

数据来源：数据库产品上市商用时间



# 第十三届中国数据库技术大会

DATABASE TECHNOLOGY CONFERENCE CHINA 2022

## 数据智能 价值创新



线上直播 | 2022/12/14-16



# 融合时序数据库在云原生 可观测领域的实践

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## 高洪涛



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tetrade创始工程师。原华  
为软件开发云技术专家。

Apache ShardingSphere  
和Apache SkyWalking核  
心贡献者。

01 可观测性一览

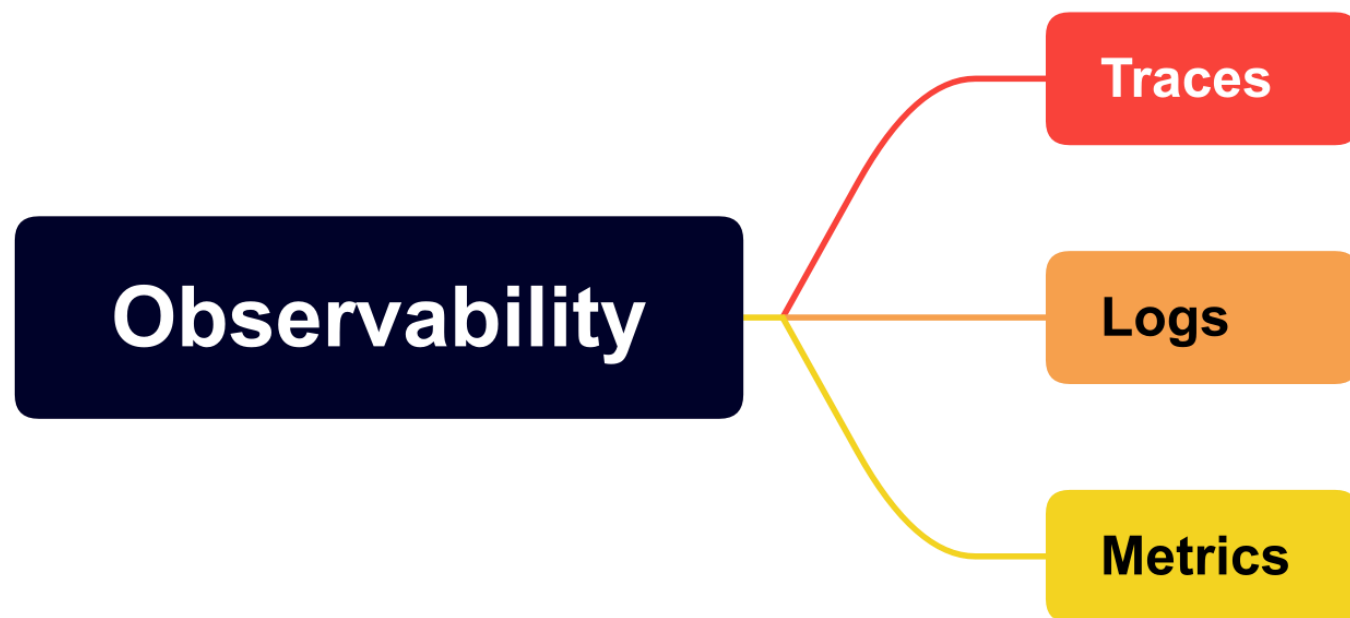
