



CockroachDB 中国社区大会



CockroachDB 2.1特性介绍及百度实践

大纲

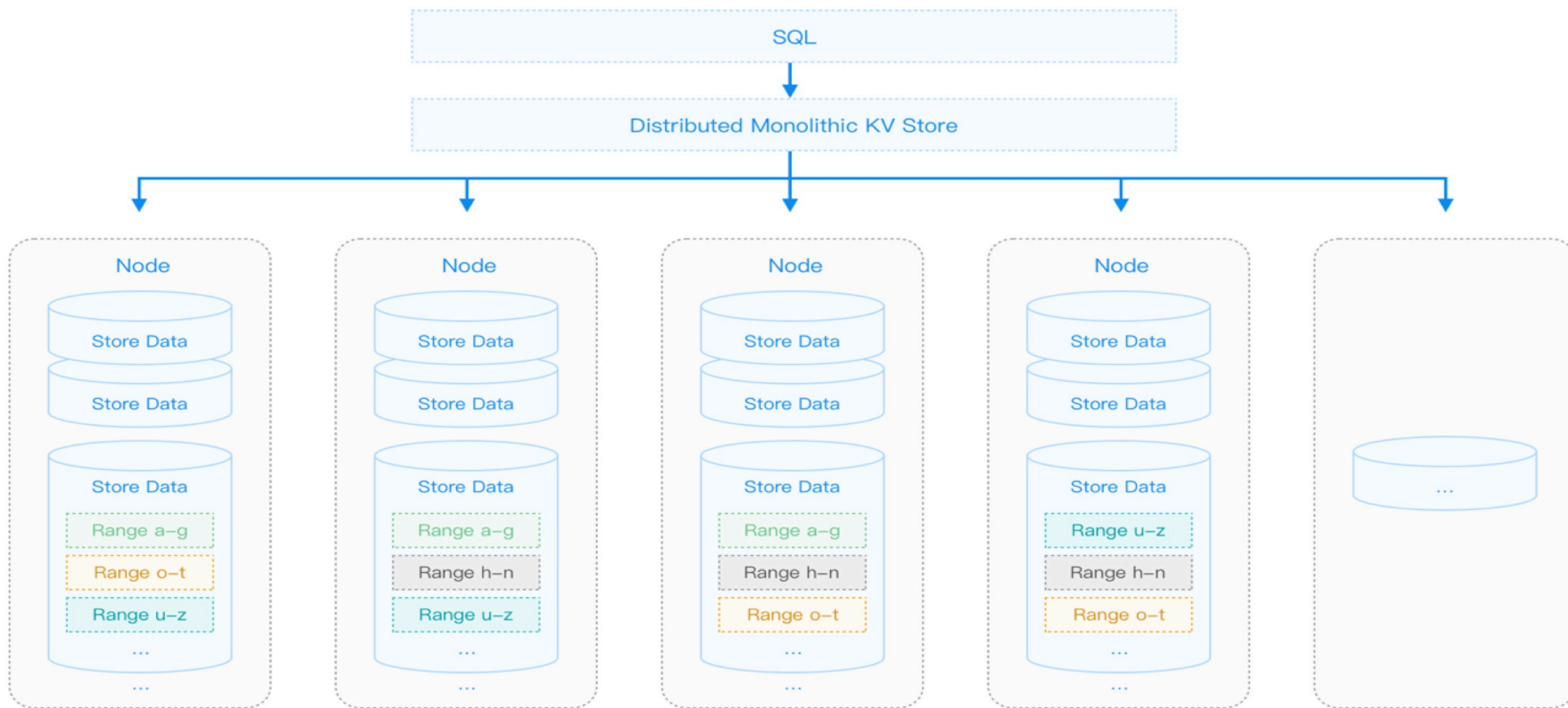
- Cockroach简介
- CockroachDB2.1特性介绍
- 百度CockroachDB实践

