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Data Stream Processing

Simone Mancini   Francesco Ottaviano   Andrea Silvi

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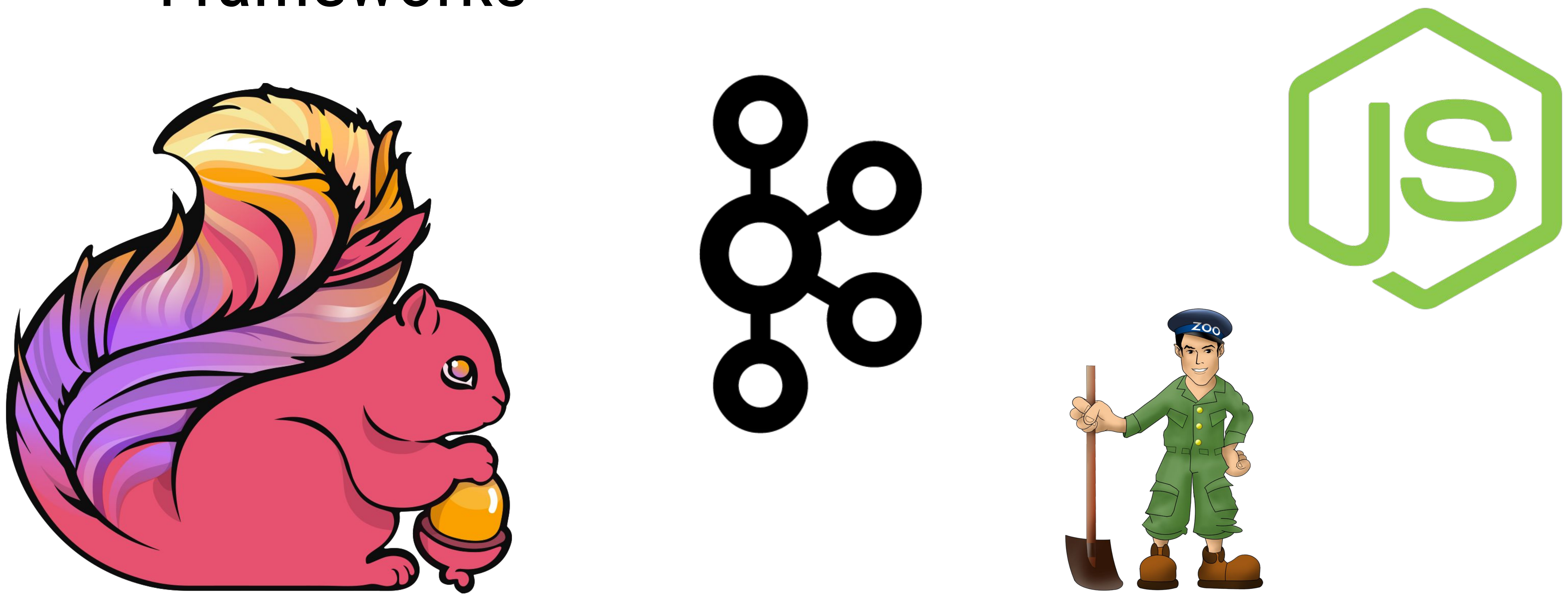
Design Choices