02 存储方案

03 RUM假说

04 BanyanDB

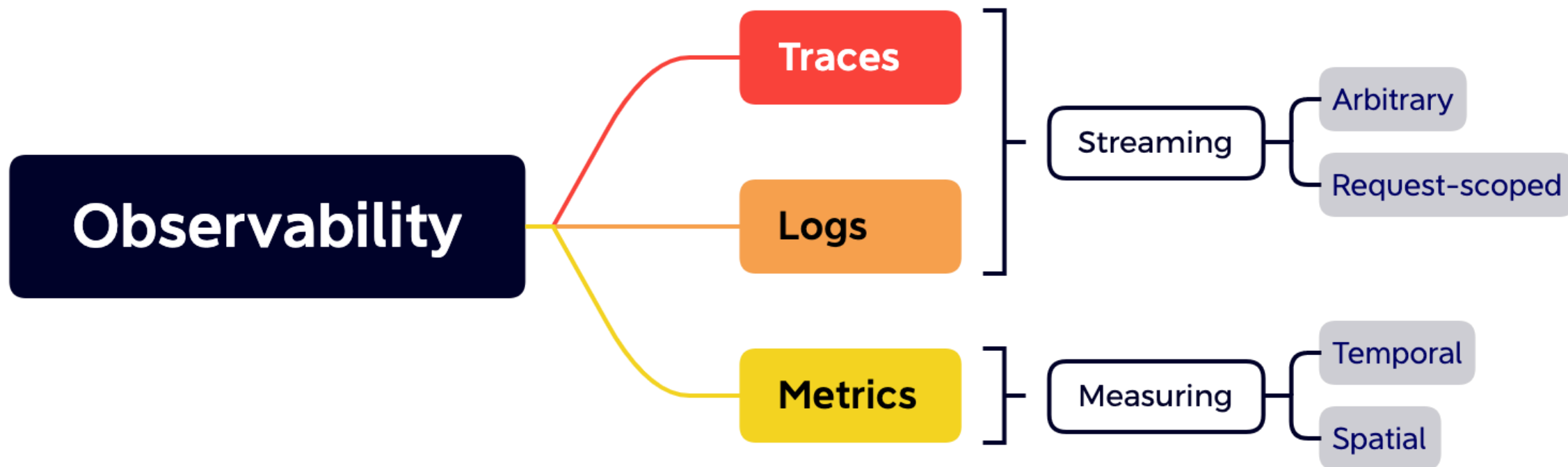
# 可观测性一览

# 可观测性三柱石

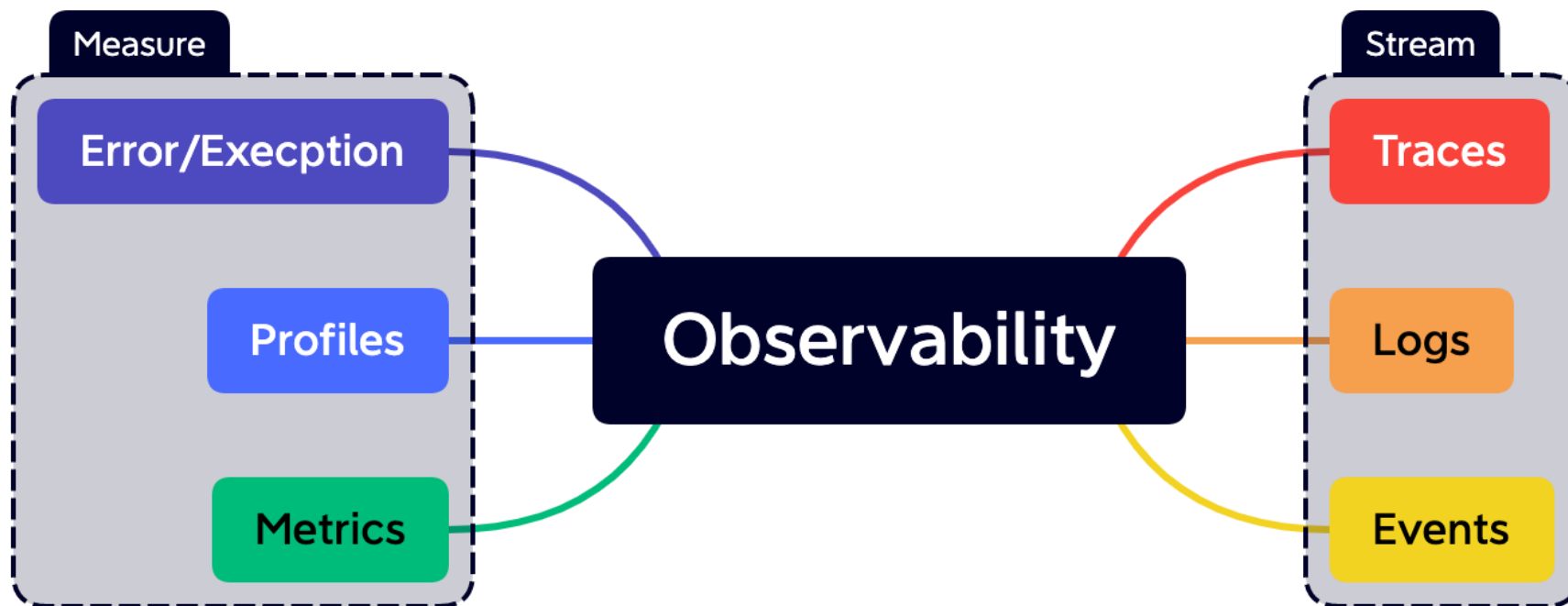




# 可观测性数据特点



# 更多的数据类型





# 存储方案

# 主流存储方案



# TimeScale



可扩展

弹性扩展  
并行读写  
数据副本



SQL

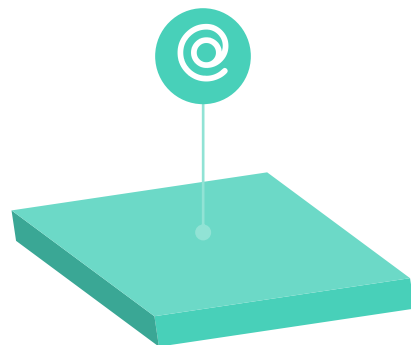
易用性  
NewSQL



可维护性

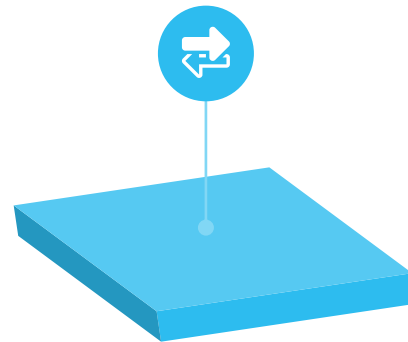
高可用方案  
第三方工具  
社区

