at Shutterfly
 - <http://gigaom.com/cloud/real-world-nosql-mongodb-at-shutterfly/>
- Real World NoSQL: Cassandra at Openwave
 - <http://gigaom.com/cloud/realworld-nosql-cassandra-at-openwave/>

Case studies

- Real World NoSQL: Amazon SimpleDB at Netflix
 - <http://gigaom.com/cloud/real-world-nosql-amazon-simplydb-at-netflix/>
- Real World NoSQL: Membase at Tribal Crossing
 - <http://gigaom.com/cloud/real-world-nosql-membase-at-tribal-crossing/>
- How Disney built a big data platform on a startup budget
 - <http://gigaom.com/data/how-disney-built-a-big-data-platform-on-a-startup-budget/>

Negative NoSQL comments ...

- MongoDB is to NoSQL like MySQL to SQL -- in the most harmful way
 - <http://use-the-index-luke.com/blog/2013-10/mysql-is-to-sql-like-mongodb-to-nosql>
- The Genius and Folly of MongoDB
 - <http://nyeggen.com/blog/2013/10/18/the-genius-and-folly-of-mongodb/>
- Why You Should Never Use MongoDB
 - <http://www.sarahmei.com/blog/2013/11/11/why-you-should-never-use-mongodb/>

Negative NoSQL comments ...

- Scaling with MongoDB
 - http://opensourcebridge.org/wiki/2011/Scaling_with_MongoDB
 - <https://speakerdeck.com/robotadam/postgres-at-urban-airship/>
- A Year with MongoDB
 - <http://blog.engineering.kiip.me/post/20988881092/a-year-with-mongodb/>
 - <https://speakerdeck.com/mitsuhiko/a-year-of-mongodb/>

Negative NoSQL comments ...

- Why MongoDB Never Worked Out at Etsy
 - <http://mcfunley.com/why-mongodb-never-worked-out-at-etsy/>
- Goodbye, CouchDB
 - <http://sauceio.com/index.php/2012/05/goodbye-couchdb/>
- Don't use NoSQL
 - <https://speakerdeck.com/roidrage/dont-use-nosql/>
 - <http://vimeo.com/49713827/>

Negative NoSQL comments ...

- Do Developers Use NoSQL Because They're Too Lazy to Use RDBMS Correctly?
 - <http://architects.dzone.com/articles/do-developers-use-nosql/>
 - <http://gaiustech.wordpress.com/2013/04/13/mongodbdays/>
- The parallels between NoSQL and self-inflicted torture
 - <http://www.parelastic.com/blog/parallels-between-nosql-and-self-inflicted-torture/>

Negative NoSQL comments

- 7 hard truths about the NoSQL revolution
 - <http://www.infoworld.com/d/data-management/7-hard-truths-about-the-nosql-revolution-197493>
- Google goes back to the future with SQL F1 database
 - http://www.theregister.co.uk/2013/08/30/google_f1_deepdive/

Security ...

- Abusing NoSQL Databases
 - <https://www.defcon.org/images/defcon-21/dc-21-presentations/Chow/DEFCON-21-Chow-Abusing-NoSQL-Databases.pdf>
- NoSQL, no security?
 - <http://www.slideshare.net/wurbanski/nosql-no-security/>
- NoSQL, No Injection!?
 - http://www.slideshare.net/wayne_armorize/nosql-no-sql-injections-4880169/

Security ...

- NoSQL, But Even Less Security
 - <http://blogs.adobe.com/asset/files/2011/04/NoSQL-But-Even-Less-Security.pdf>
- NoSQL Database Security
 - [http://conference.auscert.org.au/conf2011/presentations/Louis Nyffenegger V1.pdf](http://conference.auscert.org.au/conf2011/presentations/Louis%20Nyffenegger%20V1.pdf)
- Does NoSQL Mean No Security?
 - <http://www.darkreading.com/database-security/167901020/security/news/232400214/does-nosql-mean-no-security.html>

Security

- A Response To NoSQL Security Concerns
 - <http://www.darkreading.com/blog/232600288/a-response-to-nosql-security-concerns.html>
- MongoDB - Security Weaknesses in a typical NoSQL database
 - <http://blog.spiderlabs.com/2013/03/mongodb-security-weaknesses-in-a-typical-nosql-database.html>
- Attacking MongoDB
 - <http://www.slideshare.net/cyber-punk/mongo-db-eng/>

Polyglot persistence ...