Frameworks

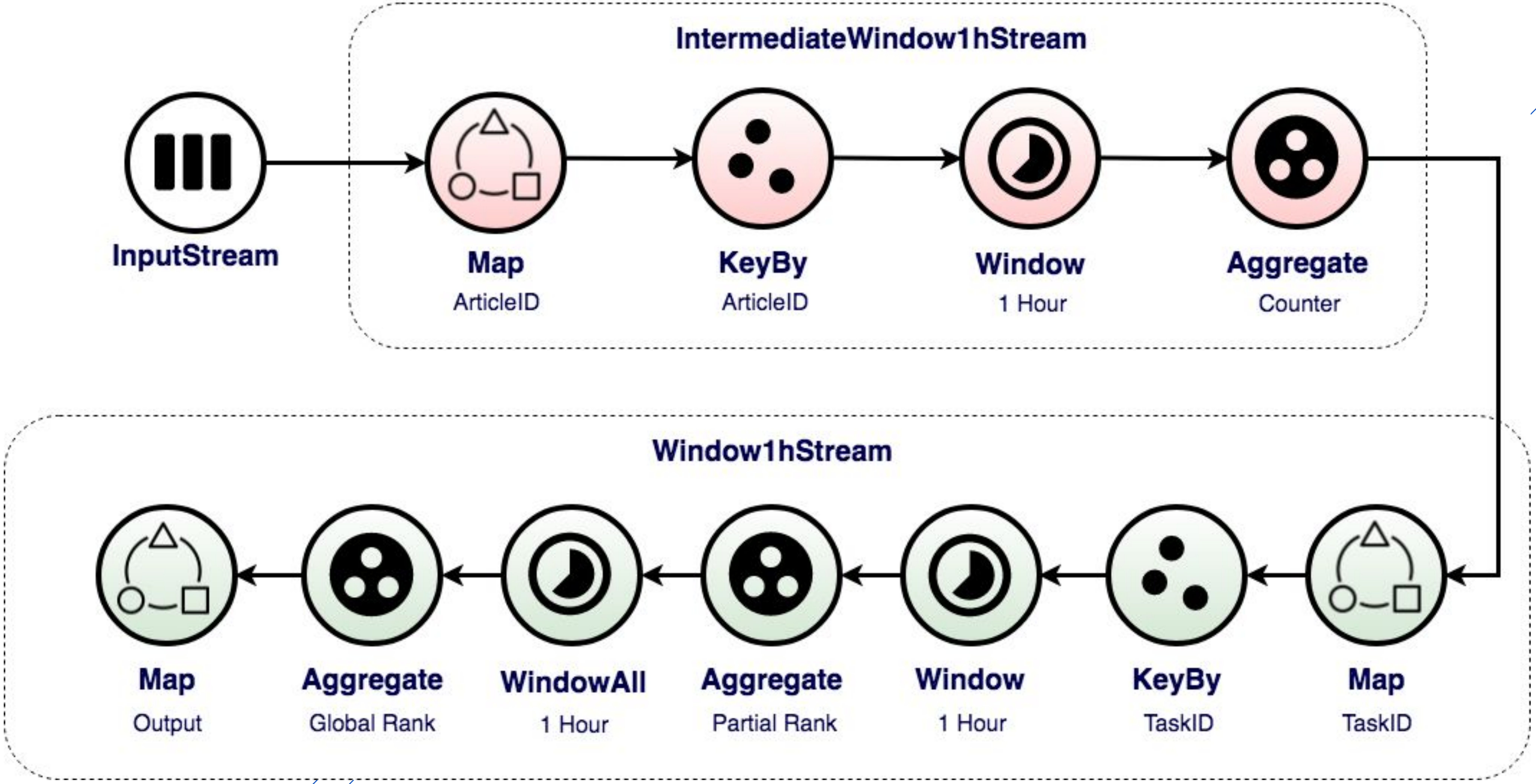


Programming Languages

Store

Queries

Query 1 - DAG


IntermediateWindow1hStream
InputStream
Map
ArticleID
KeyBy
ArticleID
Window
1 Hour
Aggregate
Counter
Window1hStream
Map
Output
Aggregate
Global Rank
WindowAll
1 Hour
Aggregate
Partial Rank
Window
1 Hour
KeyBy
TaskID
Map
TaskID

