



Couchbase

START A REVOLUTION

I HAVE A NOSQL TOASTER

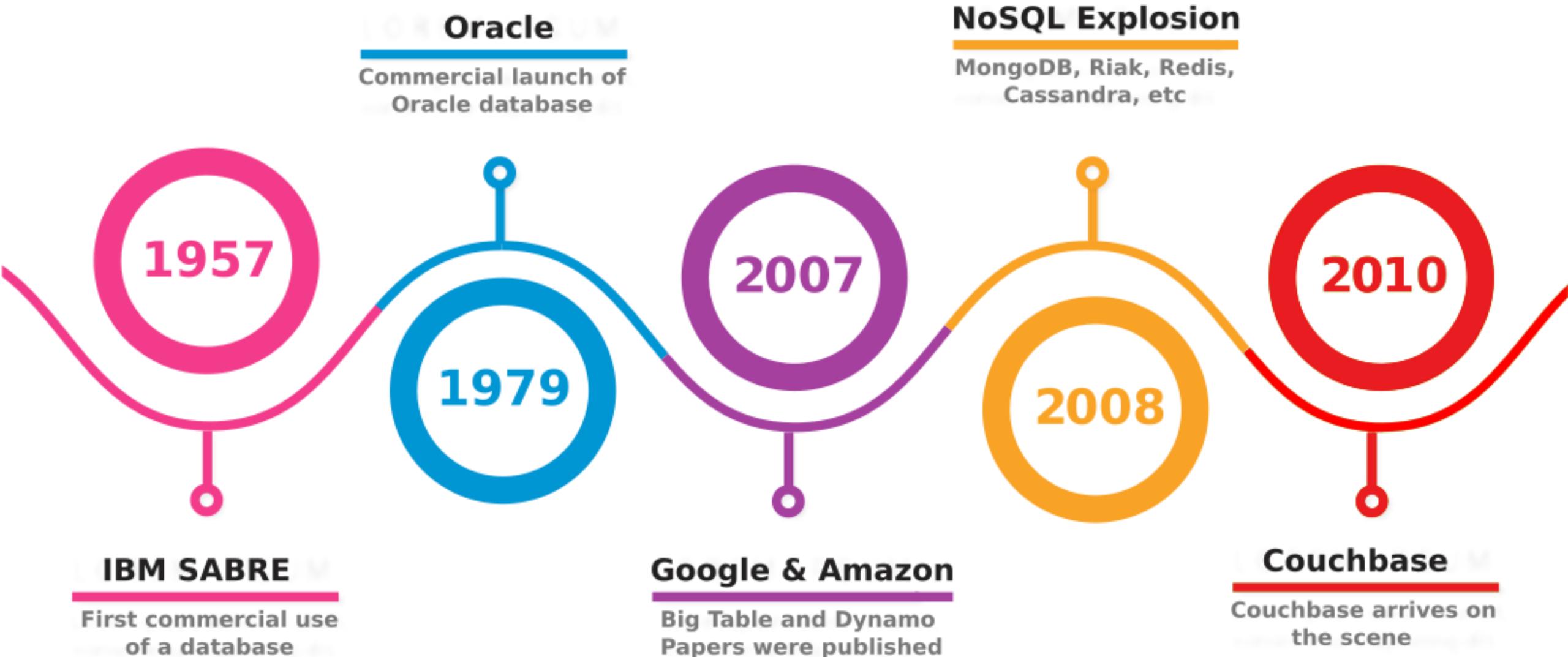
An overview of NoSQL

Denis Rosa

Developer Advocate



Database's History



NoSQL isn't a very useful term

Are they easy for development?



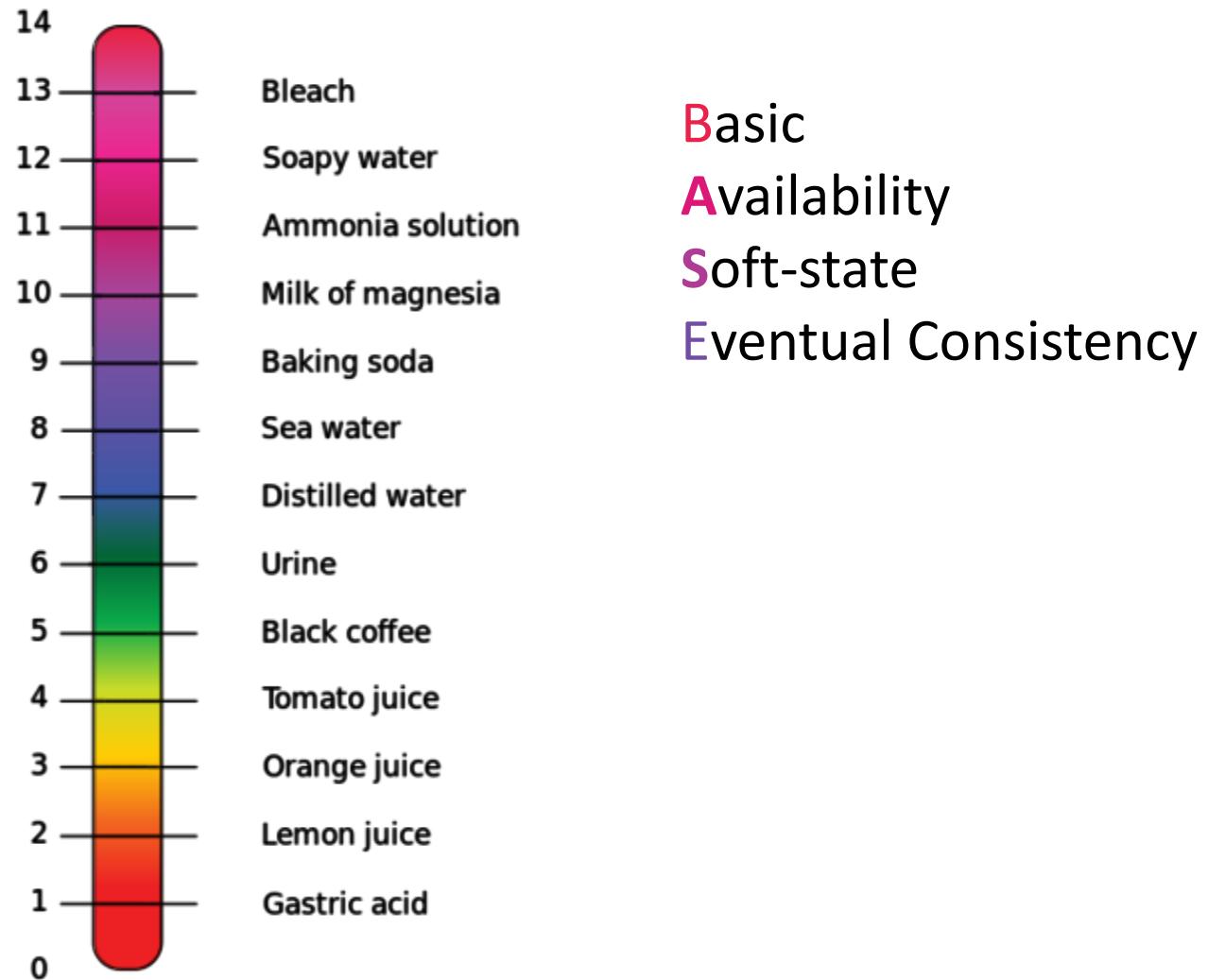
Are they scalable?