- Polyglot Persistence
 - <http://www.slideshare.net/jwoodslideshare/polyglot-persistence-two-great-tastes-that-taste-great-together-4625004/>
- HBase at Mendeley
 - <http://www.slideshare.net/danharvey/hbase-at-mendeley/>
- Polyglot Persistence Patterns
 - <http://abhishek-tiwari.com/post/polyglot-persistence-patterns/>

Polyglot persistence

- Polyglot Persistence: EclipseLink with MongoDB and Derby
 - <http://java.dzone.com/articles/polyglot-persistence-0/>
- D. Ghosh (2010) Multiparadigm data storage for enterprise applications. *IEEE Software*. Vol. 27, No. 5, pp. 57-60

Performance benchmarks ...

- Yahoo Cloud Serving Benchmark
 - <http://research.yahoo.com/node/3202/>
 - <http://altoros.com/nosql-research>
 - <http://www.slideshare.net/tazija/evaluating-nosql-performance-time-for-benchmarking/>
- Benchmarking Couchbase Server
 - <http://www.slideshare.net/Couchbase/t1-s4-couchbase-performancebenchmarkingv34/>

Performance benchmarks ...

- Ultra-High Performance NoSQL Benchmarking
 - <http://thumbtack.net/solutions/ThumbtackWhitePaper.html>
- Benchmarking Top NoSQL Databases
 - <http://www.datastax.com/resources/whitepapers/benchmarking-top-nosql-databases>
- Comparing NoSQL Data Stores
 - http://www.quantschool.com/home/programming-2/comparing_inmemory_data_stores

Performance benchmarks ...

- MongoDB Performance Pitfalls -- Behind The Scenes
 - <http://blog.trackerbird.com/content/mongodb-performance-pitfalls-behind-the-scenes/>
- MySQL vs. MongoDB Disk Space Usage
 - <http://blog.trackerbird.com/content/mysql-vs-mongodb-disk-space-usage/>
- MongoDB: Scaling write performance
 - <http://www.slideshare.net/daumdna/mongodb-scaling-write-performance/>

Performance benchmarks ...

- Can the Elephants Handle the NoSQL Onslaught?
 - http://vldb.org/pvldb/vol5/p1712_avriliafloratou_vldb2012.pdf
- Solving Big Data Challenges for Enterprise Application Performance Management
 - http://vldb.org/pvldb/vol5/p1724_tilmannrabi_vldb2012.pdf
- NoSQL RDF
 - <http://ribs.csres.utexas.edu/nosqlrdf/index.php>

Performance benchmarks

- Benchmarking Graph Databases
 - <http://istc-bigdata.org/index.php/benchmarking-graph-databases/>
- Benchmarking Graph Databases -- Updates
 - <http://istc-bigdata.org/index.php/benchmarking-graph-databases-updates/>
- Linked Data Benchmark Council
 - <http://ldbc.eu/>

Stress testing

- Jepsen
 - <http://www.aphyr.com/tags/jepsen>
- Jepsen: Testing the Partition Tolerance of PostgreSQL, Redis, MongoDB and Riak
 - <http://www.infoq.com/articles/jepsen/>
- The Man Who Tortures Databases
 - <http://www.informationweek.com/software/information-management/the-man-who-tortures-databases/240160850/>

BI/Analytics

- BI/Analytics on NoSQL: Review of Architectures Part 1
 - <http://www.dataversity.net/bianalytics-on-nosql-review-of-architectures-part-1/>
- BI/Analytics on NoSQL: Review of Architectures Part 2
 - <http://www.dataversity.net/bianalytics-on-nosql-review-of-architectures-part-2/>

Various graphics ...

