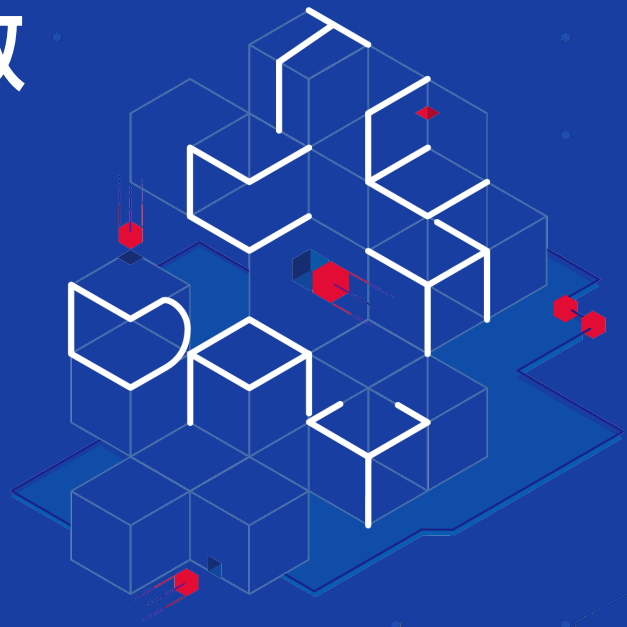
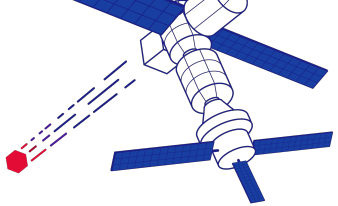
TiDB TechDay 2019

