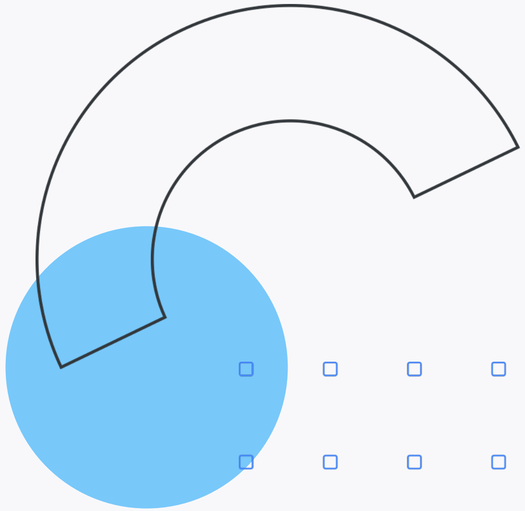
Databend

Databend 新 Hashtable 的设计和实现

主讲人：崔子龙

2022.11



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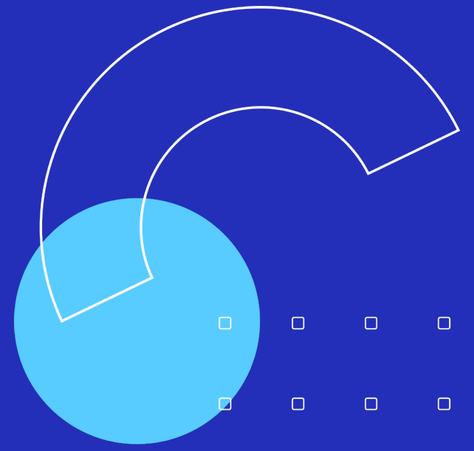
自我介绍

Databend

- 崔子龙
  - 开源之夏2022“为 Databend 增加 String Adaptive Hash Table”项目参与者



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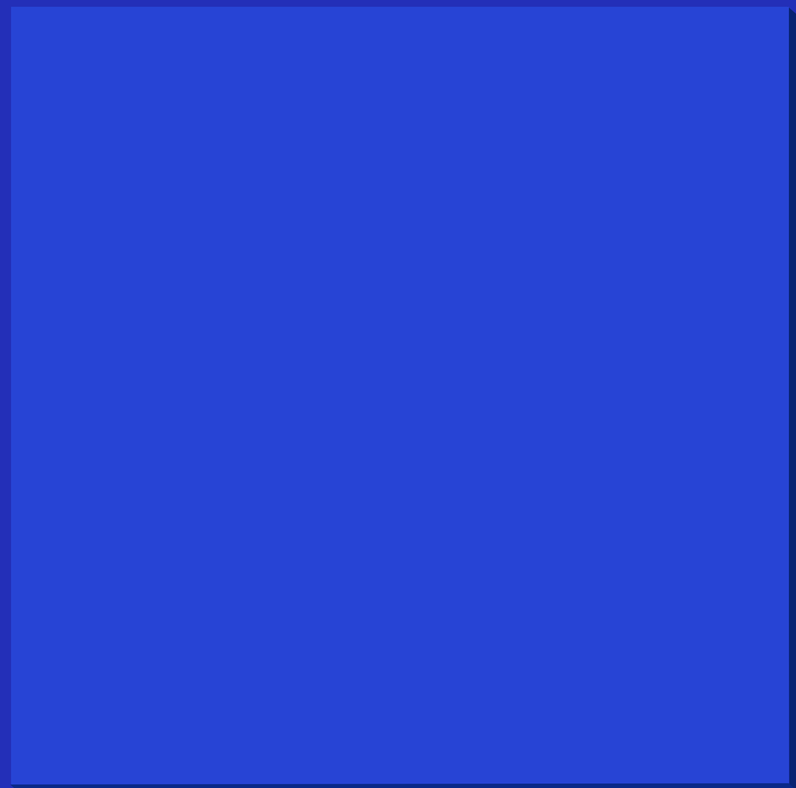
设计目标



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设计目标

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- 仅需要插入、删除和迭代
- 键包括整数和字符串两类
- String Adaptive Hash Table：根据字符串键的长度优化哈希表
- 新的 API