# Elasticsearch



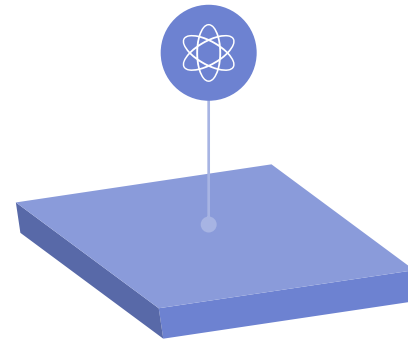
大容量

自动数据分片  
弹性扩展



实时聚合

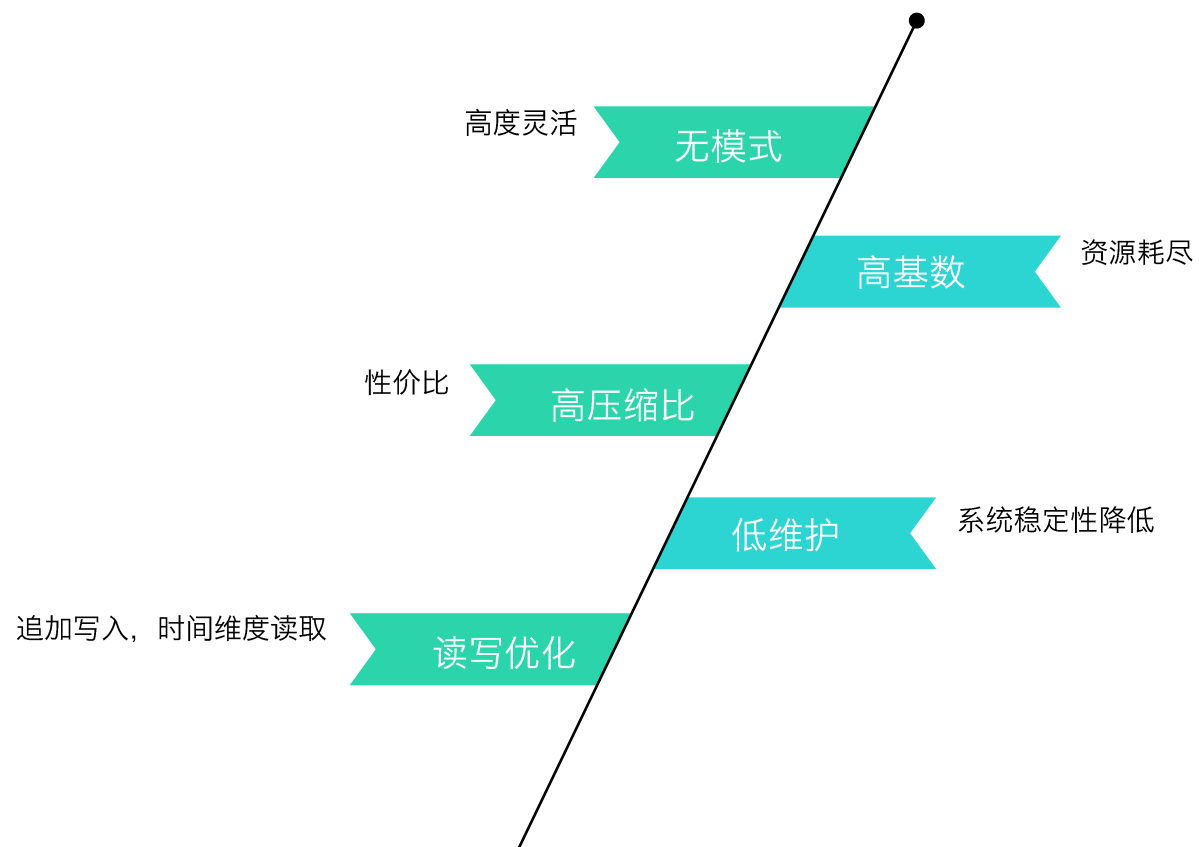
索引结构



成熟度

本地部署  
Cloud

# Time Series

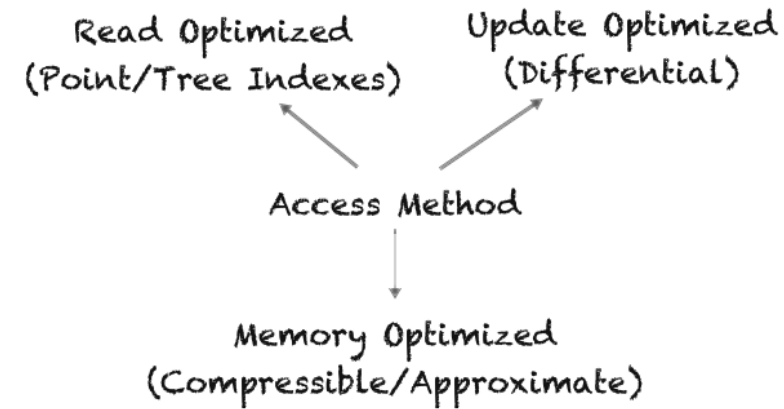


# RUM假说



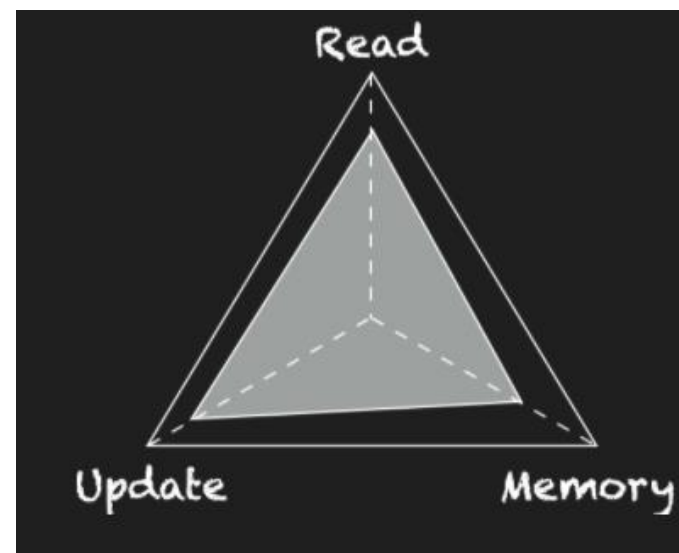
# RUM空间

when optimizing the  
read-update-memory overheads,  
optimizing in any two areas negatively  