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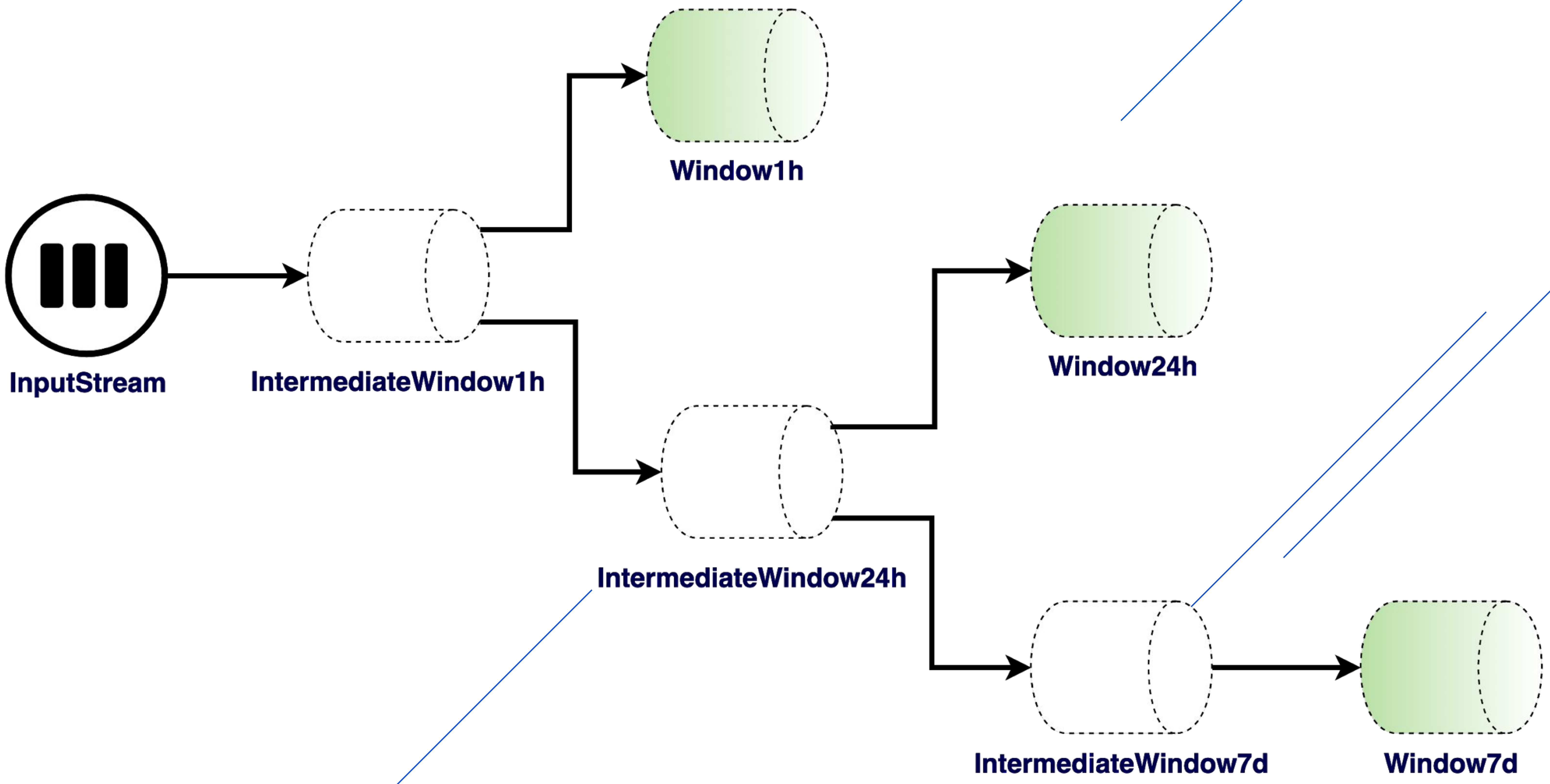
Query 1 - Chaining