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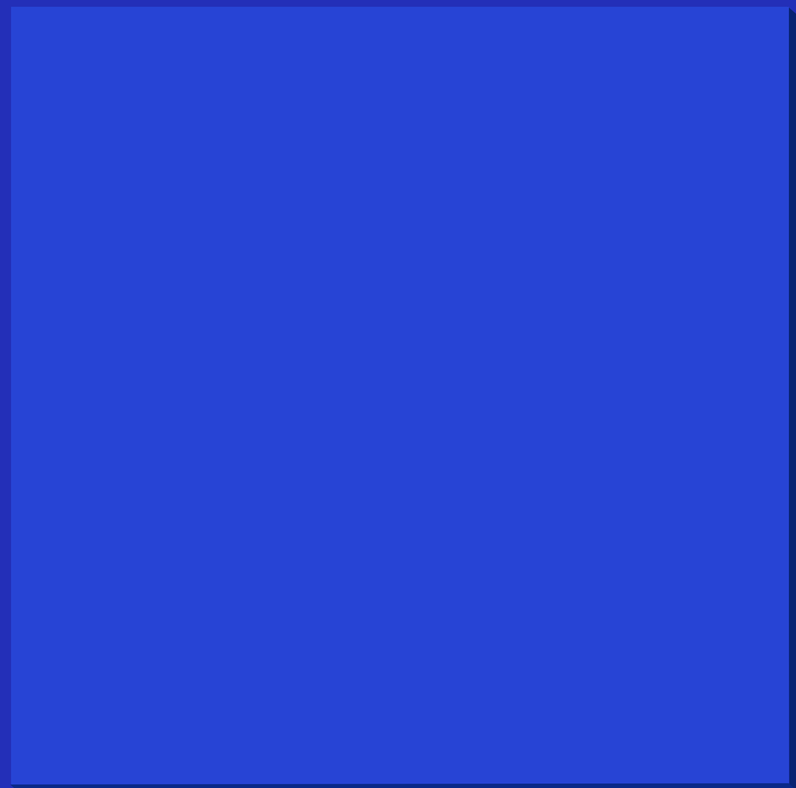
实现细节



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碰撞处理

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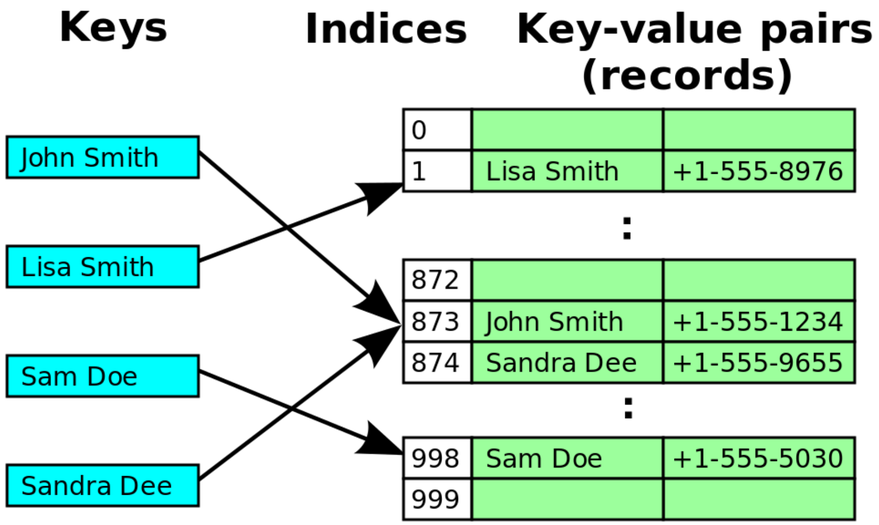
- 线性探测
- 二倍扩容



https://upload.wikimedia.org/wikipedia/commons/9/90/HASHTB12.svg

String Adaptive Hash Table

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- https: //doi.org/10.3390/app10061915
- 根据字符串长度确定不同的存储方式。