TiDB 在知乎万亿量级业务数据下的实践和挑战

孙晓光@知乎



自我介绍

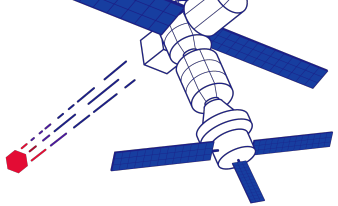


孙晓光，知乎搜索后端技术负责人

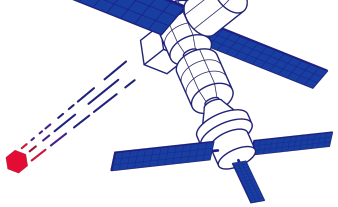
曾从事私有云相关研发，关注云原生技术

TiKV 项目 Committer

目录



知乎：可信赖的问答社区



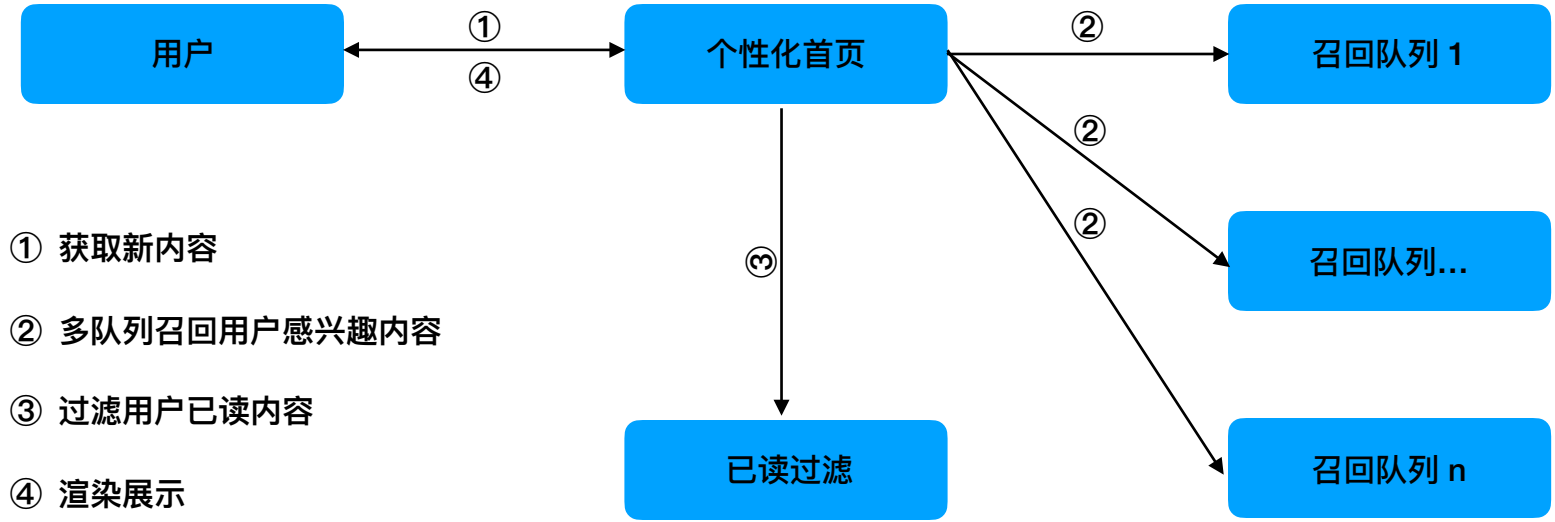
2.2 亿
用户数

38 万
话题

2800 万
问题

1.3 亿
回答

业务场景



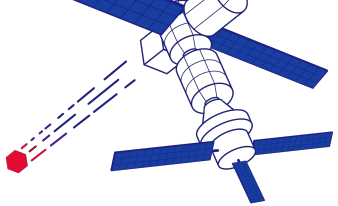
① 获取新内容

② 多队列召回用户感兴趣内容

③ 过滤用户已读内容

④ 渲染展示

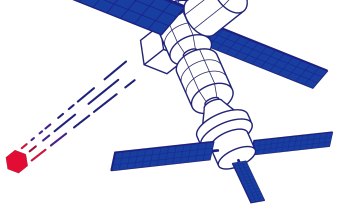
已读过滤示意图



业务特点

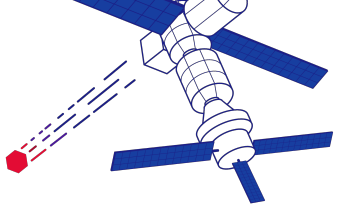
- 可用性要求“高”
  - 个性化首页和个性化推送，最重要的流量分发渠道
- 写入量“大”
  - 峰值每秒写入 40K+ 行记录，日新增记录近 30 亿条
- 历史数据“长期”保存
  - 阅读历史保存三年
  - 近一万三千亿条历史记录

业务特点



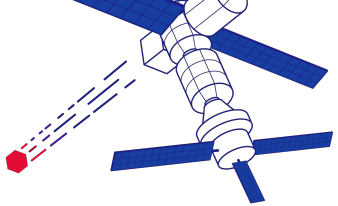
- 查询吞吐“高”
  - 峰值 30K+ QPS / 12M+ 条已读查询
- 响应时间“敏感”
  - 90ms 超时
- 可以容忍“false positive”