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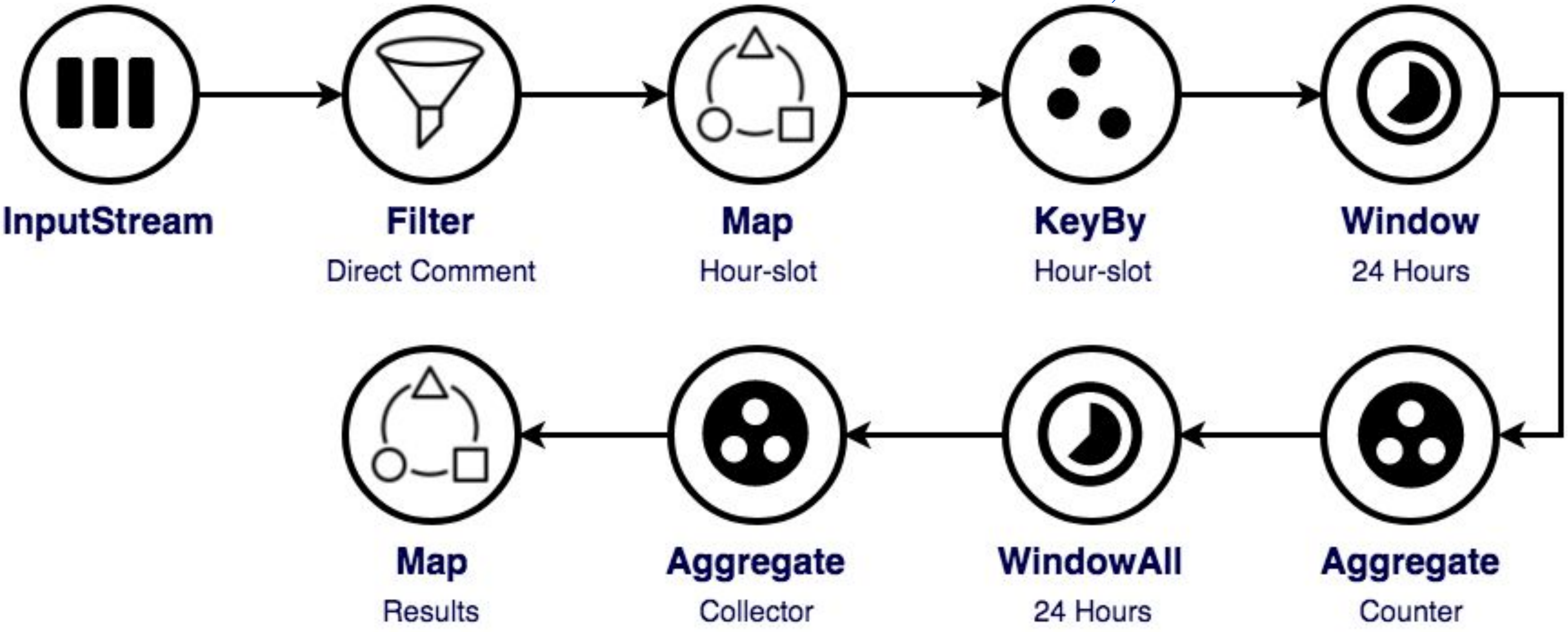