PART

01

CockroachDB简介

CockroachDB架构



CockroachDB特性

Multi-Active Availability •

Transaction & SQL •

Simplified Deployment •

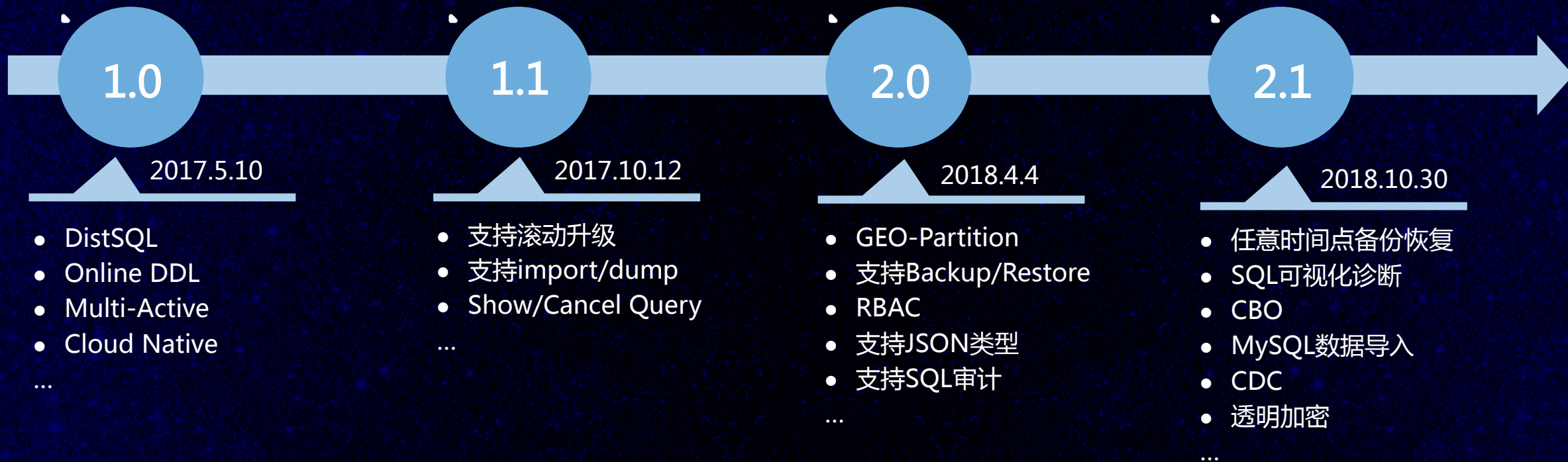
• Automated Scaling & Repair

Strong Consistency •

• High Availability



CockroachDB演进



PART

02

CockroachDB 2.1 特性介绍

Overview

SQL增强



灾备



生态

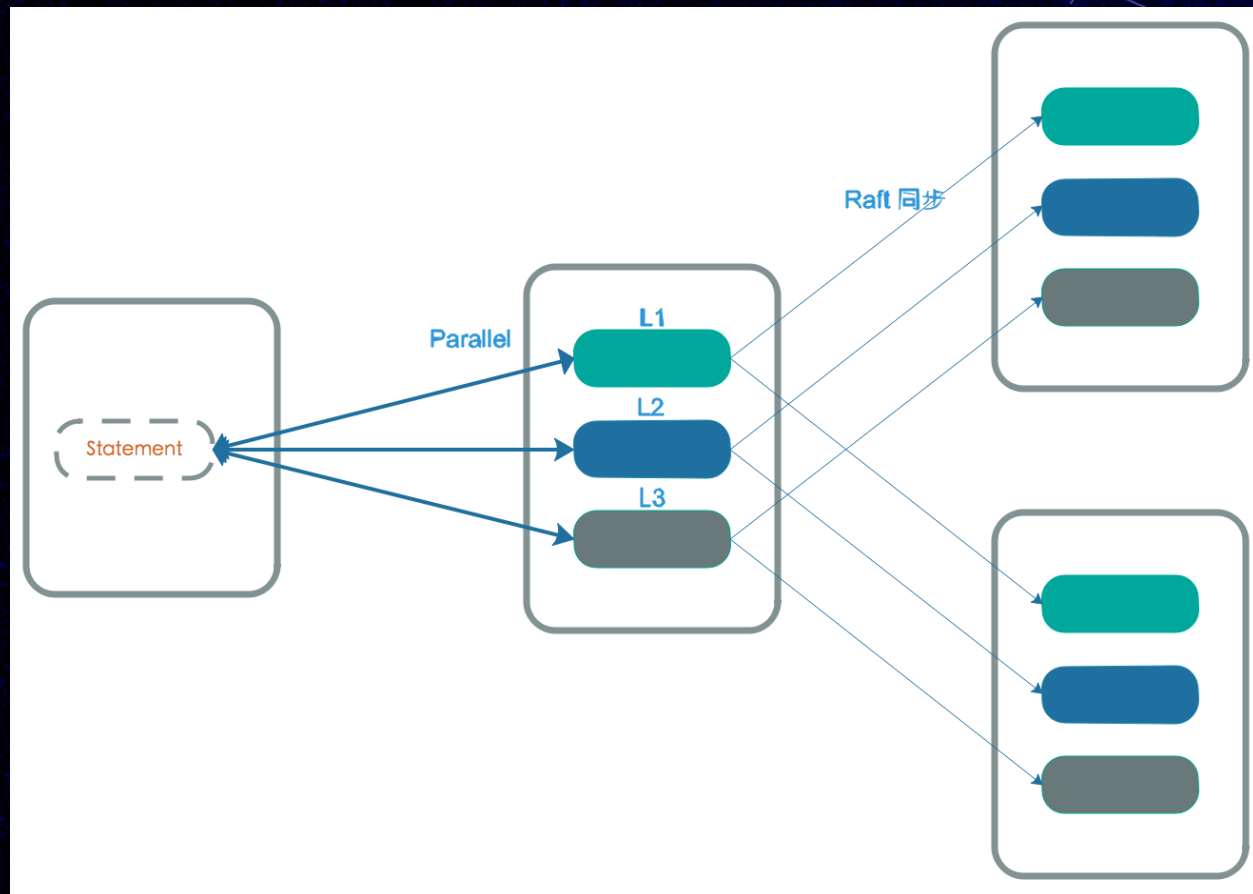