目录



- 业务场景
- 架构设计
- 关键组件
- All about TiDB

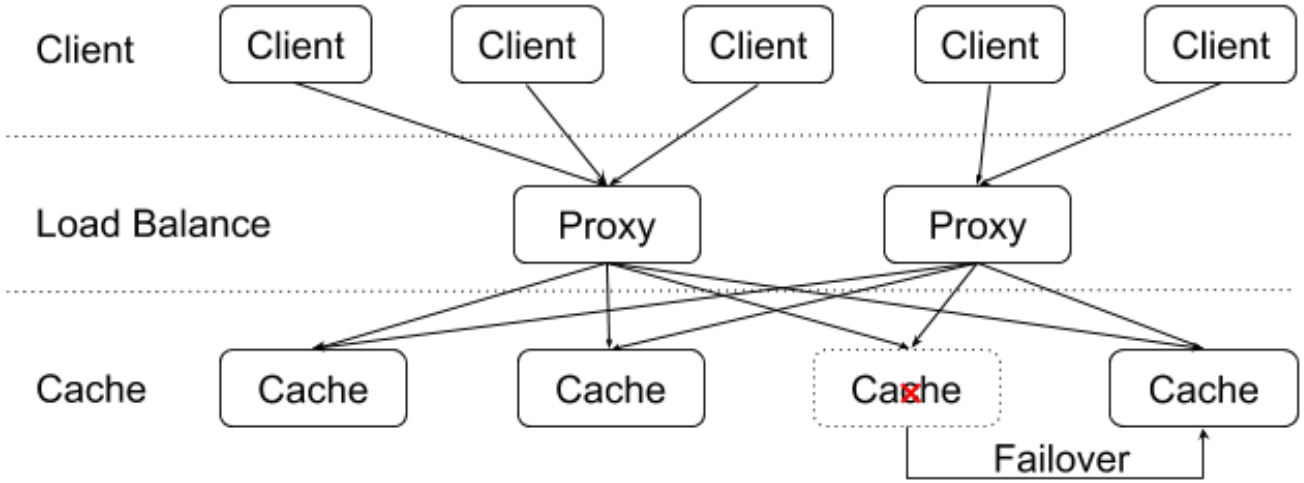
设计目标



- 高可用
- 高性能
- 易扩展

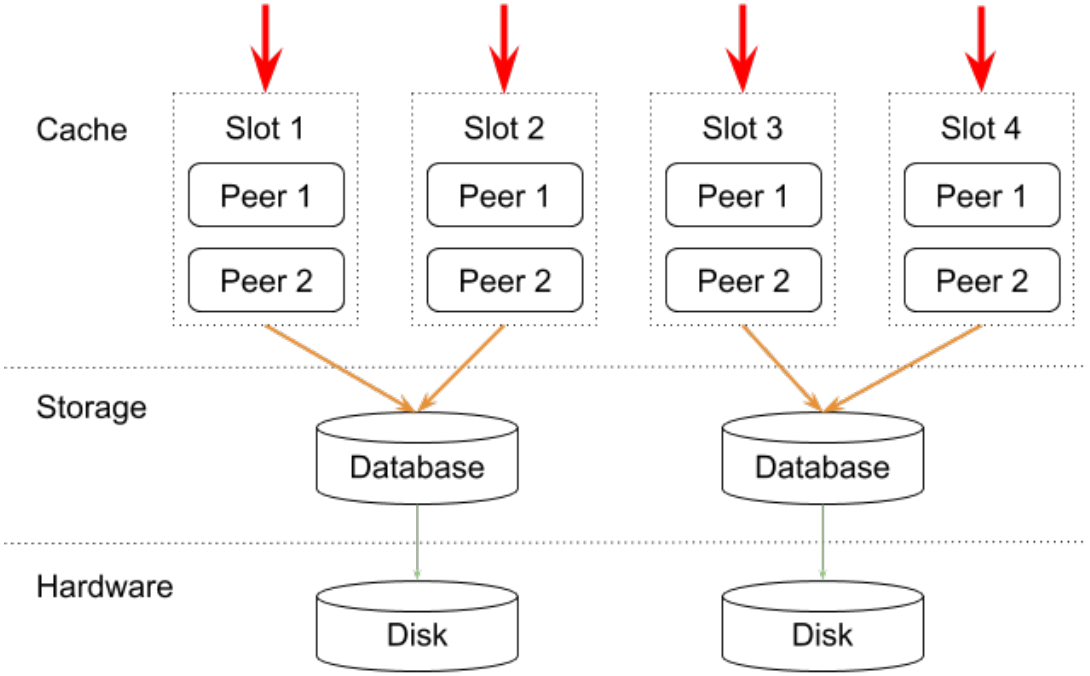
高可用

- 故障感知
- 自愈机制
- 隔离变化



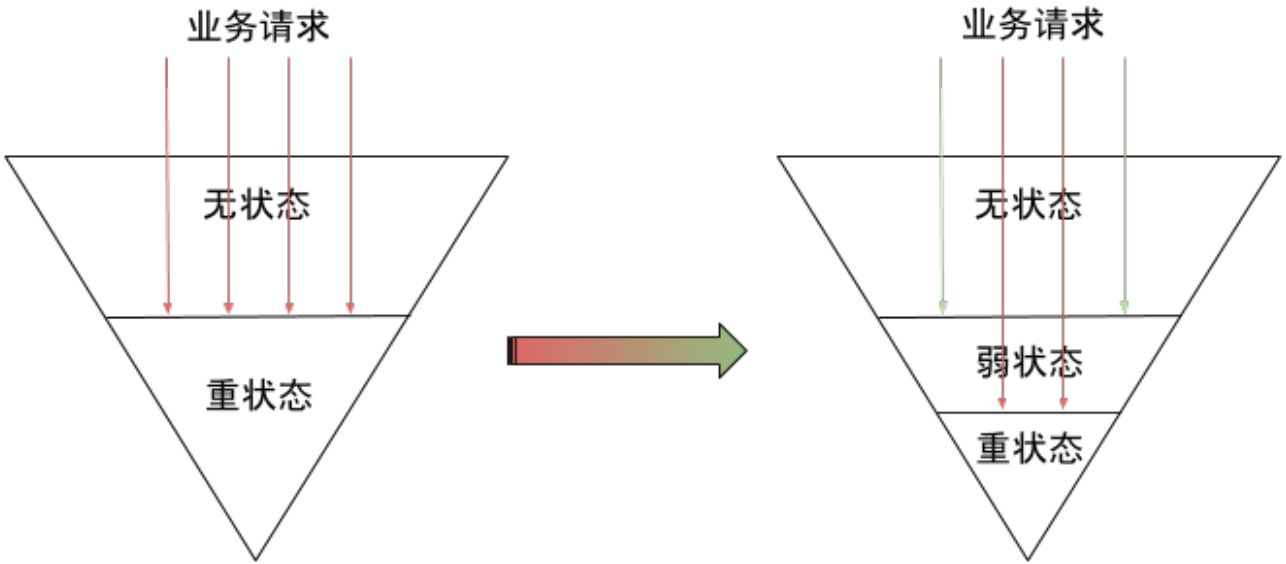
高性能

- 缓存拦截
- 副本扩展
- 压缩降压

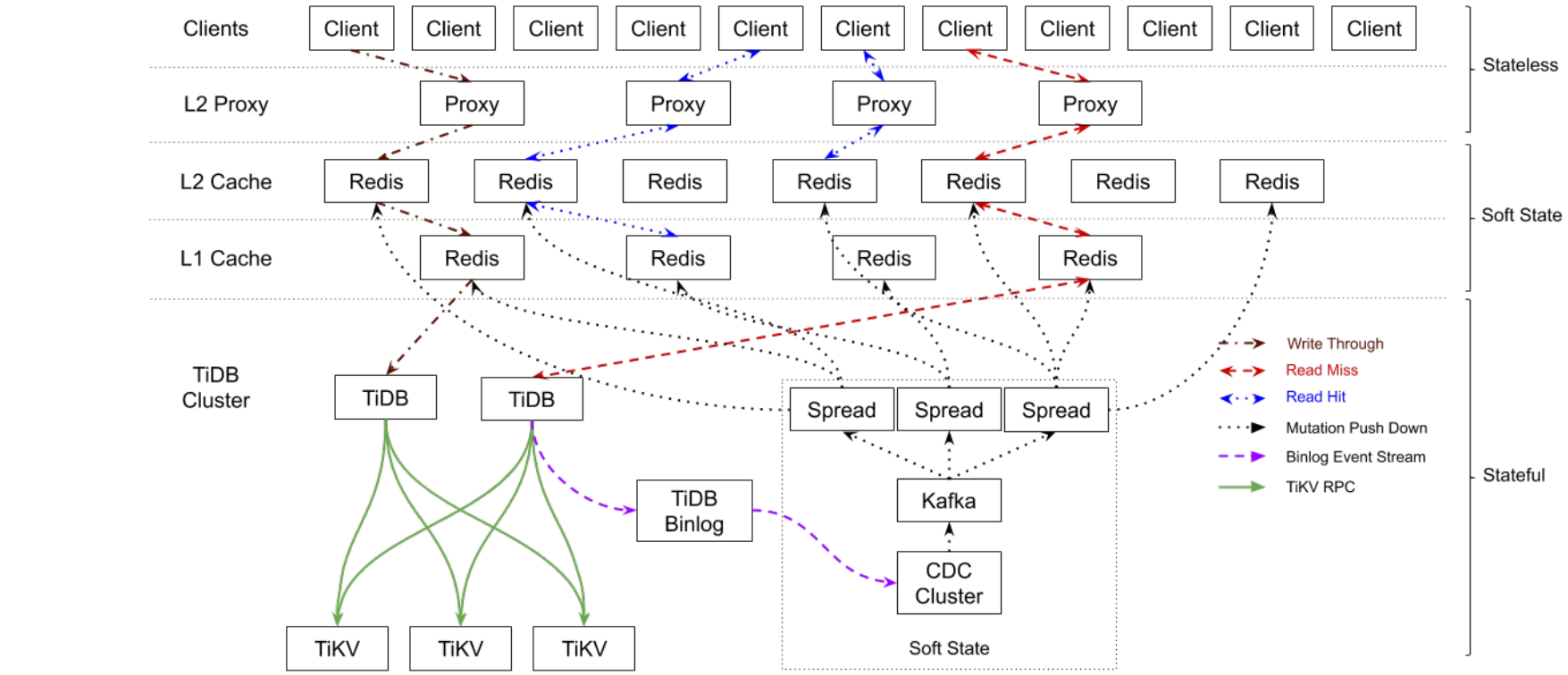


易扩展

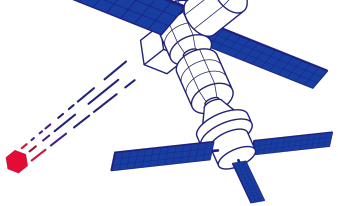
- 无状态
- 弱状态
- 重状态



已读服务


Clients
Client
Client
Client
Client
Client
Client
Client
Client
Client
Client
Client
L2 Proxy