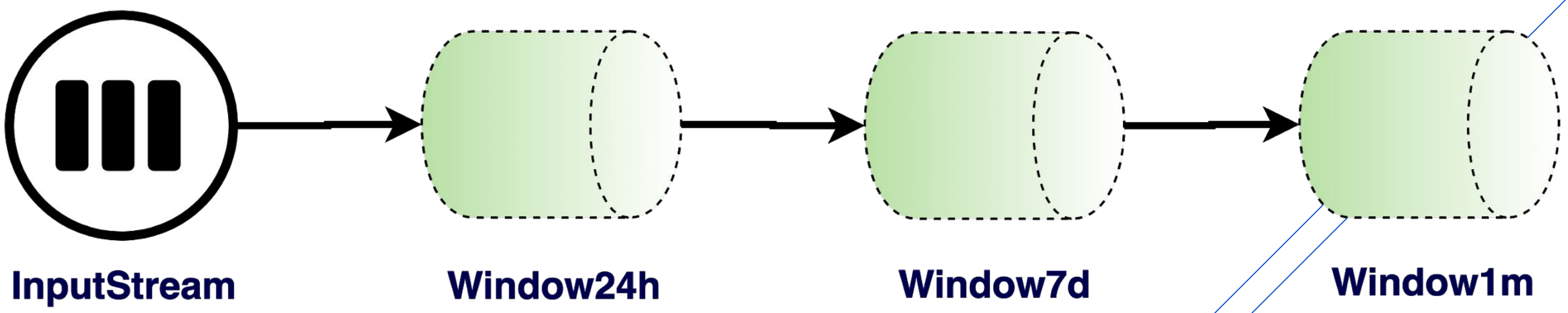
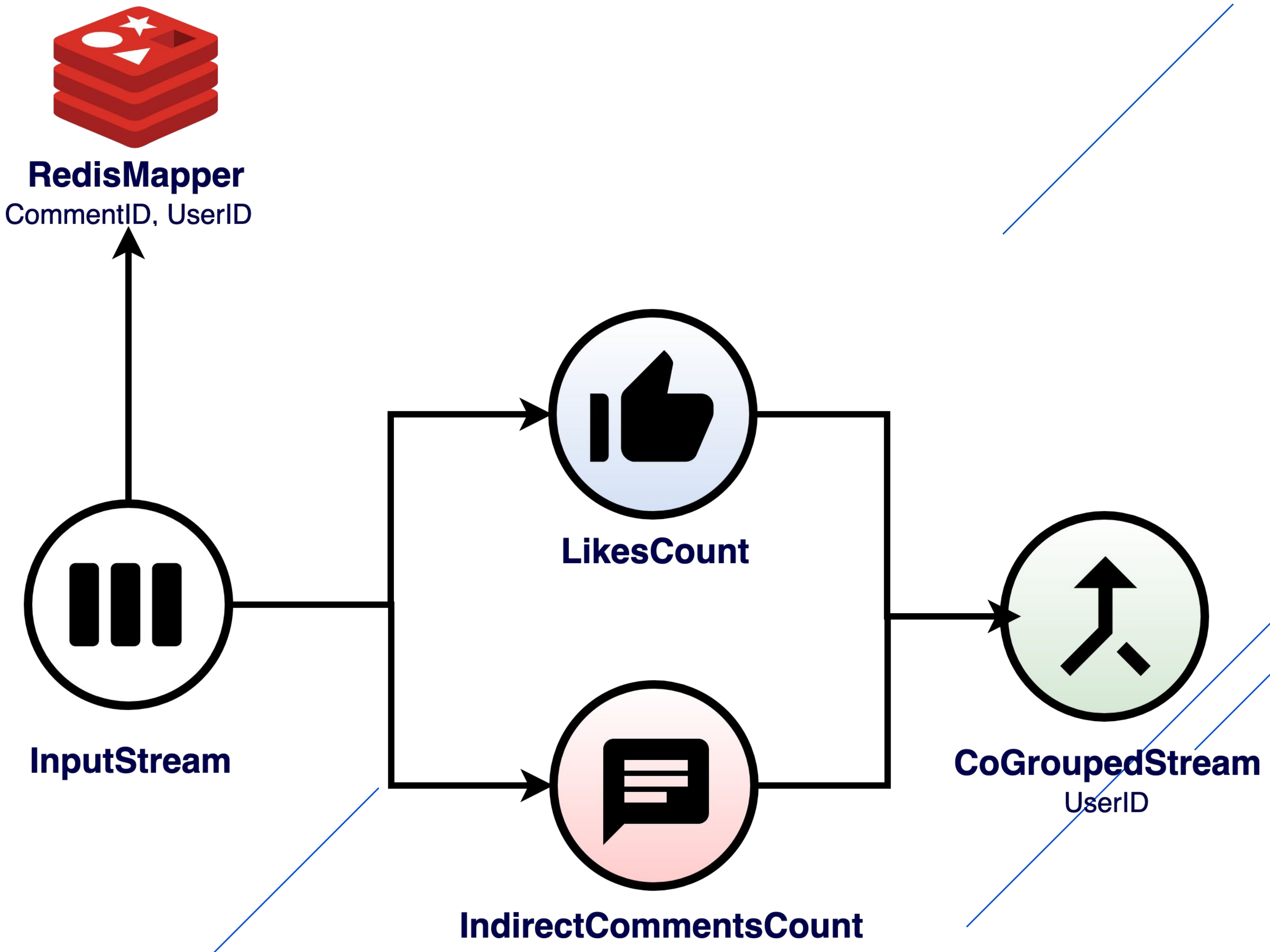
Query 2 - DAG