安全

SQL增强——Transaction Pipelining

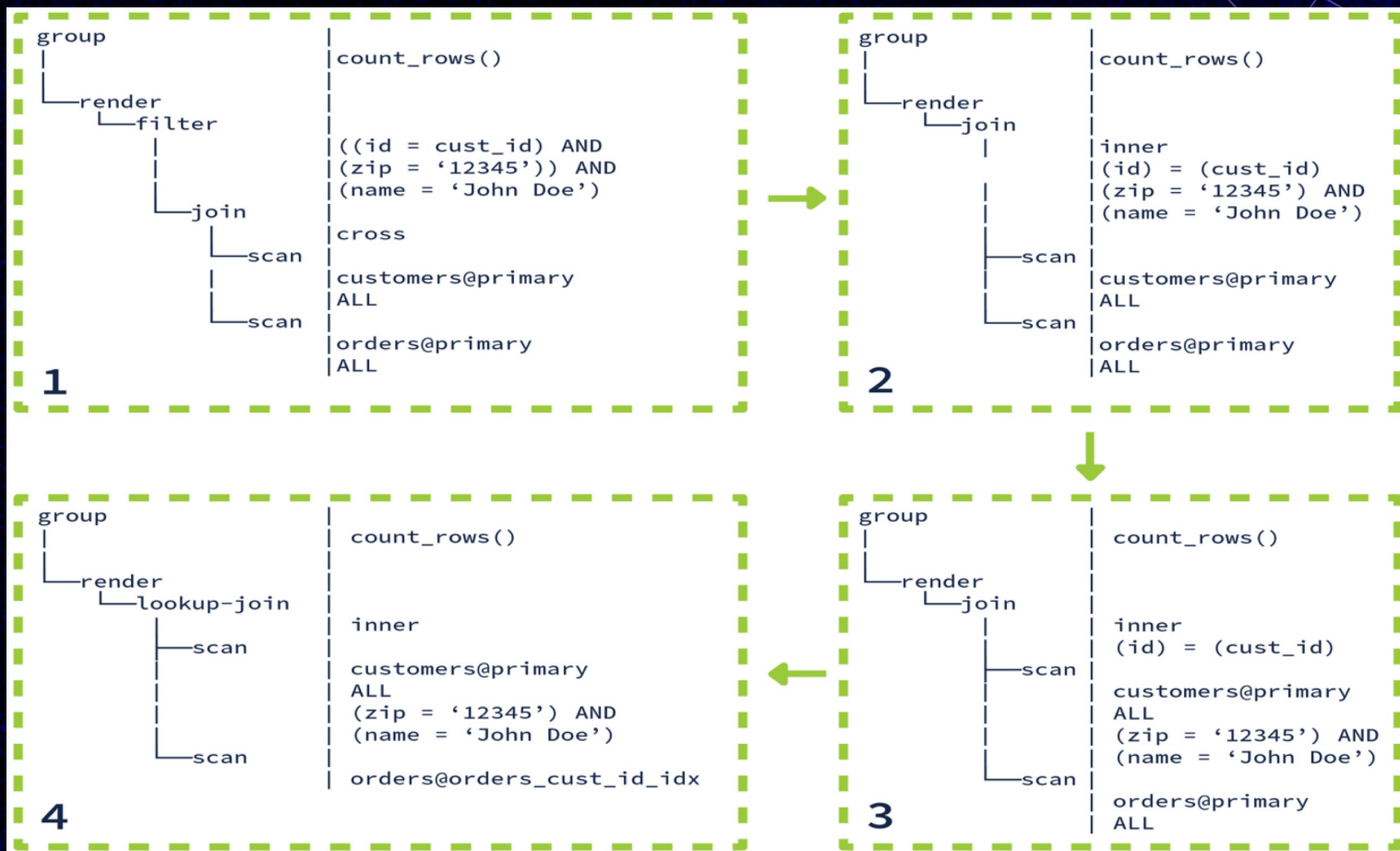
```

BEGIN;
SAVEPOINT cockroach_restart;
INSERT into kv (key, value) VALUES ('apple', 'red' );
INSERT into kv (key, value) VALUES ('banana', 'yellow' );
INSERT into kv (key, value) VALUES ('orange', 'orange' );
RELEASE SAVEPOINT cockroach_restart;
COMMIT;
    
```