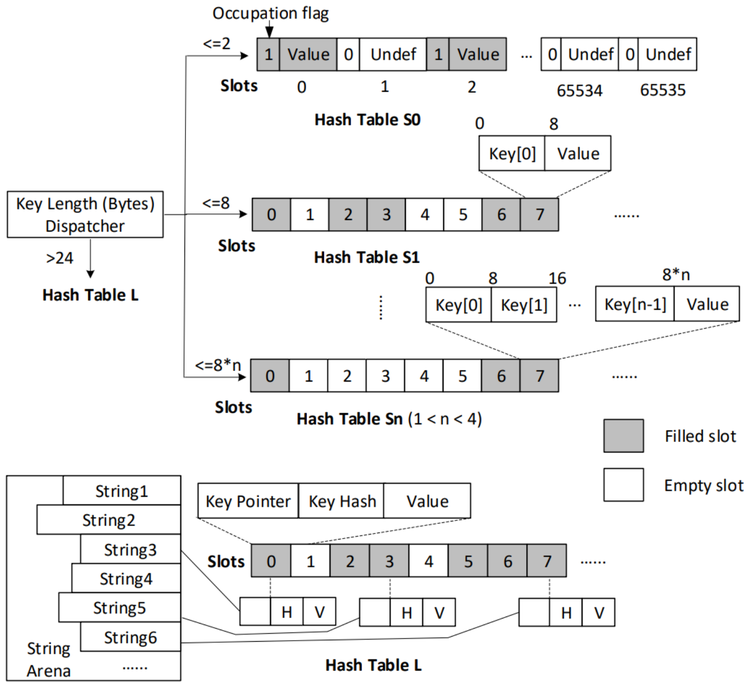

Figure 5. Architecture of SAHA with multiple hash tables to store strings with different length ranges.

哈希函数

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- AHasher
- CRC
- 32 bit or 64 bit?

内存分配

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- mmap：MAP_POPULATE
- mremap：madvise, MADV_POPULATE_WRITE (since Linux Kernel 5.14)

向量化

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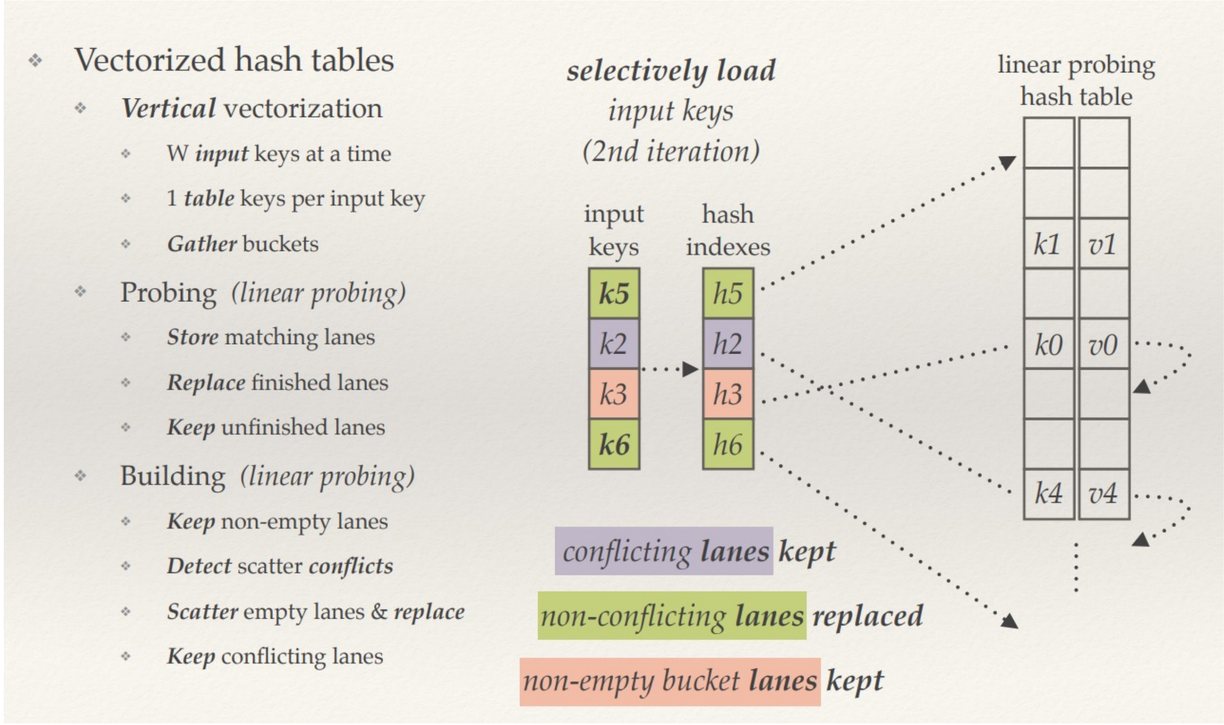
- 起源：Rethinking SIMD Vectorization for In-Memory Databases，
  https://www.cs.columbia.edu/~orestis/sigmod15.pdf
- gather, scatter
- 冲突检测
- 停顿在gather上