Query 2 - Chaining



Query 3 - DAG


RedisMapper
CommentID, UserID
InputStream
LikesCount
IndirectCommentsCount
CoGroupedStream
UserID

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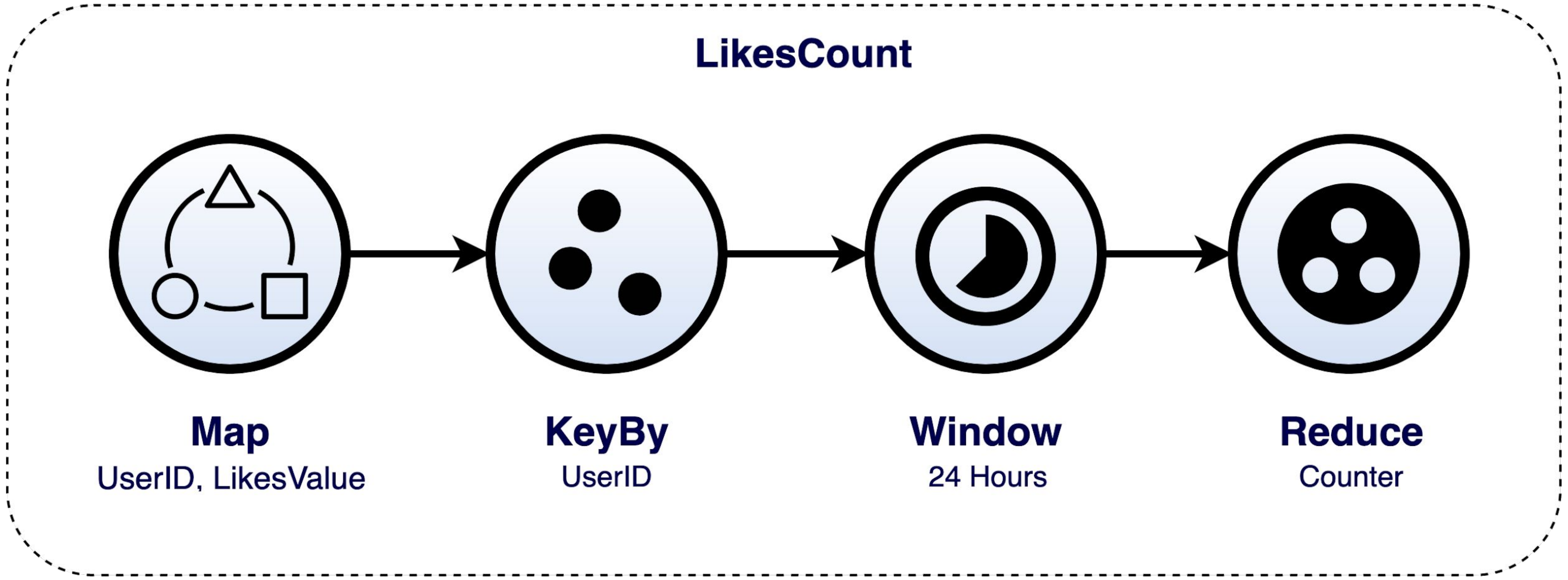
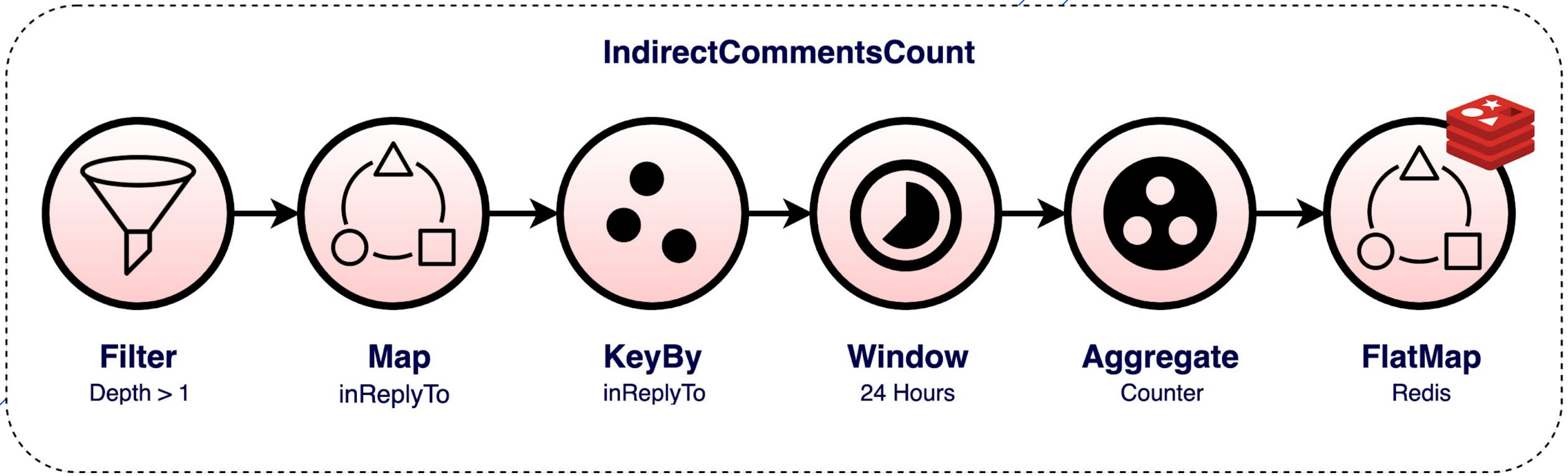
Query 3 - DAG