ACID x BASE

A
tomic
C
onsistent
I
solated
D
urable



Basic
Availability
Soft-state
Eventual Consistency

Commodity Hardware



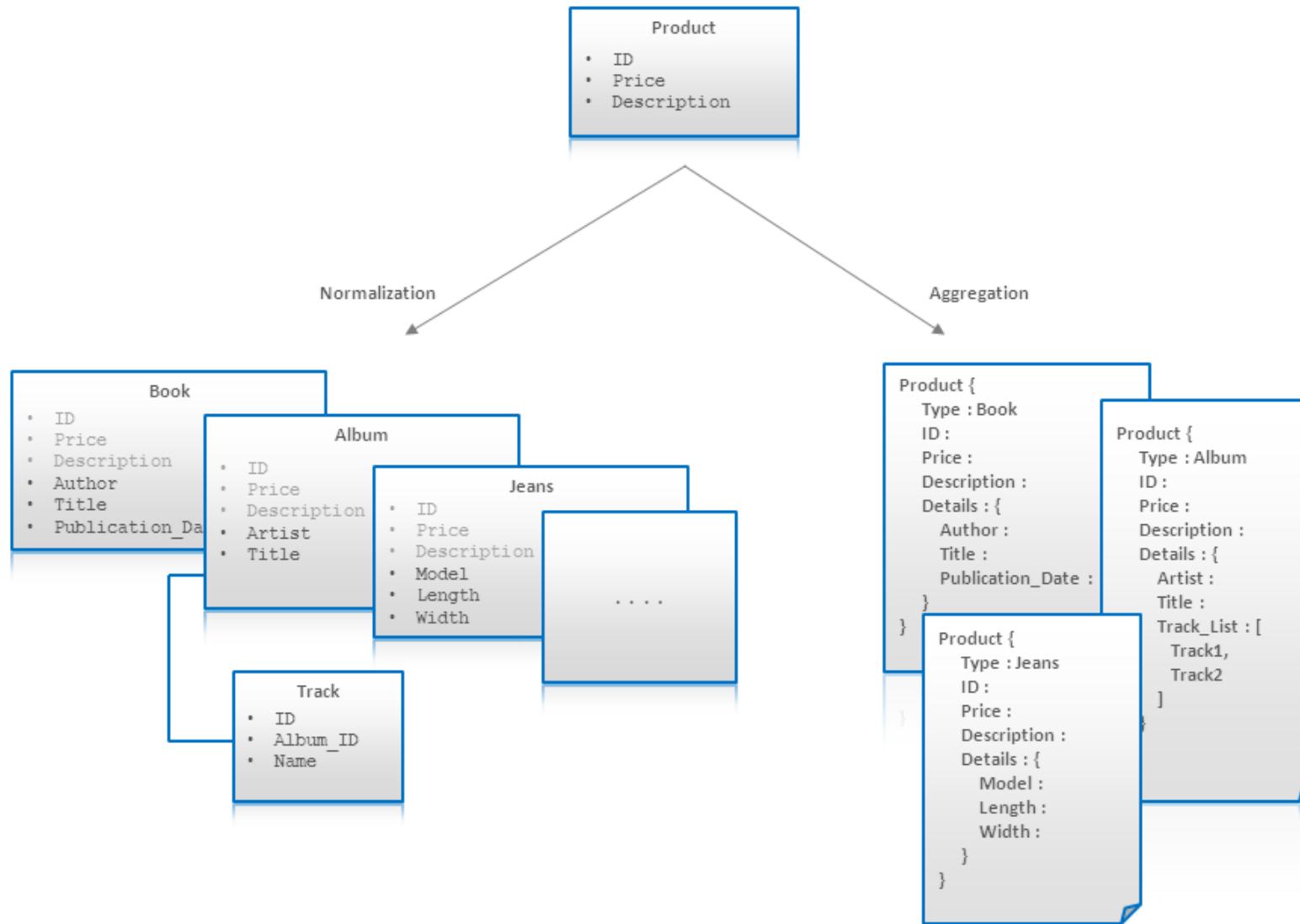


Schema Schemaless





Normalized Denormalized



Why NoSQL?