impacts the third.



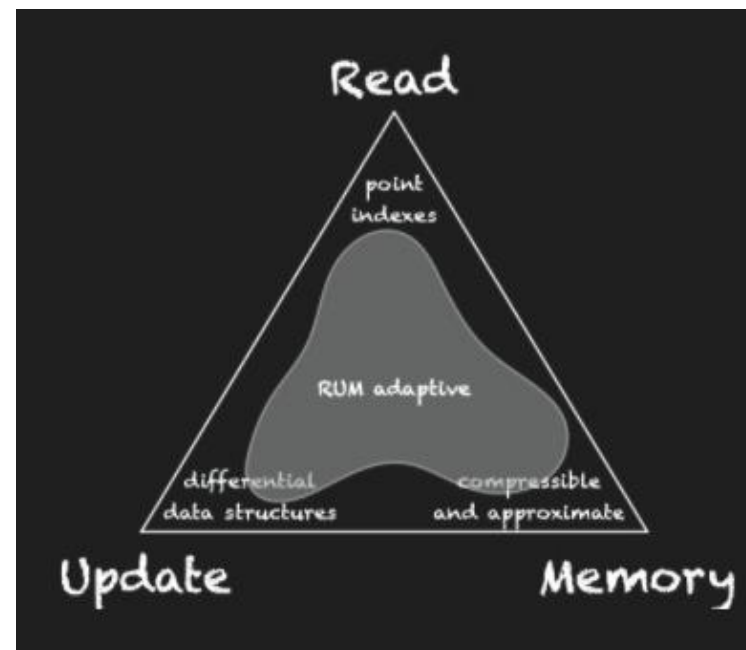
# RUM假说

When designing access methods we set an **upper bound** for two of the RUM overheads, this implies a **hard lower bound** for the third overhead which cannot be further reduced



# RUM类型的系统

the development of *specialized* systems and tools to cater data, aiming at servicing a *narrow* set of applications each.