Proxy
Proxy
Proxy
Proxy
L2 Cache
Redis
Redis
Redis
Redis
Redis
Redis
Redis
L1 Cache
Redis
Redis
Redis
Redis
TiDB Cluster
TiDB
TiDB
Spread
Spread
Spread
TiDB Binlog
Kafka
CDC Cluster
TiKV
TiKV
TiKV
Soft State
Stateless
Soft State
Stateful
Write Through
Read Miss
Read Hit
Mutation Push Down
Binlog Event Stream
TiKV RPC

目录



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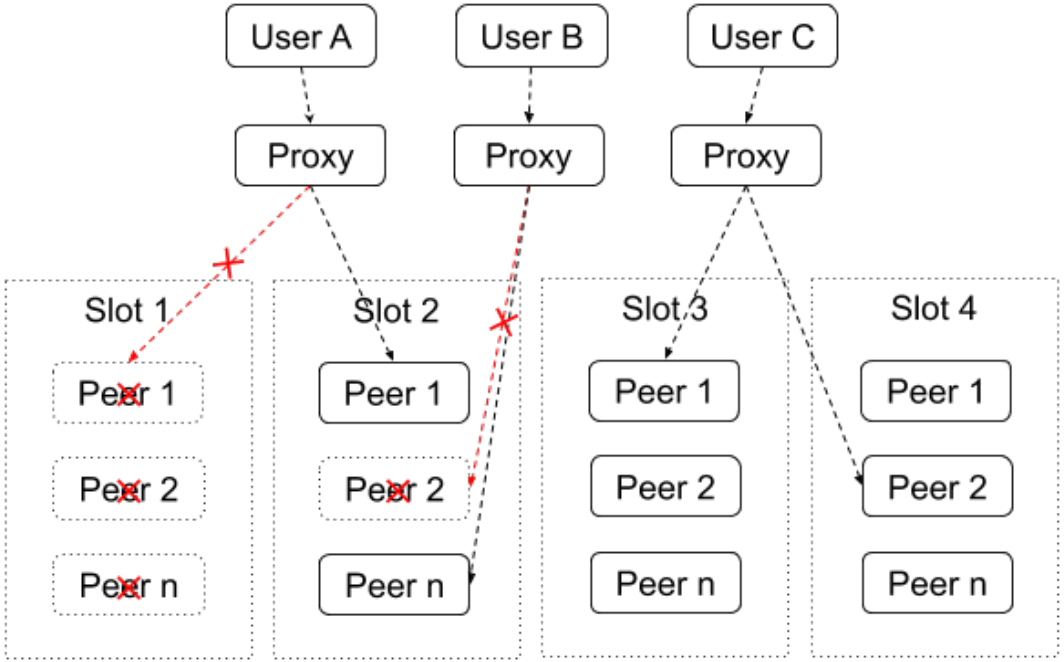
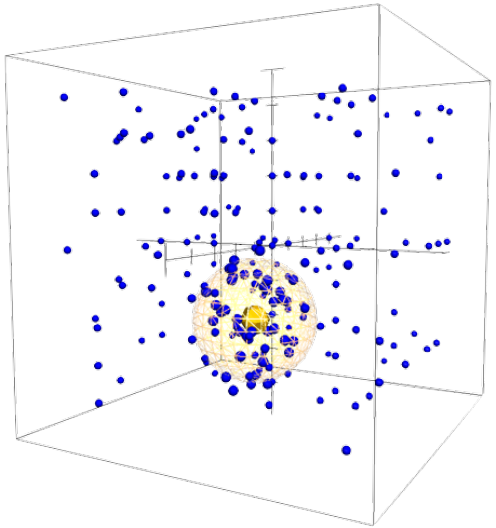
Proxy