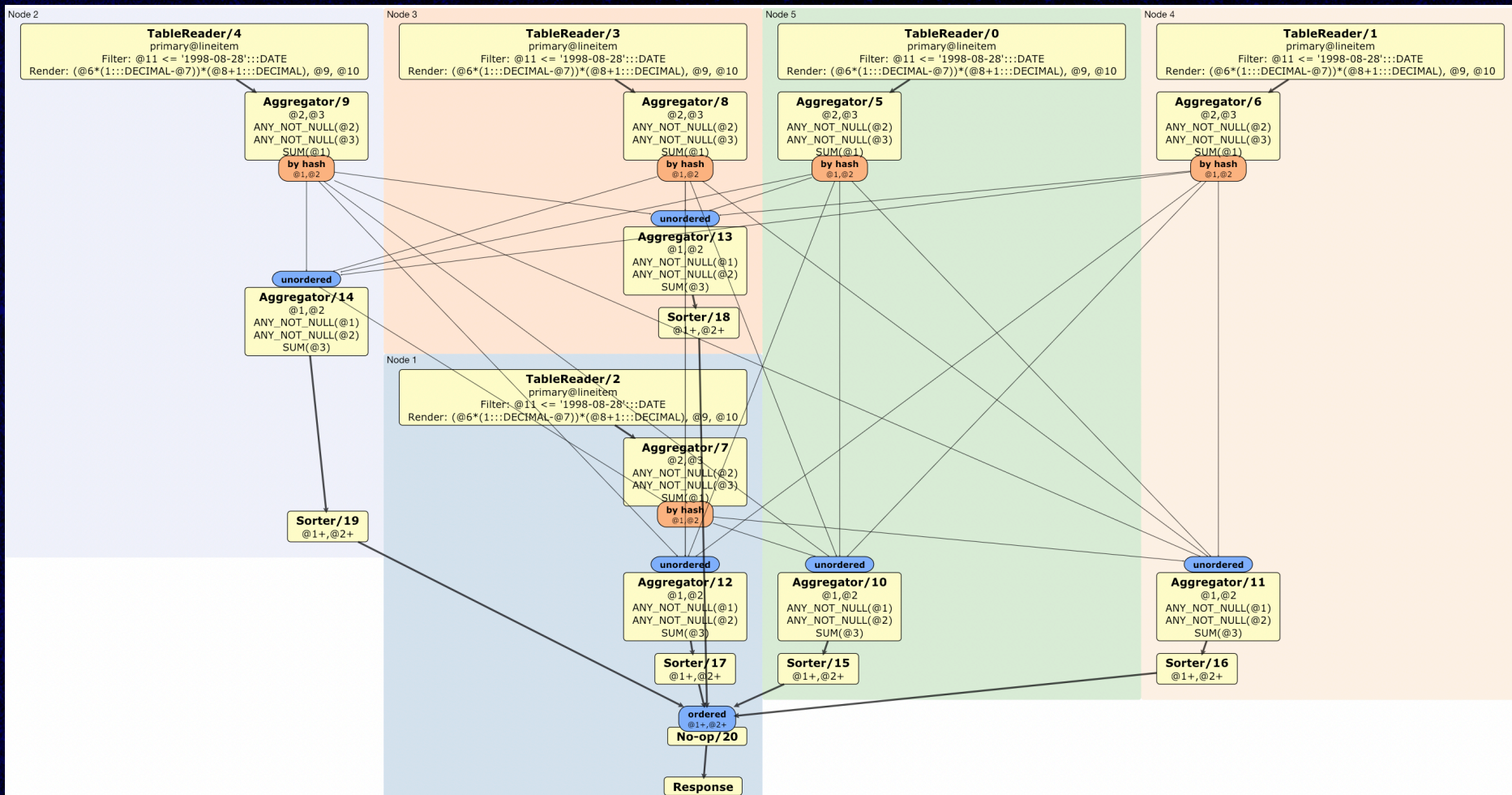
SQL增强—— Cost Base Optimizer

SELECT COUNT(*) FROM
customers c, orders o WHERE
c.id=o.cust_id AND
c.zip='12345' AND
c.name='John Doe'



SQL增强——可视化执行计划

```
SELECT sum(l_quantity) AS sum_qty FROM lineitem WHERE l_shipdate <= (DATE '1998-12-01' - '95d'::INTERVAL) GROUP BY l_returnflag, l_linestatus ORDER BY l_returnflag, l_linestatus;
```



SQL增强——SQL诊断

STATEMENTS

APP: ALL 175 statement fingerprints. Last cleared 2018-10-23 20:01:42.

STATEMENT	TIME	EXECUTION COUNT	RETRIES	ROWS AFFECTED	LATENCY
SELECT FROM new_order	42271.6 s	173k	0	1	245.0 ms
UPDATE warehouse	41029.6 s	97k	0	1	422.2 ms
UPDATE order	30324.7 s	14k	0	9	2.1 s
SELECT FROM warehouse	12506.2 s	88k	0	1	142.9 ms
UPDATE district	11387.4 s	88k	0	1	129.9 ms