Round pegs, square holes





Round pegs, square holes

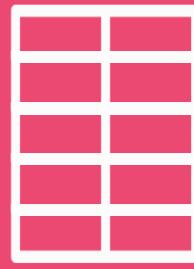




Types of NoSQL Databases



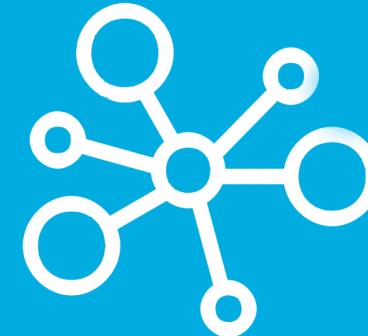
DOCUMENT



KEY-VALUE

1			1
1		1	
1	1		
			1
1			1
1		1	
	1		1
			1

COLUMNAR



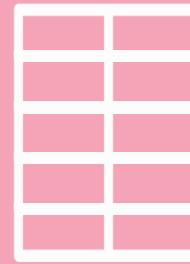
GRAPH



Types of NoSQL Databases



DOCUMENT



KEY-VALUE

1			1
1		1	1
1	1		
1			1
1		1	1
1	1		
		1	1
		1	1

COLUMNAR



GRAPH

Document Databases



Couchbase



RethinkDB



Document Databases Formats

~~XML~~

JSON

BSON



Document

```
{  
  "name": "Denis Rosa",  
  "employer": "Couchbase",  
  "email": "denis.rosa@couchbase.com",  
  "social-networks": [  
    {  
      "name": "Twitter", "url": "https://twitter.com/deniswsrosa"  
    },  
    {  
      "name": "LinkedIn", "url": "https://linkedin.com/in/deniswsrosa"  
    }  
  ]  
}
```



Document Databases

The document database understands the format of the document



Document Databases

It can do server-side stuff



- **Buckets**
- **Documents**
- **Views**
- **N1QL**



Database



Rows



Views



SQL



Couchbase

pom.xml

```
<dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-data-couchbase</artifactId>
</dependency>
```

application.properties

```
spring.couchbase.bootstrap-hosts=localhost
spring.couchbase.bucket.name=test
spring.couchbase.bucket.password=couchbase
spring.data.couchbase.auto-index=true
```



Couchbase

pom.xml

```
<dependency>
    <groupId>org.springframework.boot</groupId>
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</dependency>
```

application.properties

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spring.couchbase.bootstrap-hosts=localhost
spring.couchbase.bucket.name=test
spring.couchbase.bucket.password=couchbase
spring.data.couchbase.auto-index=true
```



Entity

```
@Document  
@Data  
@AllArgsConstructor  
@NoArgsConstructor  
public class BusinessUnity {  
  
    @NotNull  
    @Id  
    private String id;  
  
    @NotNull  
    @Field  
    private String name;  
  
    @NotNull  
    @Field  
    private String companyId;  
}
```

Repository

```
@N1qlPrimaryIndexed  
@ViewIndexed(designDoc = "businessUnity")  
public interface BusinessUnityRepository extends  
    CouchbaseRepository<BusinessUnity, String>{  
  
    List<BusinessUnity> findByCompanyId(String companyId);  
}
```



Service

```
@Service
public class BusinessUnityServiceImpl implements BusinessUnityService {

    @Autowired
    private BusinessUnityRepository businessUnityRepository;

    @Override
    public List<BusinessUnity> listByCompany(String companyId) {
        return businessUnityRepository.findByCompanyId(companyId);
    }

    @Override
    public BusinessUnity save(@Valid BusinessUnity businessUnity){
        return businessUnityRepository.save(businessUnity);
    }
}
```

Couchbase N1QL



SQL-like syntax to query data