- Slot 内多副本高可用
- Slot 内会话粘滞
- Slot 间故障降级



Cache

- BloomFilter 增加缓冲密度



User

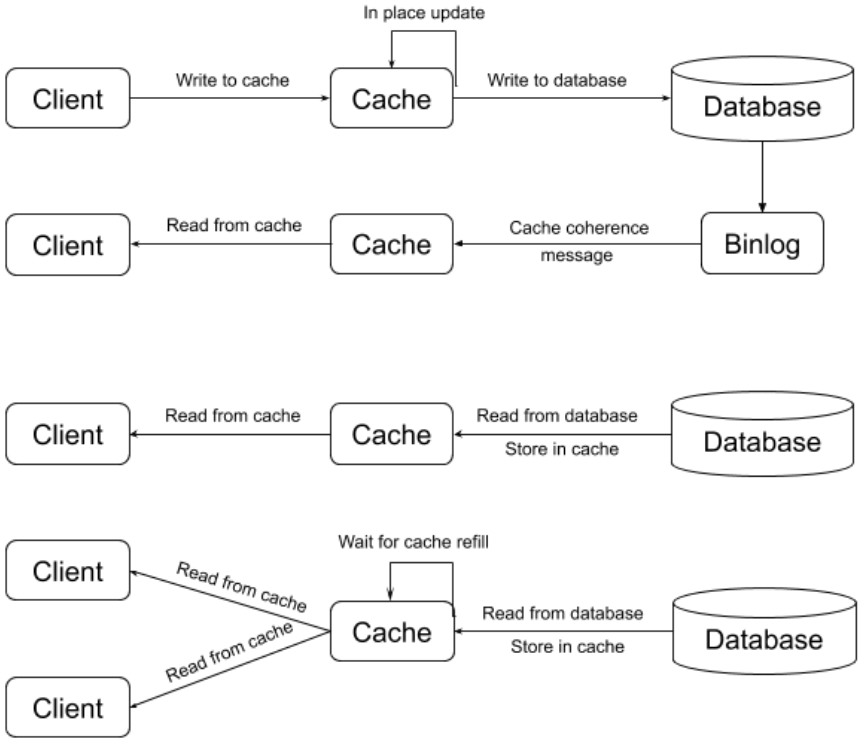
已读内容
文章 a
问题 b
回答 c
回答 d
Live e
……
回答 n

Hash Functions

BloomFilter
0
1
1
0

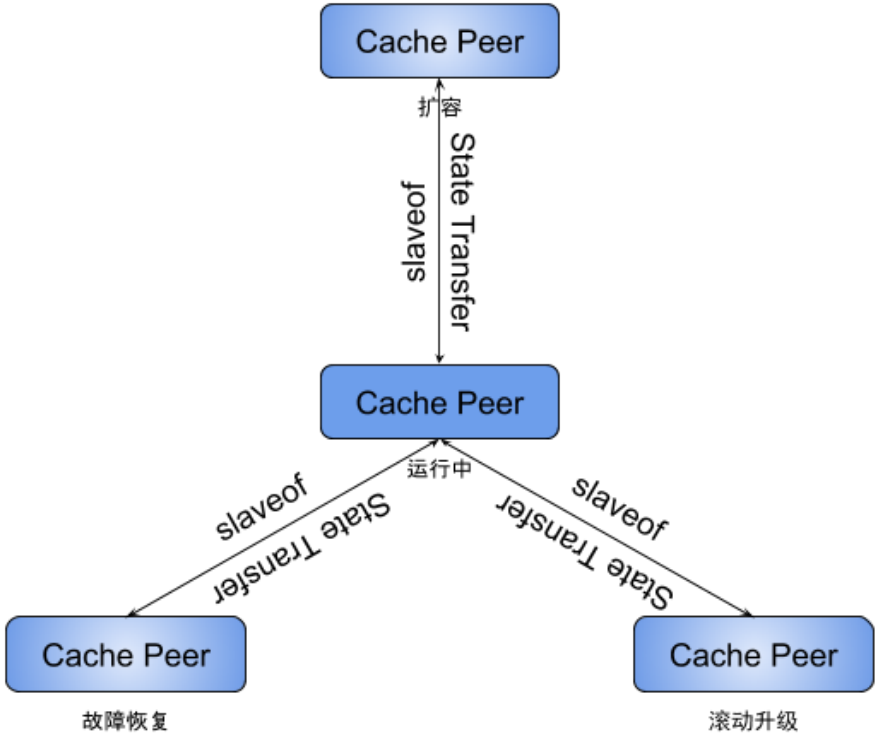
Cache

- In Place 更新，不失效缓存
- 数据变更订阅，副本间 Cache 状态最终一致
- 避免惊群



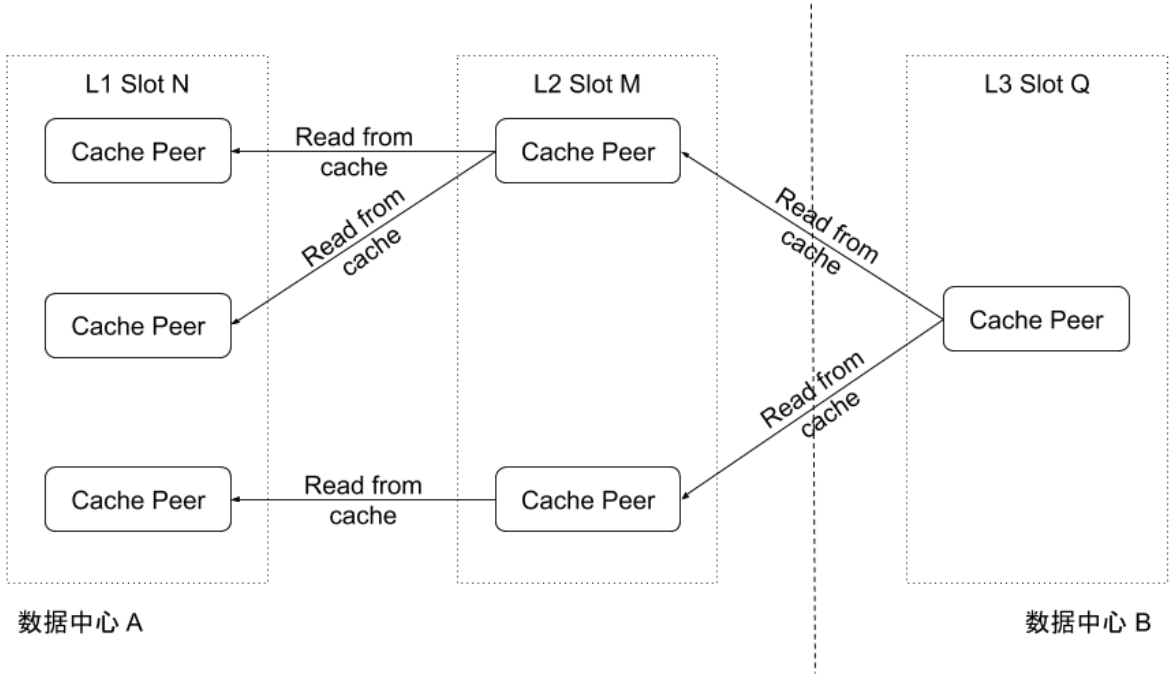