http://www.cs.columbia.edu/~orestis/sigmod15slides.pdf

新 API

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- 减少暴露裸指针，用生命周期保证安全性
- GAT

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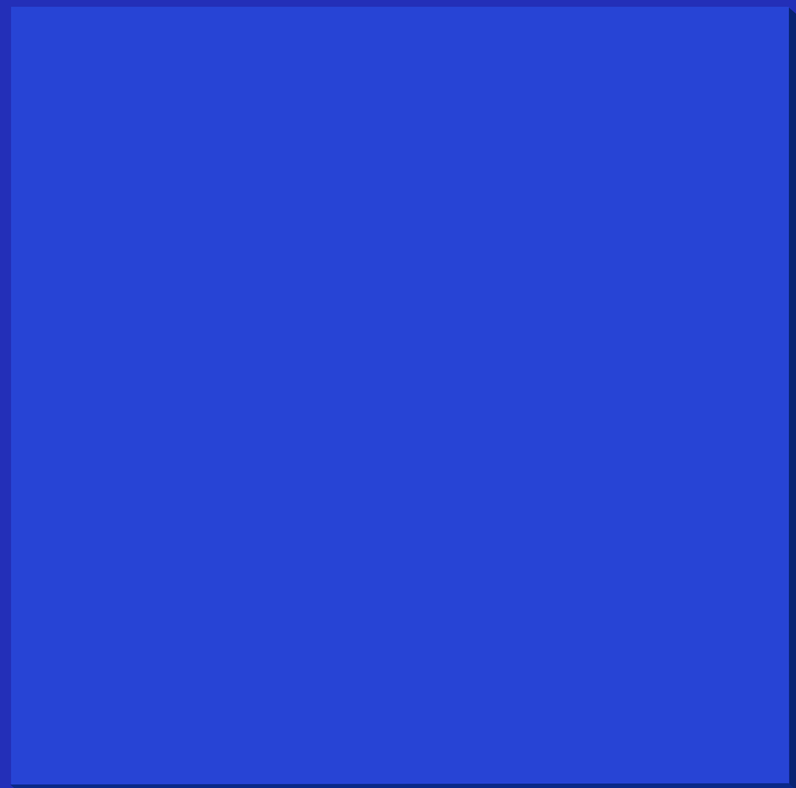
性能分析



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性能分析

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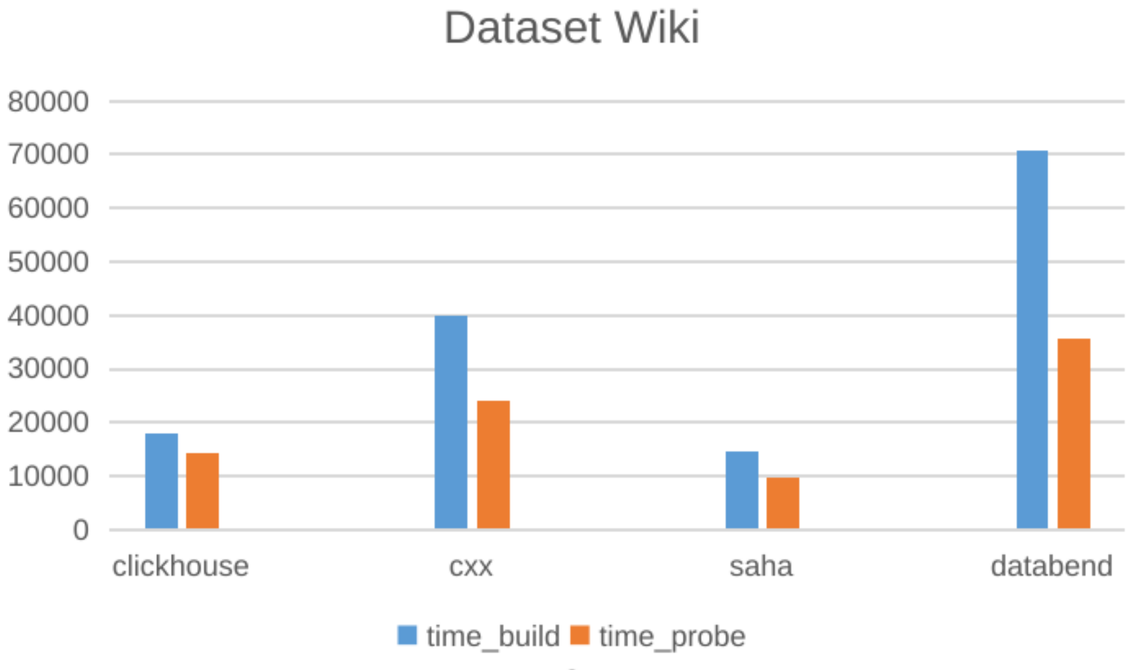