```
SELECT *  
  FROM tutorial  
 WHERE fname = 'Ian'
```



```
{  
  "results": [  
    {  
      "tutorial": {  
        "age": 56,  
        "children": [  
          {  
            "age": 17,  
            "fname": "Abama",  
            "gender": "m"  
          },  
          {  
            "age": 21,  
            "fname": "Bebama",  
            "gender": "m"  
          }  
        ],  
        "email": "ian@gmail.com",  
        "fname": "Ian",  
        "hobbies": [  
          "golf",  
          "surfing"  
        ]  
      }  
    }  
  ]  
}
```



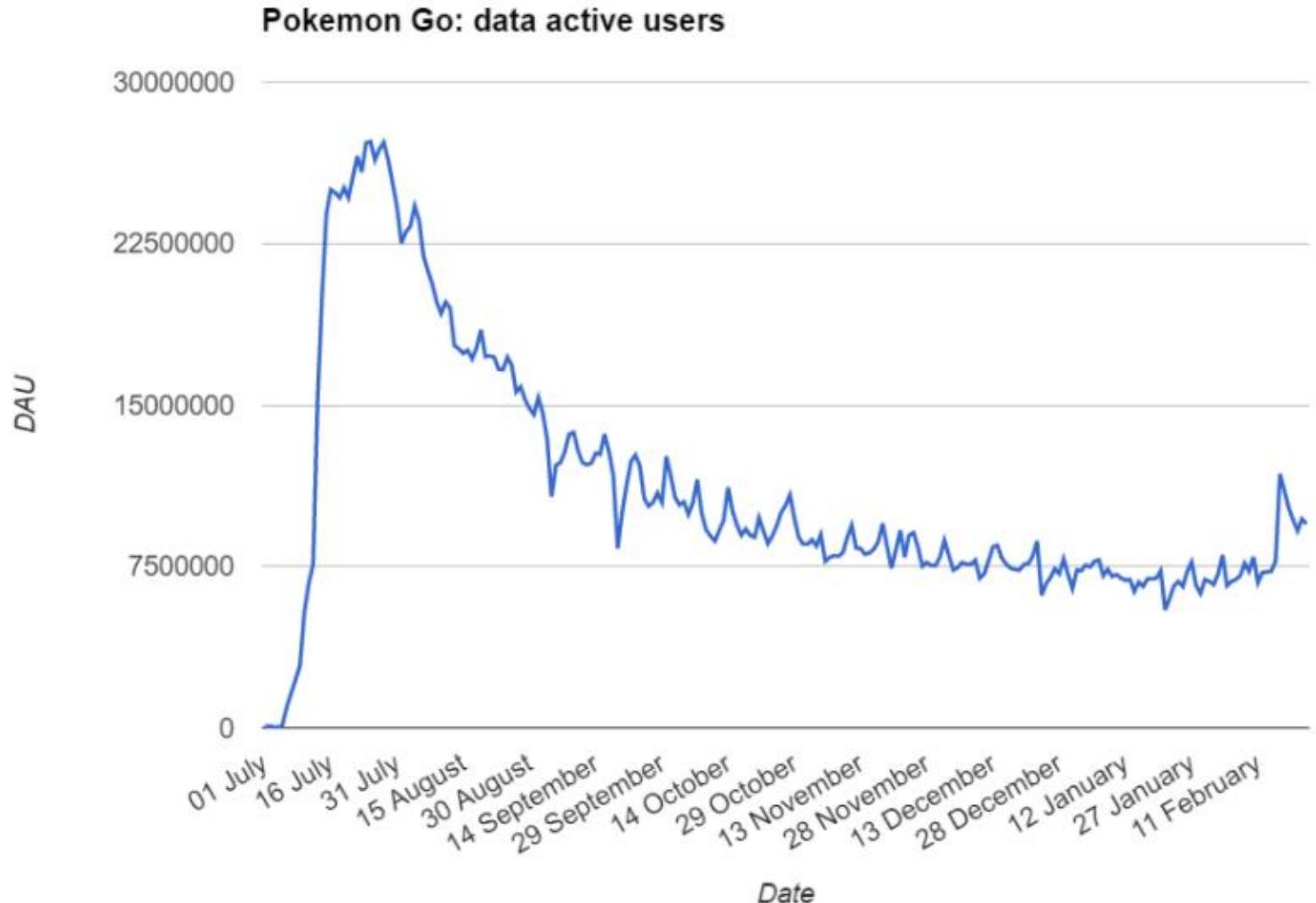
INTERACTIONS

TRANSACTIONS



<https://www.youtube.com/watch?v=MLdWbwQJWI0>

Active Users Growth





Couchbase

- Great for dev
- Scales easily
- Consistently fast



Use Cases for Document Databases

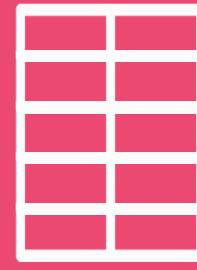
- User profiles
- Session stores
- Content management
- General replacement relation DBs



Types of NoSQL Databases



DOCUMENT



KEY-VALUE

1			1
1		1	1
1	1		
1			1
1		1	1
1	1		
		1	1
		1	1

COLUMNAR



GRAPH



Key-Value Store

Key	Value
K1	AAA,BBB,CCC
K2	AAA,BBB
K3	AAA,DDD
K4	AAA,2,01/01/2015
K5	3,ZZZ,5623



Key-Value Stores



LEVELDB



Couchbase



hazelcast



Key-Value Stores

Distributed Data Stores

In-Memory Caches