Cache

- 缓冲状态迁移
  - 平滑扩容
  - 平滑滚动升级
  - 故障快速恢复



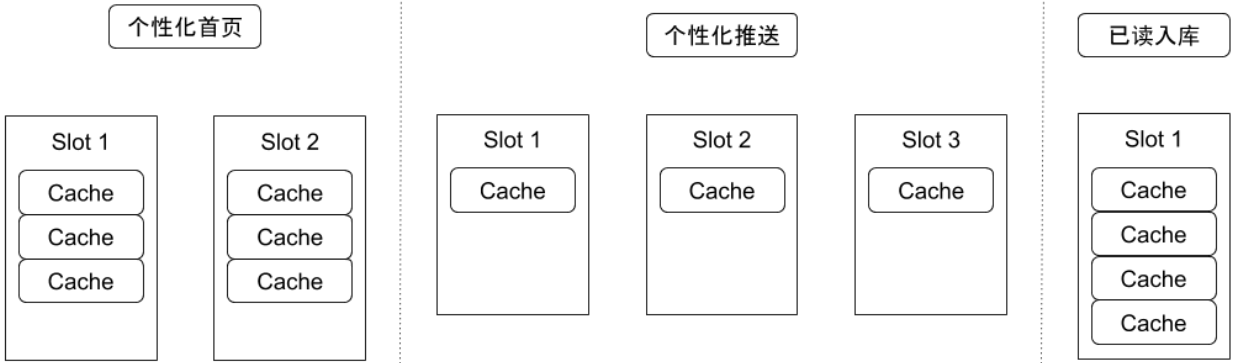
Cache

- 多层缓冲
  - 时间维度 / 空间维度
  - 跨数据中心部署



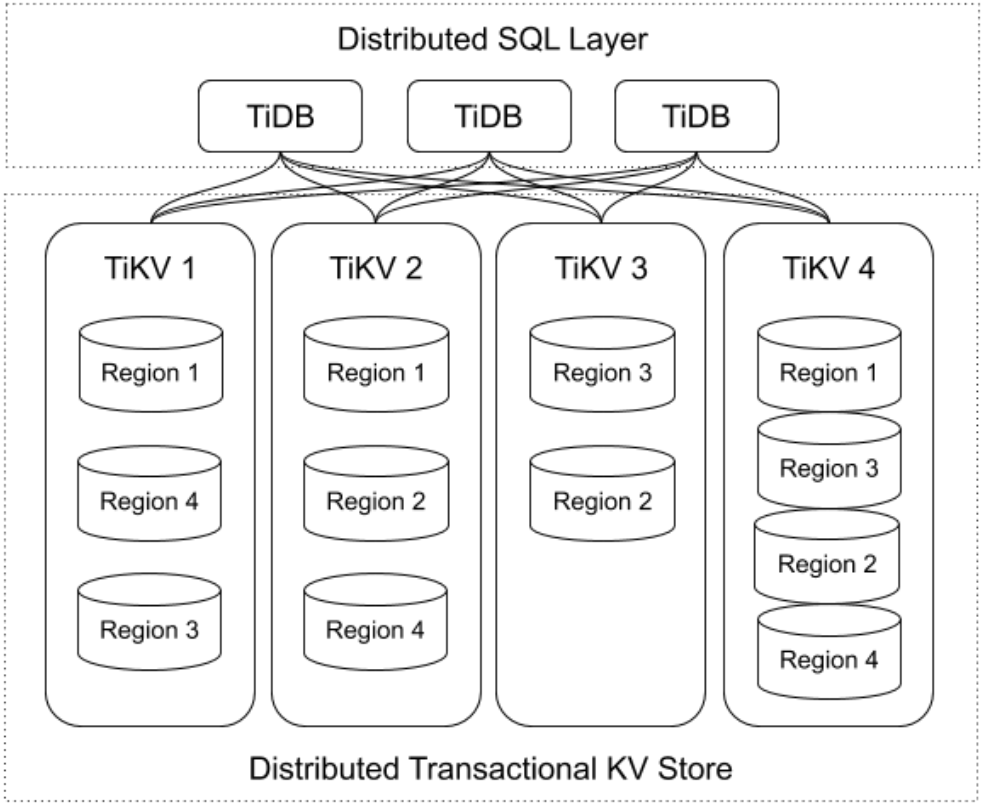
Cache

- 分组隔离
  - 在线离线隔离
  - 业务多租户隔离



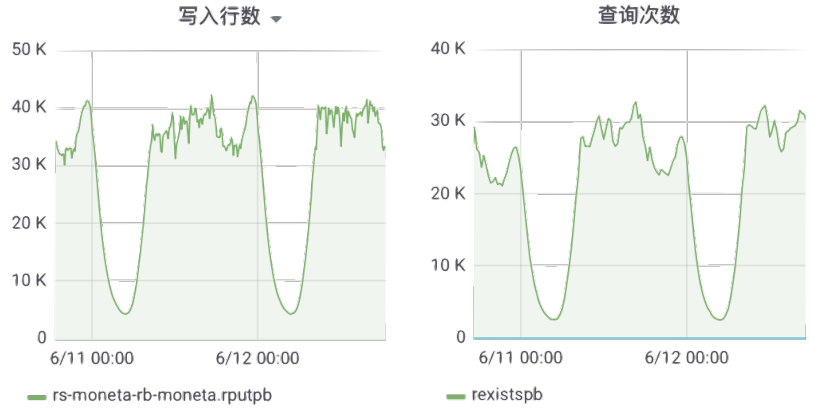
Storage

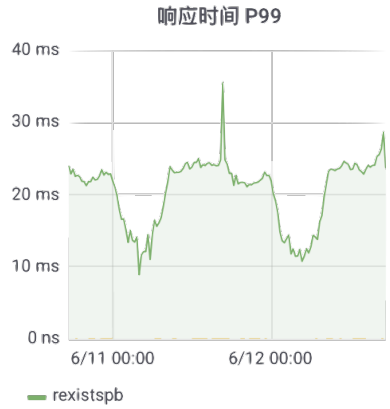
- ✘ MySQL 分库分表 + MHA
  - ✘ 难以扩展
- ✓ TiDB