SELECT FROM order_line	8942.5 s	8k	0	1	1.1 s
UPDATE district	4228.6 s	97k	0	1	43.6 ms
UPDATE order	2599.4 s	1k	0	8	2.5 s
INSERT INTO order_line	1967.7 s	38k	0	13	51.5 ms
DELETE FROM new_order	1946.5 s	12k	0	7	161.4 ms
INSERT INTO history	1562.8 s	93k	0	1	16.8 ms
SELECT FROM customer	1377.9 s	87k	0	1	15.8 ms
SELECT FROM order_line	1283.3 s	169k	0	1	7.6 ms

STATEMENT DETAILS

INSERT INTO ycsb.usertable VALUES (\$1, \$2, ...,more9...)

PHASE	MEAN LATENCY	STANDARD DEVIATION
Parse	0.0 ns	0.0 ns
Plan	98.1 μs	333.6 μs
Run	120.5 ms	95.9 ms
Overhead	331.7 μs	3.4 ms
Overall	120.9 ms	95.9 ms

NODE	TIME	EXECUTION COUNT	RETRIES	ROWS AFFECTED	LATENCY
n2	12305.2 s	100k	0	1	123.1 ms
n3	12010.5 s	100k	0	1	120.1 ms
n1	11966.7 s	100k	0	1	119.7 ms