Traces, maybe Logs  
Write many, never read

# BanyanDB

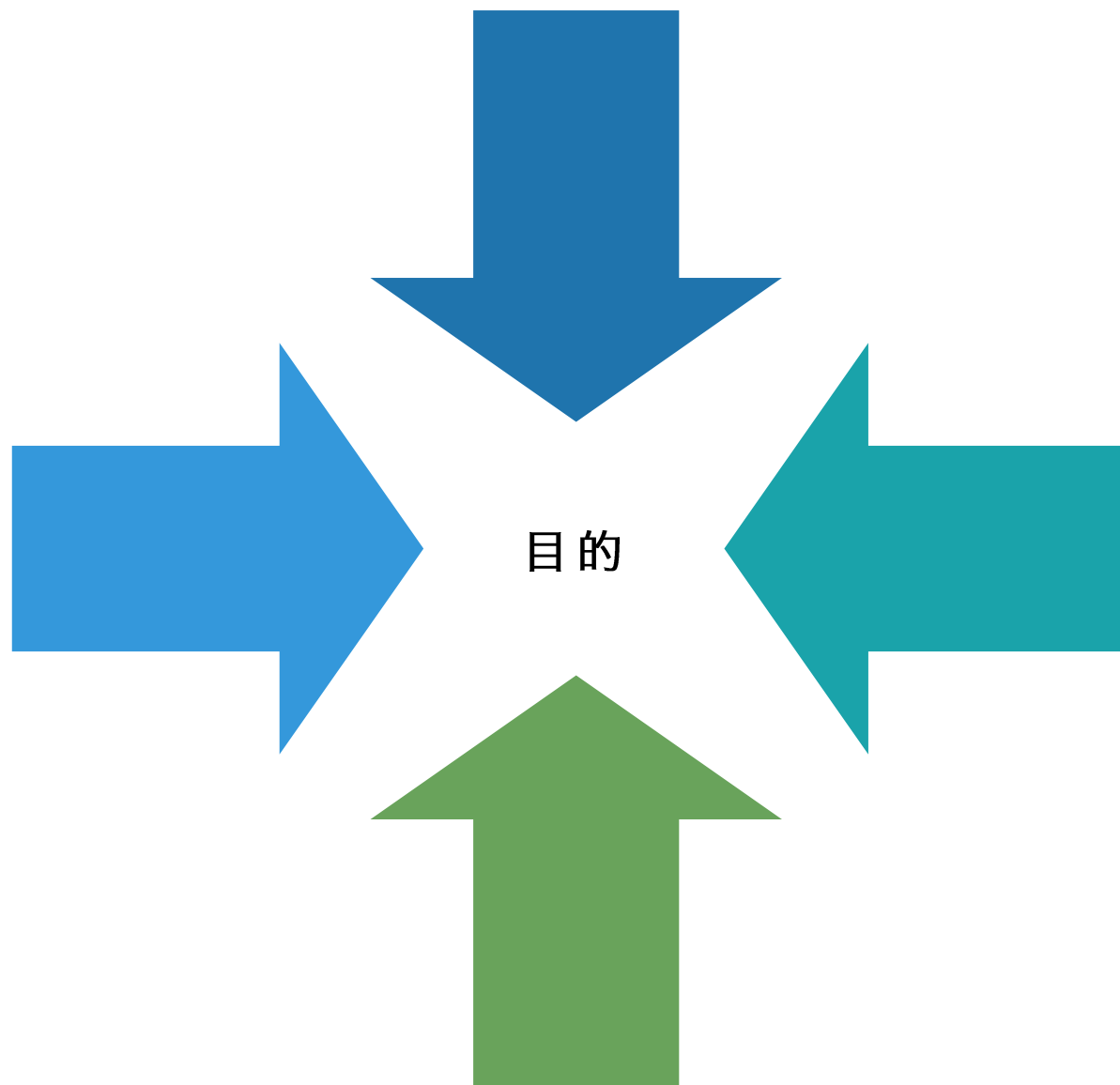
# BanyanDB的来源

[github.com/apache/skywalking-banyandb](https://github.com/apache/skywalking-banyandb)