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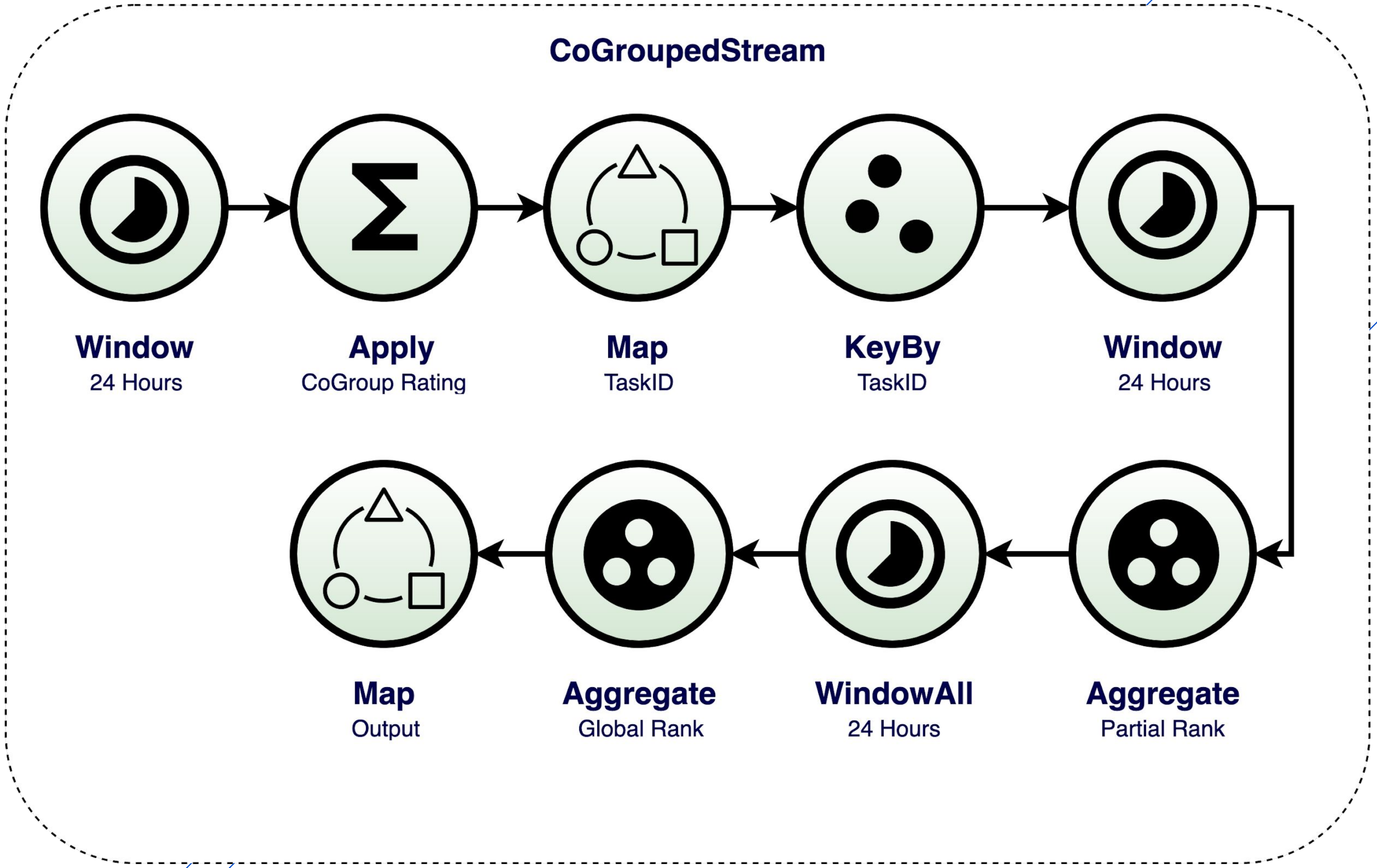
Query 3 - DAG