EXECUTION COUNT	
First Attempts	300000
Retries	0
Max Retries	0
Total	300000

MEAN ROWS		STANDARD DEVIATION
Rows Affected	1.00	0

36282.4 s
TOTAL TIME

300k
EXECUTION COUNT

100%
EXECUTED WITHOUT RETRY

120.9 ms
MEAN SERVICE LATENCY

1
MEAN NUMBER OF ROWS

App	ycsb
Distributed execution?	No
Used cost-based optimizer?	No
Failed?	No

生态——数据迁移

□ 步骤

- 使用mysqldump导出MySQL基准数据
- 调用CockroachDB的IMPORT MYSQLDUMP命令直接将基准数据导入到CockroachDB

□ 关键点

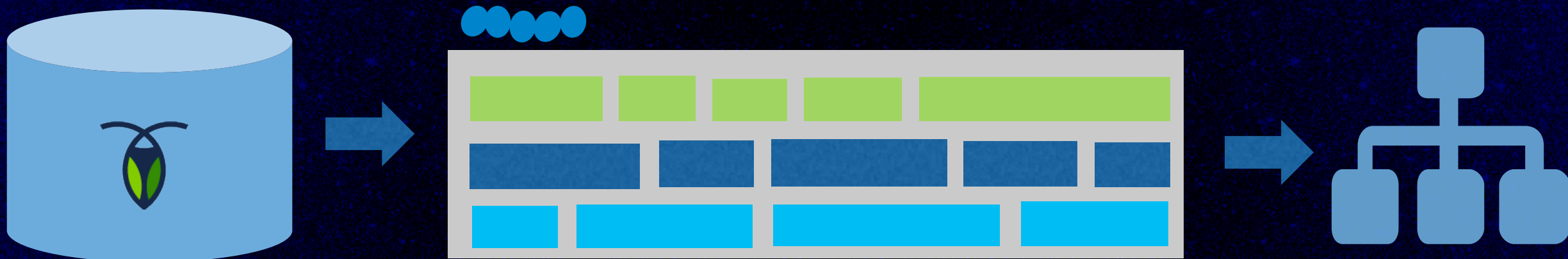
- 解析MySQL语法，做相应Statement映射
- 解析MySQL表字段类型，做相应数据类型映射

□ 限制

- 不支持fulltext类型迁移
- 不支持无效Date类型迁移

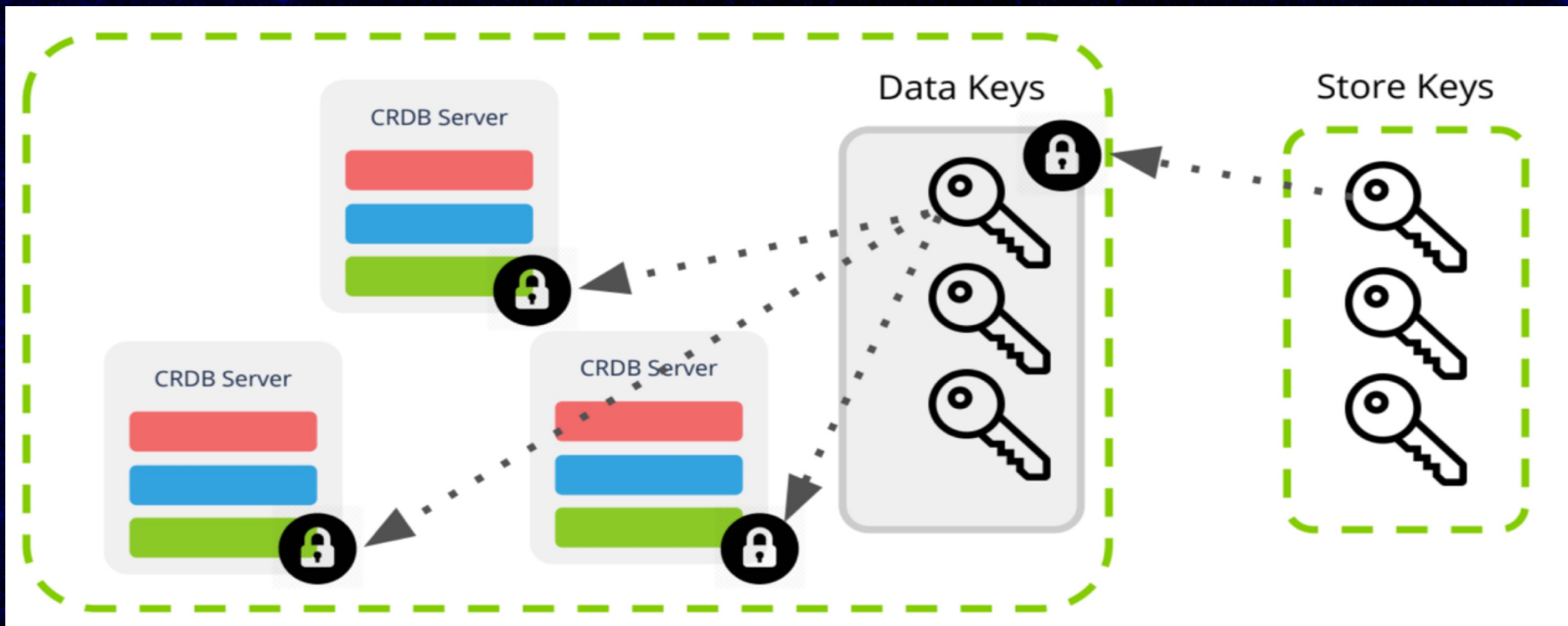
```
~/mysqldemo — bash
~/mysqldemo $ mysqldump drupal > drupal.sql
Enter password:
~/mysqldemo $ cockroach sql --set display_format=records -e "CREATE DATA
BASE test; USE test; IMPORT MYSQLDUMP ('nodelocal:///drupal.sql'
-[ RECORD 1 ]
job_id          | 394965594449870849
status          | succeeded
fraction_completed | 1
rows            | 6789
index_entries   | 7453
system_records  | 0
bytes           | 6679075
~/mysqldemo $ cockroach sql -d test -e "SELECT * FROM [SHOW TABLES] LIMIT
5;"
      table_name
+-----+
batch
block_content
block_content__body
block_content__field_banner_image
block_content__field_content_link
(5 rows)
~/mysqldemo $
```