Doesn't care what your data is (mostly)

KEY1	{ type: "json" }
KEY2	<data type="xml"></data>
KEY3	Lorem ipsum
...	00100101000100101
KEYN	



Key-value store



- Buckets
- Key-Value Pairs



C# Riak

```
private static void DoStuffWithRiak()
{
    var cluster = RiakCluster.FromConfig("riakConfig");
    var client = cluster.CreateClient();

    var actor = new RiakObject("actors", "James Bond", "Sean Connery");
    client.Put(actor);

    var actorBackOut = client.Get("actors", "James Bond");
    var str = System.Text.Encoding.UTF8.GetString(actorBackOut.Value.Value);
    Console.WriteLine($"Value: {str}");
}
```



Introducing: Eventual Consistency





Introducing: Eventual Consistency

Conflict





There can be only one



So, fix it





Use Cases for K/V

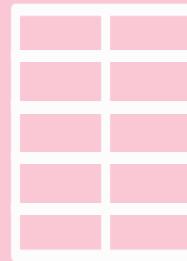
- **Data variability**
- **Object caching**
- **Session storage**
- **Large object storage**



Types of NoSQL Databases



DOCUMENT



KEY-VALUE

1			1
1		1	1
1	1		
			1
1			1
1		1	1
	1		
			1

COLUMNAR



GRAPH



Columnar storage





Columnar storage

Row Store

	NULL	
		NULL
		NULL

Column Store

Columnar storages

APACHE
HBASE



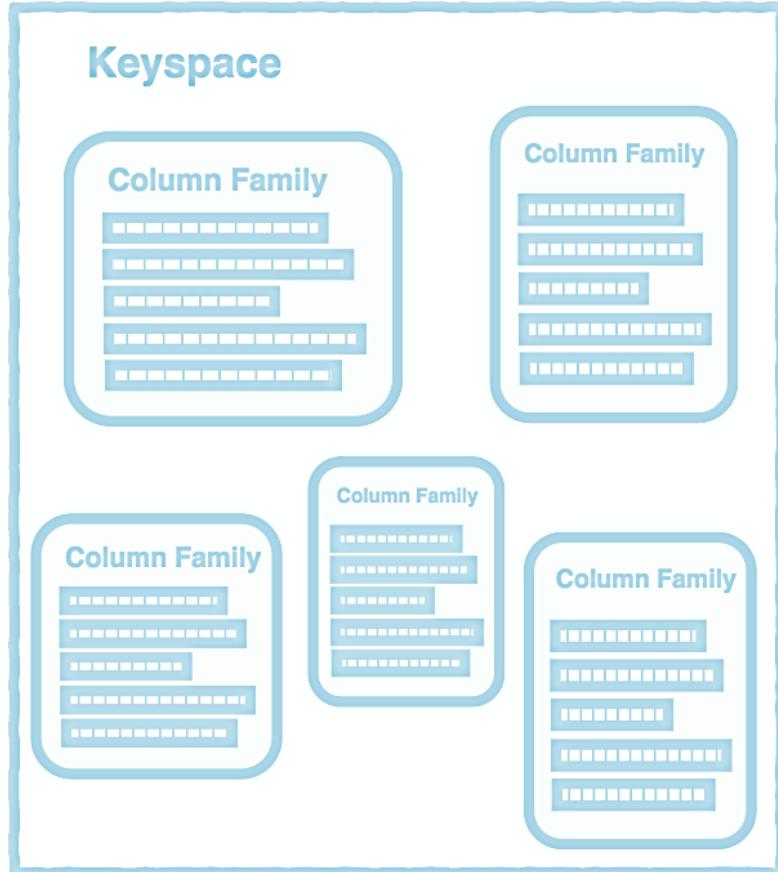
TERADATA.



InfiniDB®

cassandra





- **Keyspaces**
- **Column Families**
- **Rows**
- **Columns**

cassandra