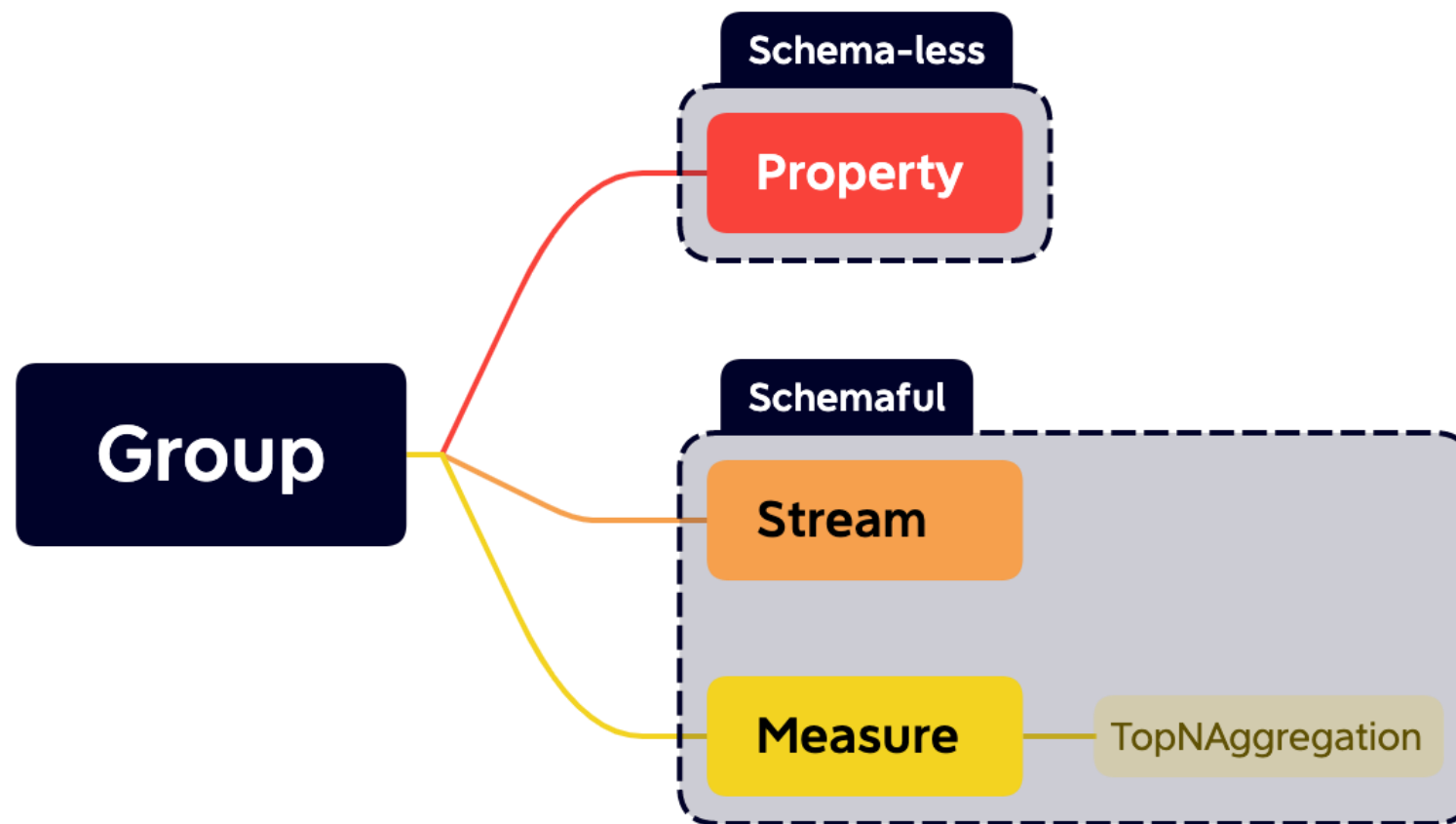




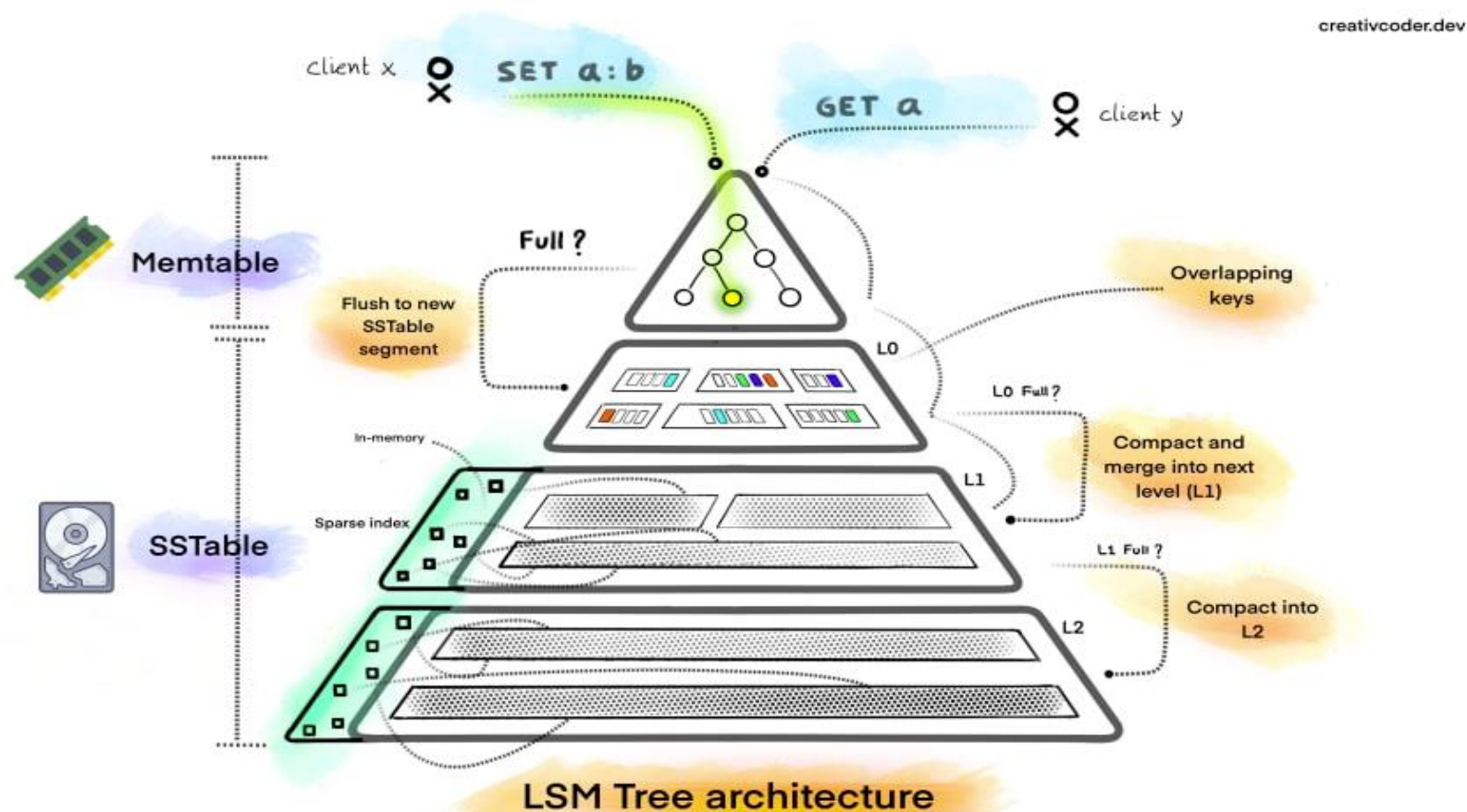
# 设计目标



# 数据模型



# LSM树



# 数据按需索引

2019-12-11T10:01:02.123456789Z {app="nginx",cluster="us-west1"} GET /about

**Timestamp**  
with nanosecond precision

**Prometheus-style Labels**  
key-value pairs