  - ✓ 强一致高可用
  - ✓ 线性扩展



性能指标

- 峰值每秒写入 40K+ 行
- 峰值 30K+ QPS，12M+ 文档
- 查询 P99 ≈ 25ms P999 ≈ 50ms





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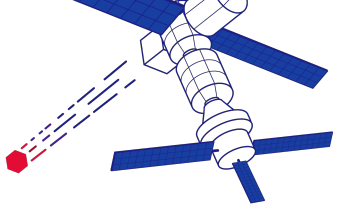

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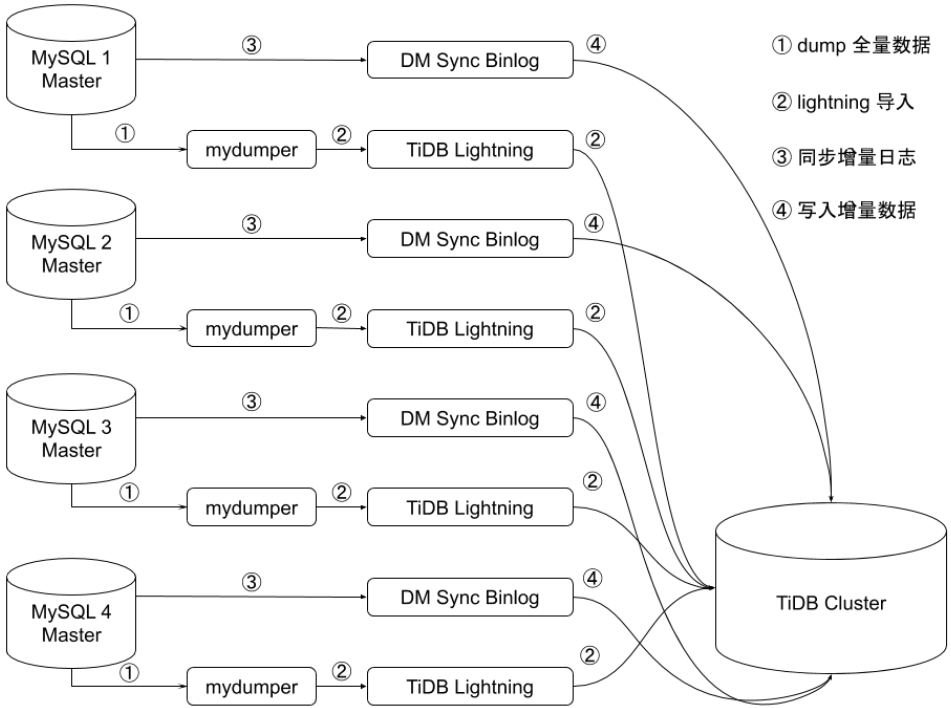
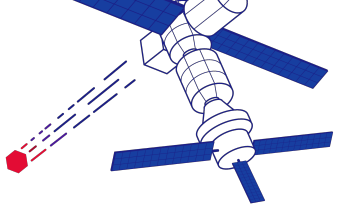
MySQL to TiDB