```
CREATE KEYSPACE mykeyspace  
WITH replication = { 'class': 'SimpleStrategy',  
    'replication_factor': '1'};
```

```
CREATE TABLE users (firstname text, lastname text, age int,  
email text, city text, PRIMARY KEY (lastname));
```

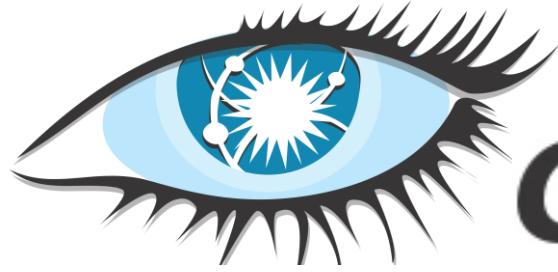
cassandra



```
private static void DoStuffWithDataStax()
{
    var cluster = Cluster.Builder().AddContactPoint("127.0.0.1").Build();
    var session = cluster.Connect("mykeyspace");

    session.Execute("insert into users (lastname, age, city, email, firstname)
                    values ('Jones', 35, 'Austin', 'bob@example.com', 'Bob')");

    var userBackOut = session.Execute("select * from users where
                                      lastname='Jones'").First();
    Console.WriteLine($"{userBackOut["firstname"]} {userBackOut["age"]}");
}
```



- Impedance Mismatch
- Scales well (Ops Headache)
- Suited for Analytics



Use Cases for Columnar

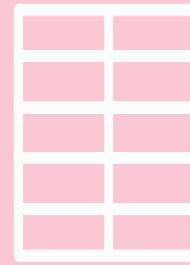
- **Metering Data**
- **Really big data**
- **Analytics**



Types of NoSQL Databases



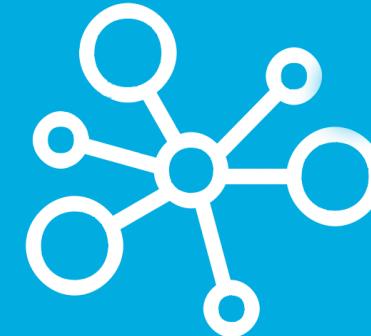
DOCUMENT



KEY-VALUE

1			1
1		1	1
1	1		
1			1
1		1	1
1			1
	1		1
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COLUMNAR

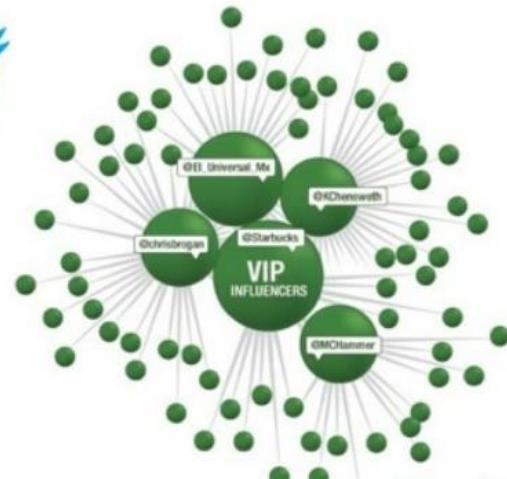
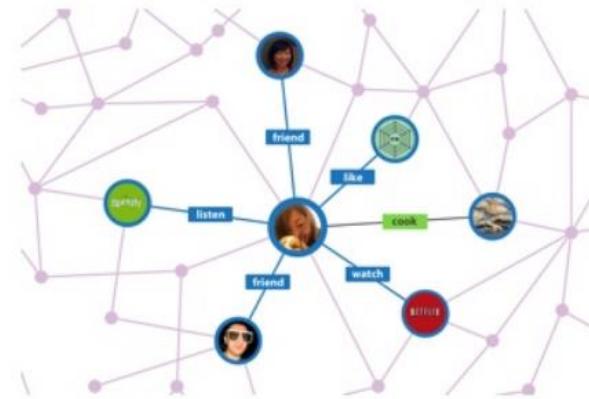


GRAPH

Graphs



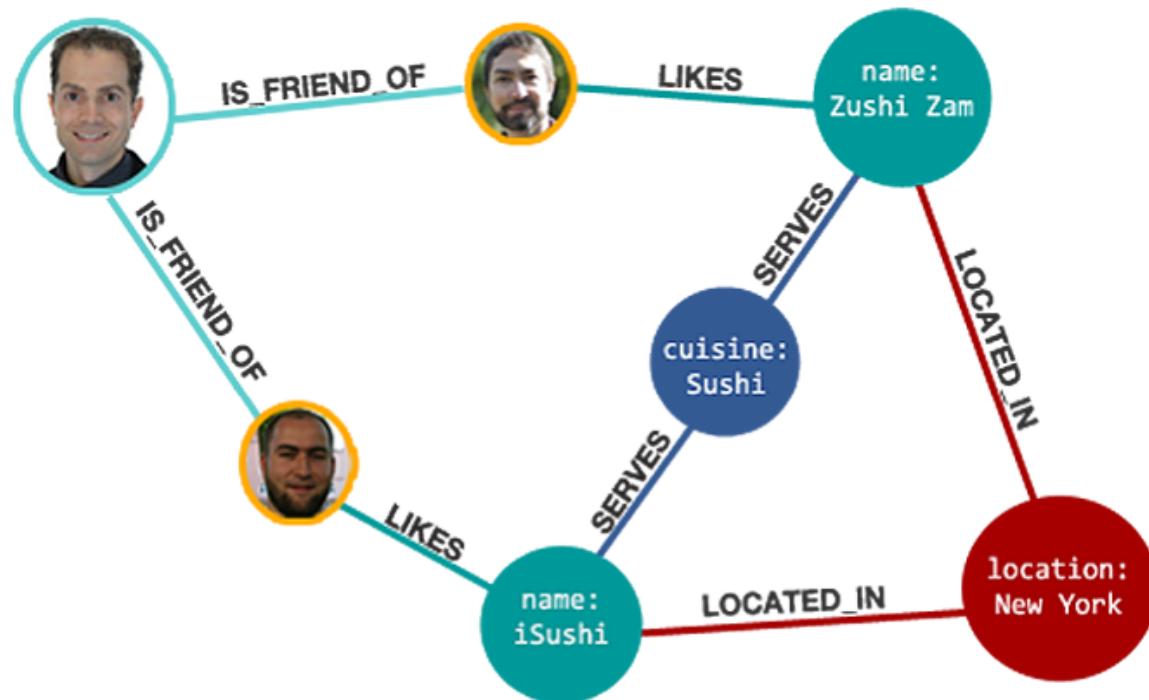
Graph Databases



Google



Graph Databases





Graph Databases

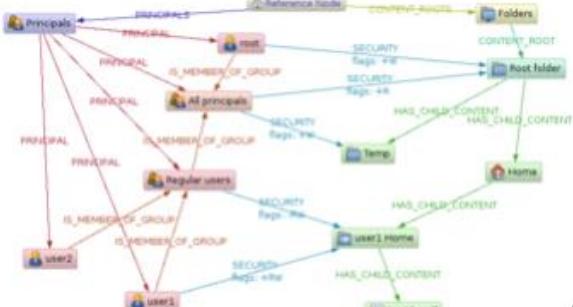