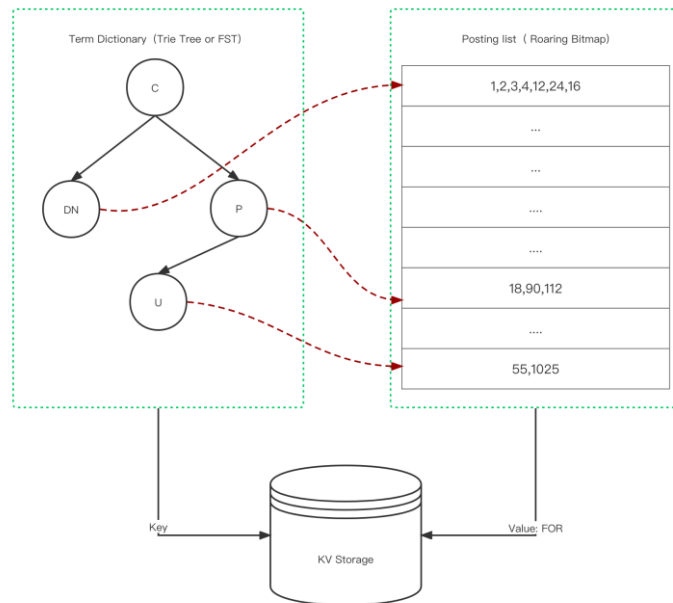
**Content**  
logline

indexed

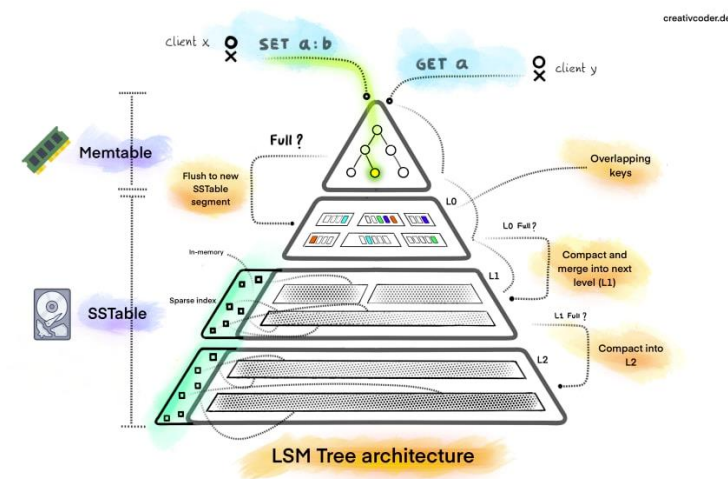
unindexed

# 索引的类型

## 反向索引



## 树索引 (LSM)



# 数据写入模式

`{component="printer",location="f2c16",level="error"} "Printing is not supported by this printer"`