生态——CDC



- 集群间数据同步，可用于灾备，模拟沙盒环境等。
- 与其他数据生态互通，可用于数据分析，数据挖掘等。

安全——透明加密



□ 背景

- 防止磁盘用户数据泄露

□ 示例

- 生成store密钥：`cockroach gen encryption-key -s 128 /path/to/my/aes-128.key`
- 根据密钥启动节点：`cockroach start --store=cockroach-data --enterprise-encryption=path=cockroach-data,key=/path/to/my/aes-128.key,old-key=plain`

灾备——备份恢复

- 支持备份至Local, NFS, S3, GCE, BOS
- 指定时间点备份, 增量备份
- 恢复到任意时间点
- 备份/恢复任务可随时暂停, 重启, 终止

Version History N

Version History N

Version History N

Version History 2

Version History 2

Versoion History 2

Version History 1

Version History 1

Version History 1

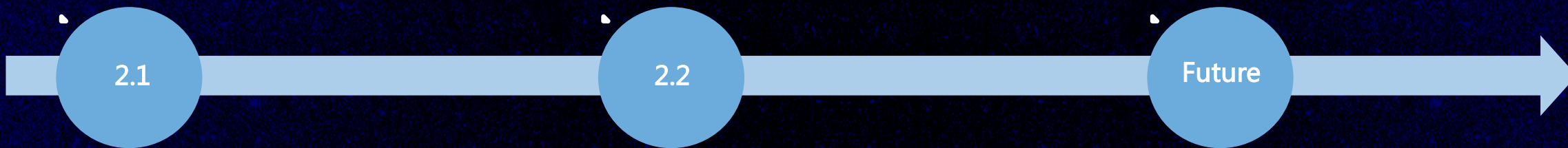
Backup 20181001

Backup 20181007

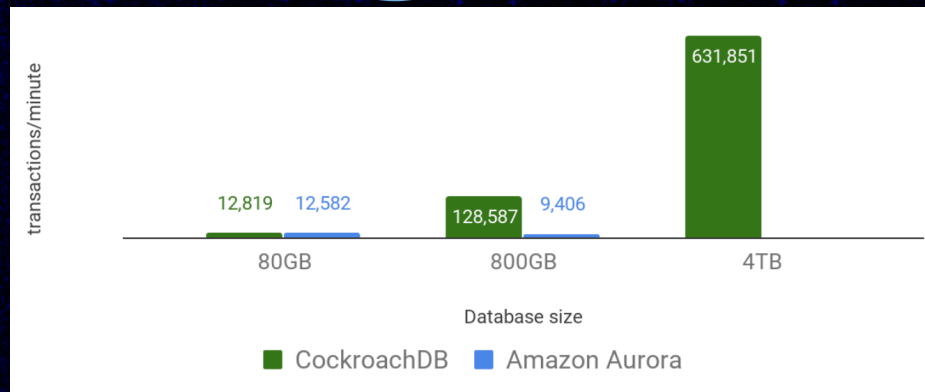
Backup 20181014

CockroachDB Roadmap

- CBO优化
- Plan Cache
- 关联子查询
- Read From Follower
- CockroachDB云服务



- 任意时间点恢复
- 导入导出
- SQL诊断
- CBO
- ...



- Load-Based Split
- Parallel Commit
- 存储过程
- 存储引擎改造
- ...