```
MATCH (me:Person)-[:IS_FRIEND_OF]->(friend),  
      (friend)-[:LIKES]->(restaurant),  
      (restaurant)-[:LOCATED_IN]->(city:Location),  
      (restaurant)-[:SERVES]->(cuisine:Cuisine)  
  
WHERE me.name = 'Philip' AND city.location='New York' AND  
cuisine.cuisine='Sushi'  
  
RETURN restaurant.name
```



Use Cases for Graph databases

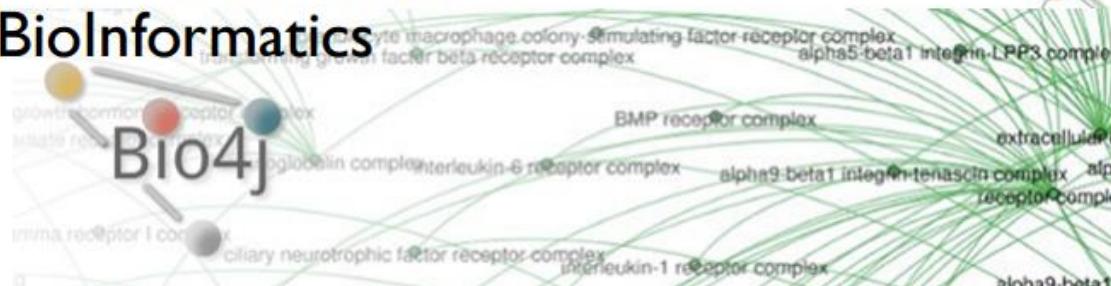
Content Management & Access Control



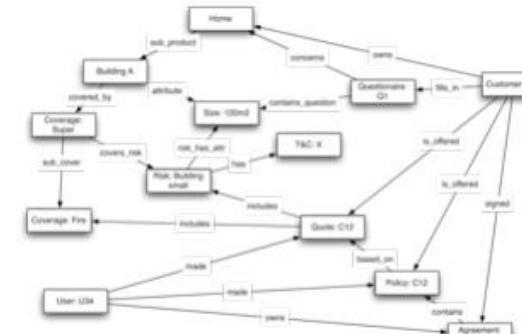
Network Cell Analysis



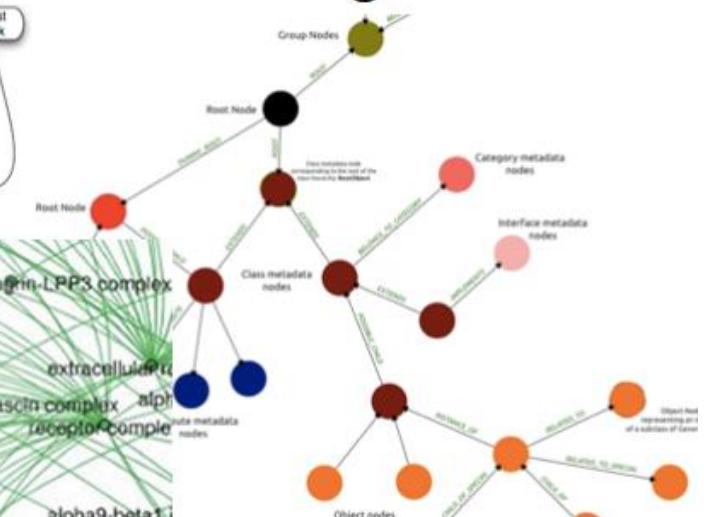
BioInformatics



Insurance Risk Analysis

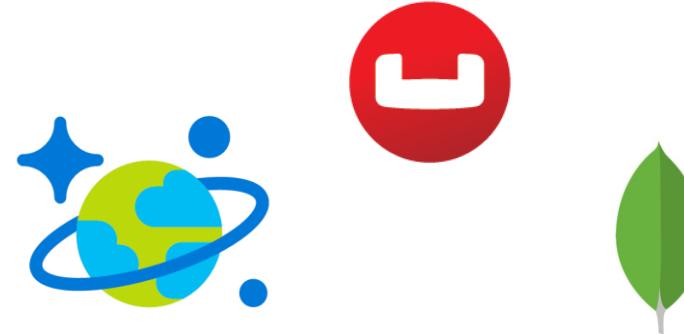
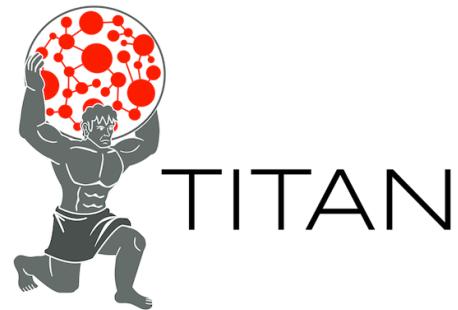


Network Asset Management





Graph Databases





CosmosDB

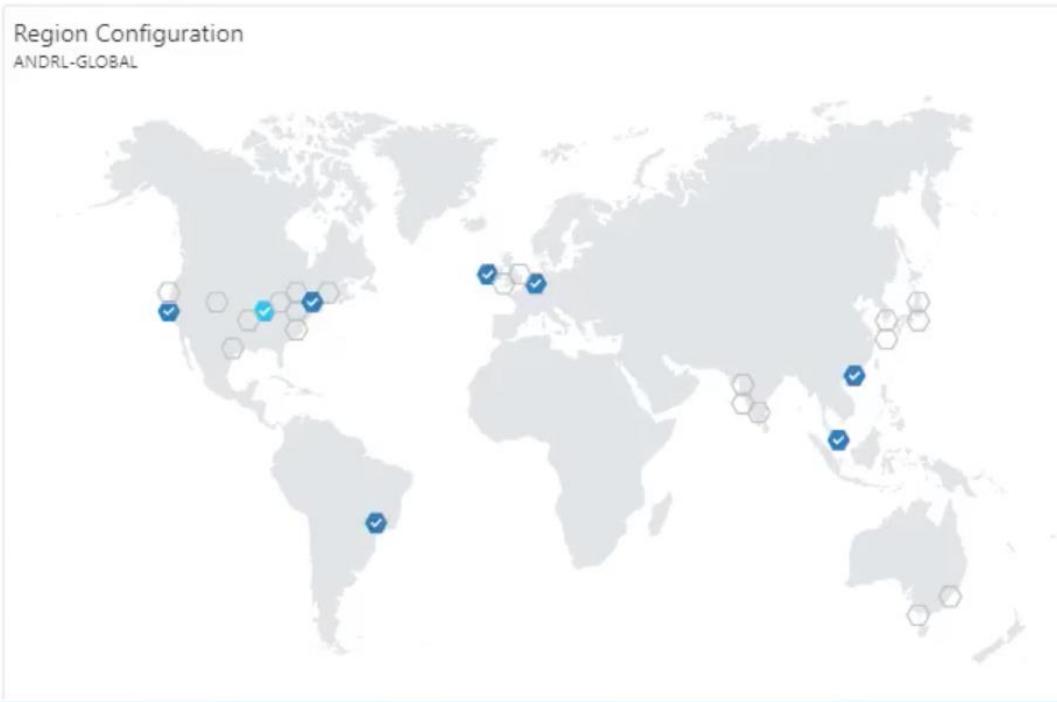
- Key-Value Store ✓
- Document Database
- Columnar Storage
- Graph Database ✓



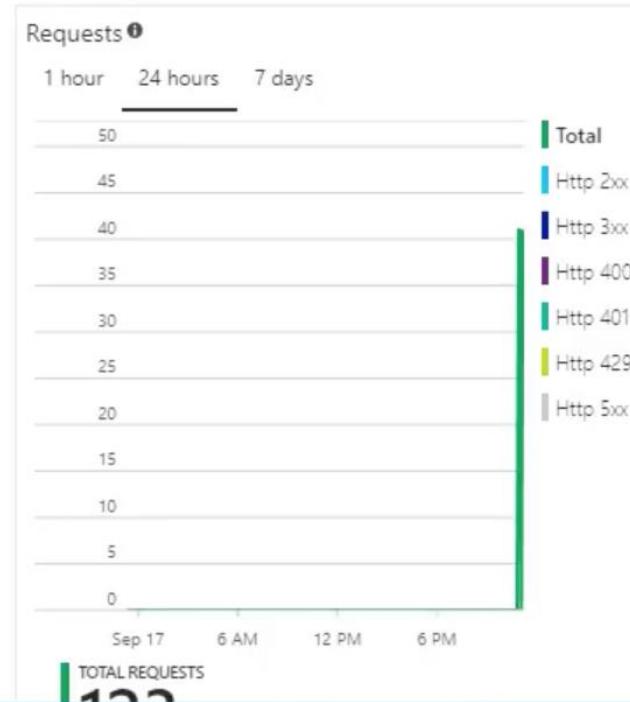