- NoSQL LinkedIn Skills Index -- September 2013
 - http://blogs.the451group.com/information_management/2013/10/01/nosql-linkedin-skills-index-september-2013/
- Updated Database Landscape map -- June 2013
 - http://blogs.the451group.com/information_management/2013/06/10/updated-database-landscape-map-june-2013/

Various graphics ...

- Necessity is the mother of NoSQL
 - http://blogs.the451group.com/information_management/2011/04/20/necessity-is-the-mother-of-nosql/
- Making Sense of Big Data
 - <http://www.slideshare.net/infochimps/making-sense-of-big-data/>
- NoSQL, Heroku, and You
 - <https://blog.heroku.com/archives/2010/7/20/nosql/>

Various graphics

- The NoSQL vs. SQL hoopla, another turn of the screw!
 - <http://www.parelastic.com/blog/nosql-vs-sql-hoopla-another-turn-screw/>
- Navigating the Database Universe
 - <http://www.slideshare.net/lisapaglia/navigating-the-database-universe/>

Discussion fora

- LinkedIn NoSQL
 - <http://www.linkedin.com/groups?gid=2085042>
- LinkedIn NewSQL
 - <http://www.linkedin.com/groups/NewSQL-4135938>
- Google groups
 - <http://groups.google.com/group/nosql-discussion>
- Quora
 - <https://www.quora.com/NoSQL/>

London meetup groups ...

- Cassandra
 - <http://www.meetup.com/Cassandra-London/>
- Couchbase
 - <http://www.meetup.com/Couchbase-London/>
- MongoDB
 - <http://www.meetup.com/London-MongoDB-User-Group/>
- Neo4j
 - <http://www.meetup.com/graphdb-london/>

London meetup groups

- Redis
 - <http://www.meetup.com/Redis-London/>
- Riak
 - <http://www.meetup.com/riak-london/>

NoSQL jokes/humour ...

- LinkedIn discussion thread
 - <http://www.linkedin.com/groups/NoSQL-Jokes-Humour-2085042.S.177321213>
- NoSQL Better Than MySQL?
 - <http://www.youtube.com/watch?v=QU34ZVD2yIY>
 - Shorter version of “Episode 1 - MongoDB is Web Scale”
- say No! No! and No! (=NoSQL Parody)
 - <http://www.youtube.com/watch?v=fXc-QDJBXpw>

NoSQL jokes/humour

- When someone brags about scaling MongoDB to a whopping 100GB
 - <http://dbareactions.tumblr.com/post/62989609976/when-someone-brags-about-scaling-mongodb-to-a>
- C.R.U.D.
 - <http://crudcomic.tumblr.com/>
- Twitter
 - @mongodbfacts
 - @BigDataBorat

Miscellaneous ...

- PowerPoint template
 - <http://www.articulate.com/rapid-elearning/heres-a-free-powerpoint-template-how-i-made-it/>
- Autostereogram
 - http://www.all-freeware.com/images/full/46590-free_stereogram_screensaver_audio___multimedia_othr.jpeg
- Theatre Curtain Animations
 - <http://www.slideshare.net/chinateacher1/theater-curtain-animations/>

Miscellaneous ...

- Bar and Column charts
 - <http://www.diychart.com/>
- Newspaper headlines
 - <http://www.imagechef.com/ic/make.jsp?tid=Newspaper+Headline>
- Pie charts
 - <http://www.onlinecharttool.com/>

Miscellaneous

- Icons and images
 - <http://www.geekpedia.com/icons.php>
 - <http://cemagraphics.deviantart.com/>
 - <http://www.freestockphotos.biz/>
 - <http://www.graphicsfuel.com/2011/09/comments-speech-bubble-icon-psd/>
 - <http://icondock.com/>