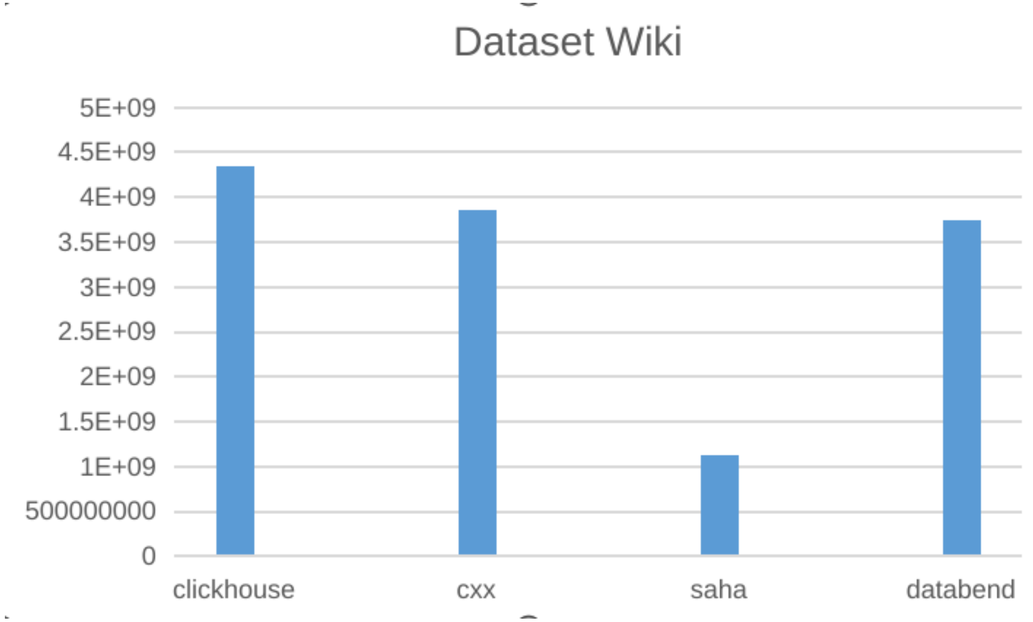

memory

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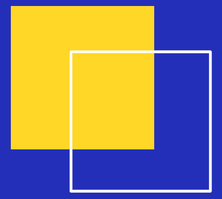
Q & A



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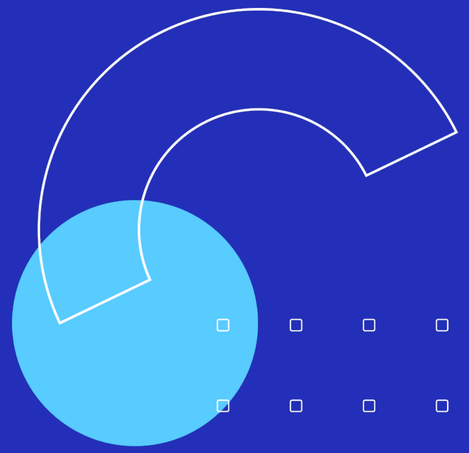
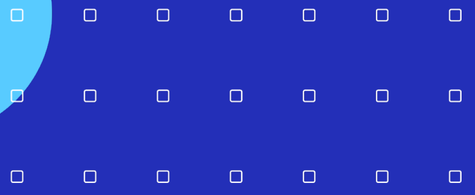
THANKS!





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