CosmosDB - Global Distribution

* This is NOT your bill. This is an estimated hourly rate for the currently provisioned throughput, and the size of the data stored. The estimate DOES NOT take into account any of the discounts you may be eligible for.

Regions



Monitoring



Storage

ANDRL-GLOBAL

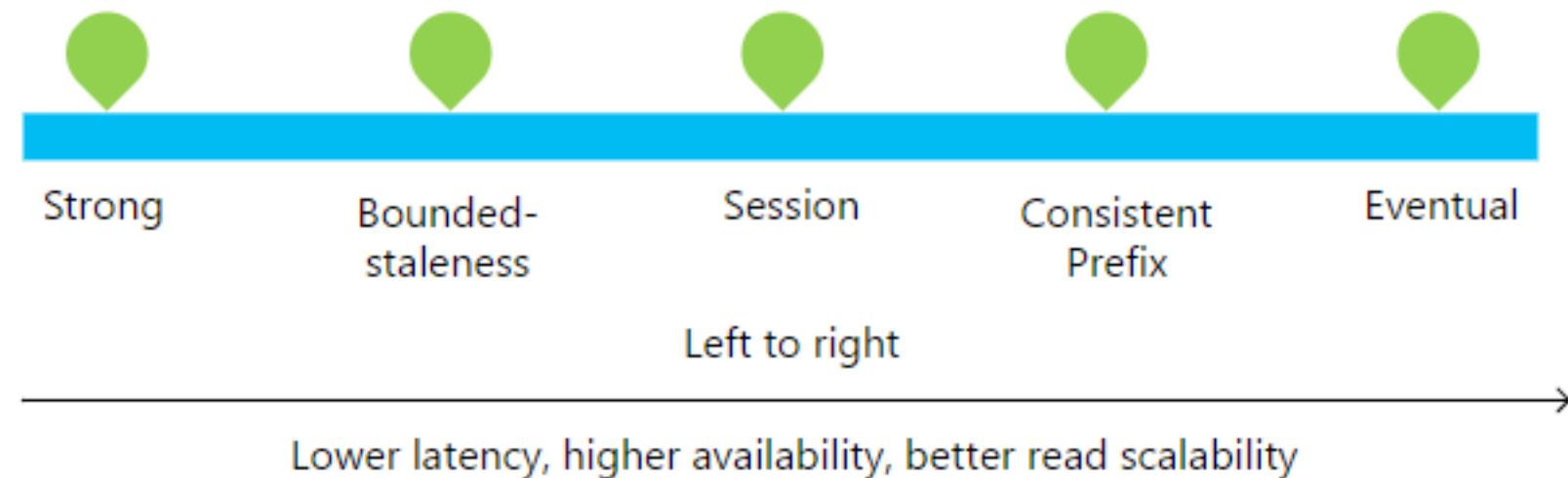


CURRENT
45.616 MiB

THRESHOLD
110 GiB



CosmosDB – Consistency Models





CosmosDB - API

- DocumentDB
- MongoDB
- Cassandra
- TinkerPop



CosmosDB

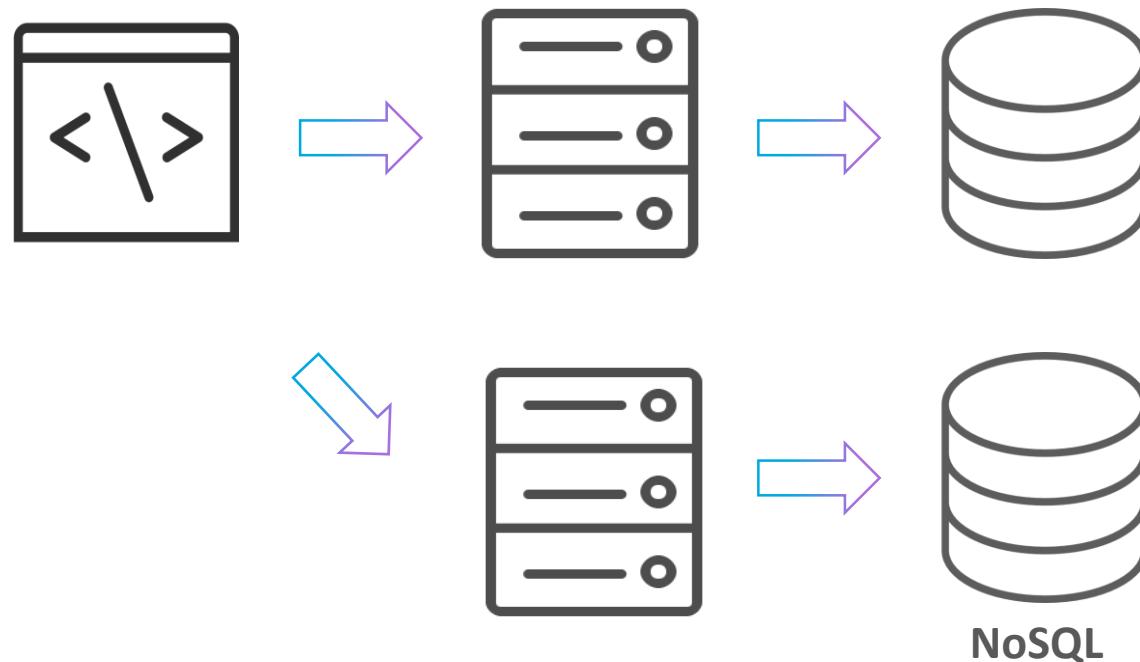


https://www.youtube.com/watch?v=4fRKzcU__jY

Say
What?

Relational
Document
Key/Value
Columnar
Graph
Objects
Others...

Modern Architectures





What to Read Next

blog.couchbase.com

azure.microsoft.com/en-us/services/cosmos-db/

THANK YOU



Couchbase

START A REVOLUTION

Denis Rosa | Senior Developer Advocate

@deniswsrosa

denis.rosa@couchbase.com