Label key/values hashed to form Stream ID: 3b2cea09797978fc

The log entry is added to a "chunk"

Additional log messages with the same labels are added to the same "chunk":

`{component="printer",location="f2c16",level="error"} "Out of paper"`

`{component="printer",location="f2c16",level="error"} "Too much paper"`

Chunks are filled then compressed and stored:

Printing is not supported by this printer  
Out of paper  
Too much paper



Printing is not supported by this printer  
Out of paper  
Too much paper

A separate and small index is kept to lookup chunks

Different label keys or values will hash to a different stream and different chunk:

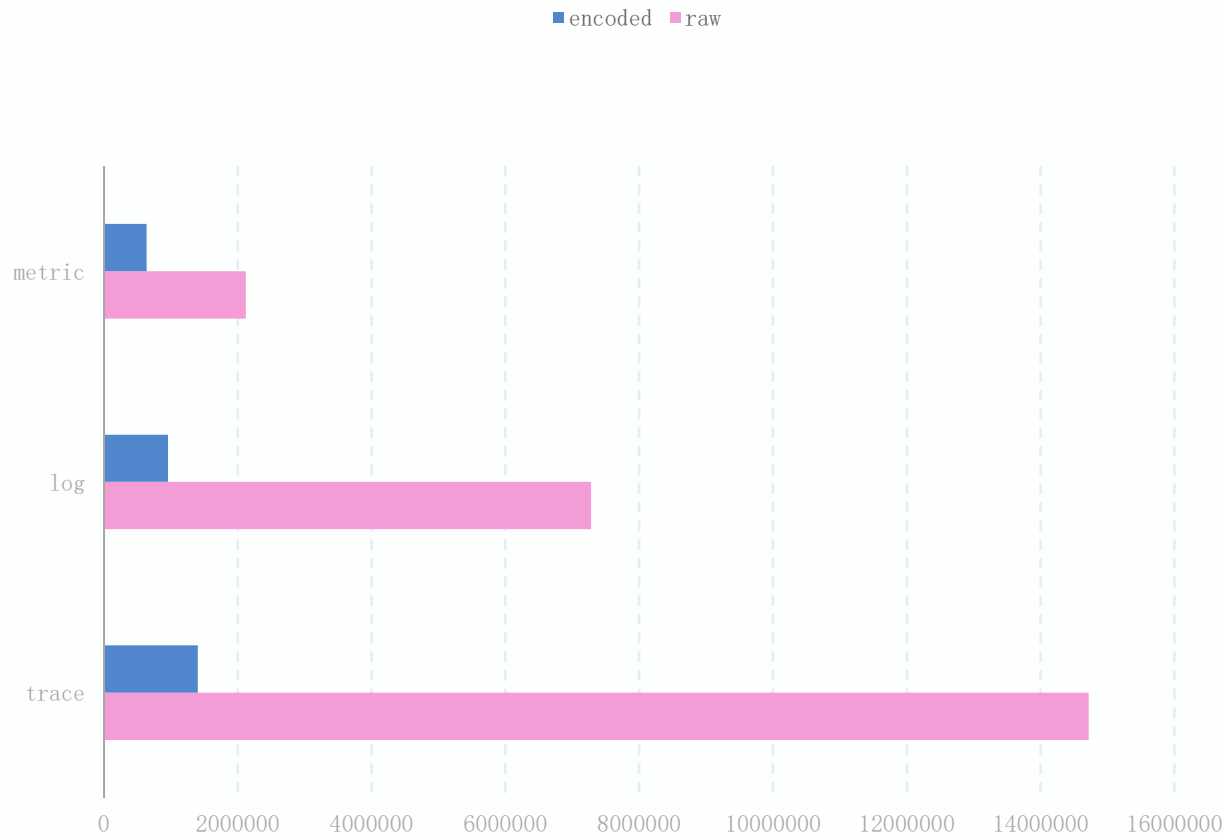
`{component="printer",location="f2c16",level="info"} "Consider the environment before printing this log message"`

fd9a709ddf43a93a



# 数据压缩效果

可观测性数据压缩率



# THANKS

SQL Server  
vertica  
D B 2  
G B a s e  
O r a c l e  
达梦数据库  
神舟通用  
KingbaseES

2010

2014

2018

openGauss  
OceanBase  
ArkDB  
RASESQL  
HotDB  
StellarDB  
QianBase xTP  
云树Shard  
GoldenDB  
DolphinDB  
MatrixDB  
DynamoDB  
SinoDB  
FastData  
Galaxybase  
KunDB  
GDB  
GaussDB  
PolarDB  
KunDB  
Spacture  
SequoiaDB  
OushuDB  
ArgoDB  
开务数据库  
GreatDB  
MongoDB  
TDSQL  
TiDB  
Tapdata  
StarRocks  
UbiSQL