PART

03

百度CockroachDB实践

百度CockroachDB云服务能力

高可扩展
EB级数据存储能力

高可用
5个9，秒级恢复

高性能
百万TPS

高可靠
多副本强一致

去中心化

分布式事务

MySQL & PG兼容

全局二级索引

滚动升级

Online Schema
Change

Row-Level
Partition

Distributed Query

Change data
Capture

异地多活

多副本强一致

Column Family

计算虚拟化

存储虚拟化

网络虚拟化

CPU

NVMe

GPS原子钟

RDMA

FPGA

监控管理

上线管理

灾备管理

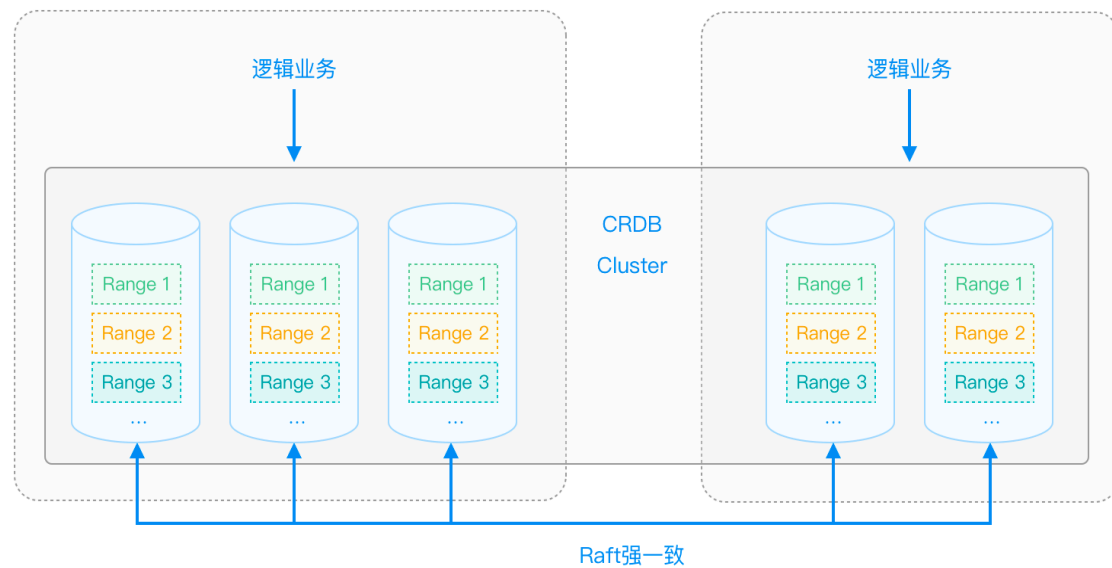
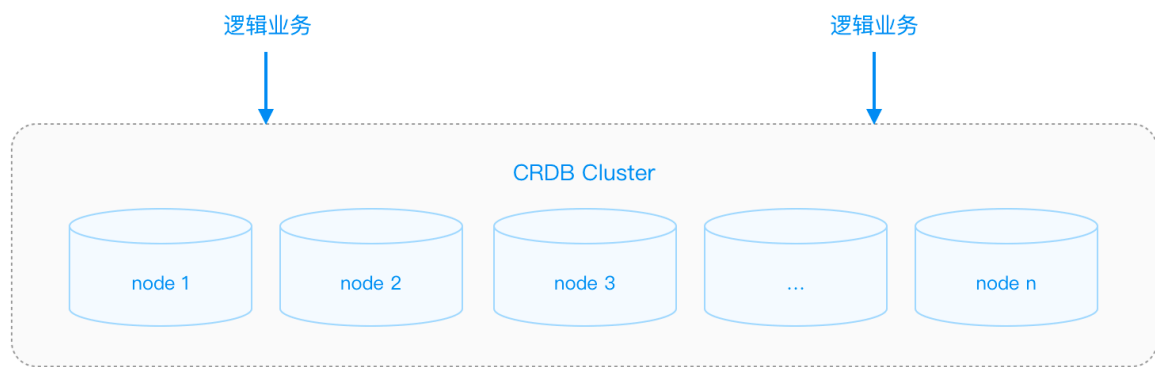
容量管理

权限管理

安全管理

数据迁移

使用场景



百度CockroachDB云服务

- 分布式事务
- 水平弹性扩容
- 异地多活
- 多副本强一致
- 自动故障修复
- 兼容PostgreSQL

CockroachDB 云数据库

CockroachDB Database

高扩展、高性能、高可用的分布式NewSQL数据库服务，支持完整的事务ACID特性，采用强一致性算法保障数据可靠性，并高度兼容 PostgreSQL 协议，迁移使用成本极低。

🔊 CockroachDB 云数据库公开测试中，欢迎申请使用！

立即申请

帮助文档

CockroachDB 中国社区

□ 中文社区网站

<http://www.cockroachchina.cn>

□ 中文手册

<http://doc.cockroachchina.baidu.com>



 **CockroachDB**
著名的开源NewSQL数据库CockroachDB—中国社区

CockroachDB 中国社区

文章搜索

Thanks