- TiDB Lightning 全量导入
  - 大数据量导入
  - 高投入高产出
- DM 数据增量同步

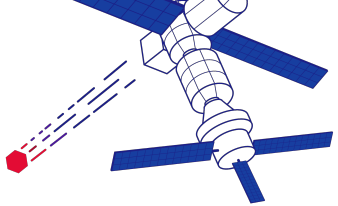


MySQL to TiDB



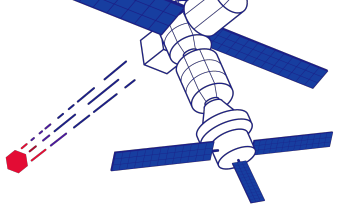
- 调优 TiDB 和 TiKV 满足苛刻时延要求
  - Latency 敏感 Query 部署独立 TiDB
  - 充分利用 SQL Hint
  - 低精度 TSO
  - 复用 Prepared Statement

MySQL to TiDB



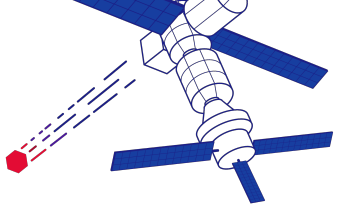
- 移植 MySQL Binlog 到 TiDB Binlog
  - 按 database/table 拆分 binlog 到多分区
  - drainer 持续优化
- 资源评估
  - master/slave 两副本 vs raft 三副本
  - 联合主键非聚簇索引的空间消耗
  - 计算存储分离网络要求高

关于 TiDB 3.0



业务	日增行数	日增尺寸	查询时效	保存时效
已读	30 亿	140 GB	3 年	3 年
反作弊	80 亿	1.5 TB	2 天	6 年

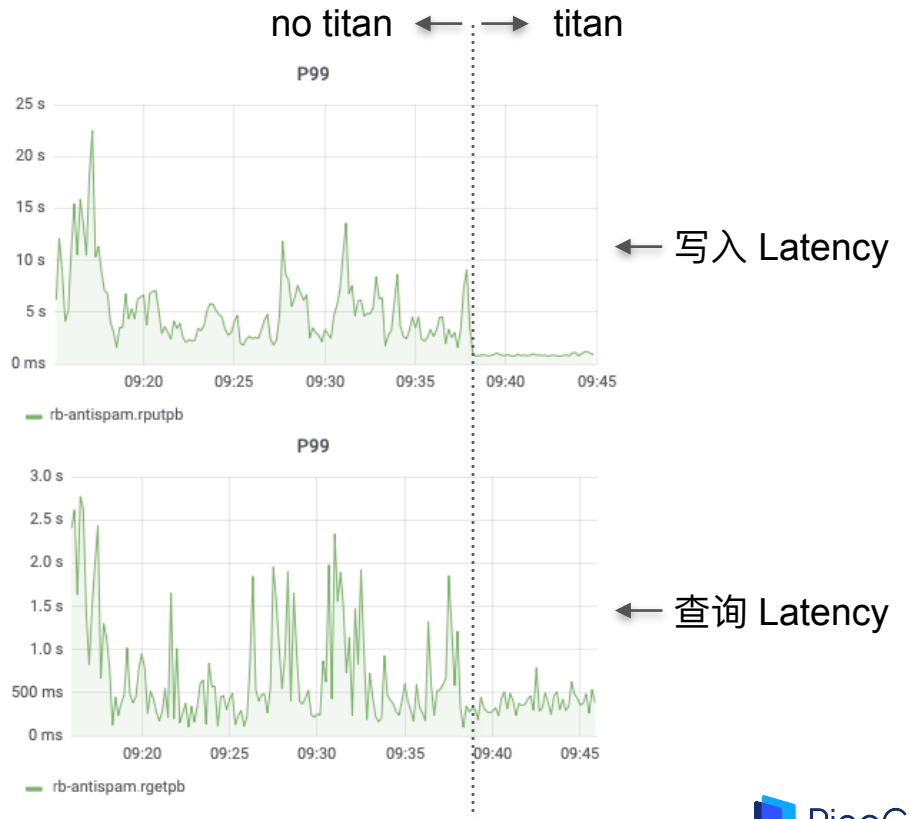
关于 TiDB 3.0



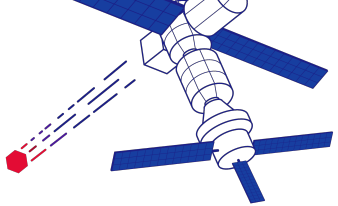
- 已读
  - 高写入
    - gRPC Batch Message
    - 多线程 Raft Store
  - Latency: Plan Management
  - 分析能力: TiFlash

关于 TiDB 3.0

- 反作弊
  - 高写入
    - gRPC Batch Message
    - 多线程 Raft Store
  - 大记录: Titan 存储引擎
  - 查询时效：Table Partition



总结



- 理解业务
  - 对症下药
  - 抽象提炼
- 参与社区，贡献社区
- 拥抱新技术 Cloud Native from Ground Up

Thank You !