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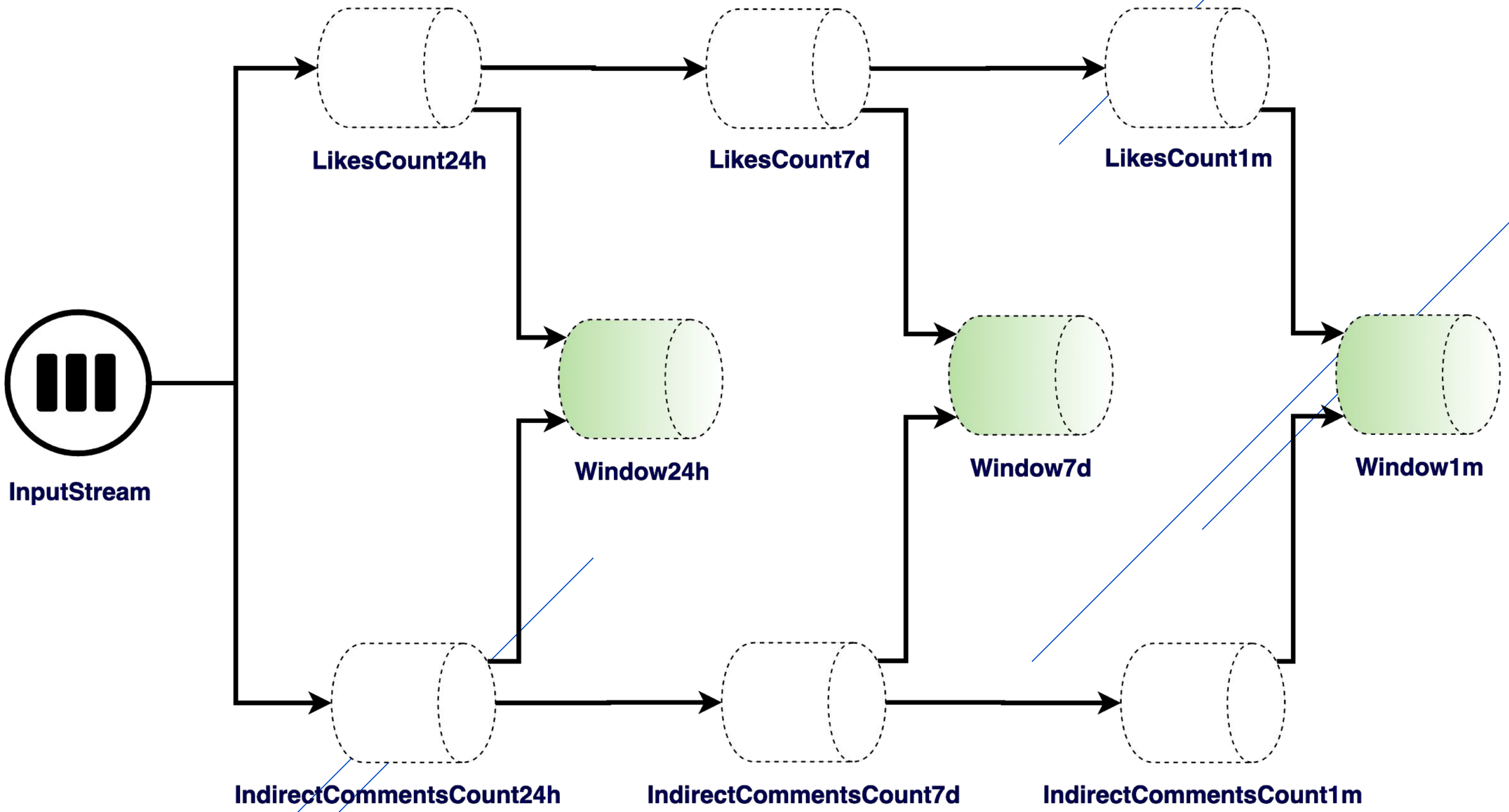
Query 3 - Chaining



Kafka Streams

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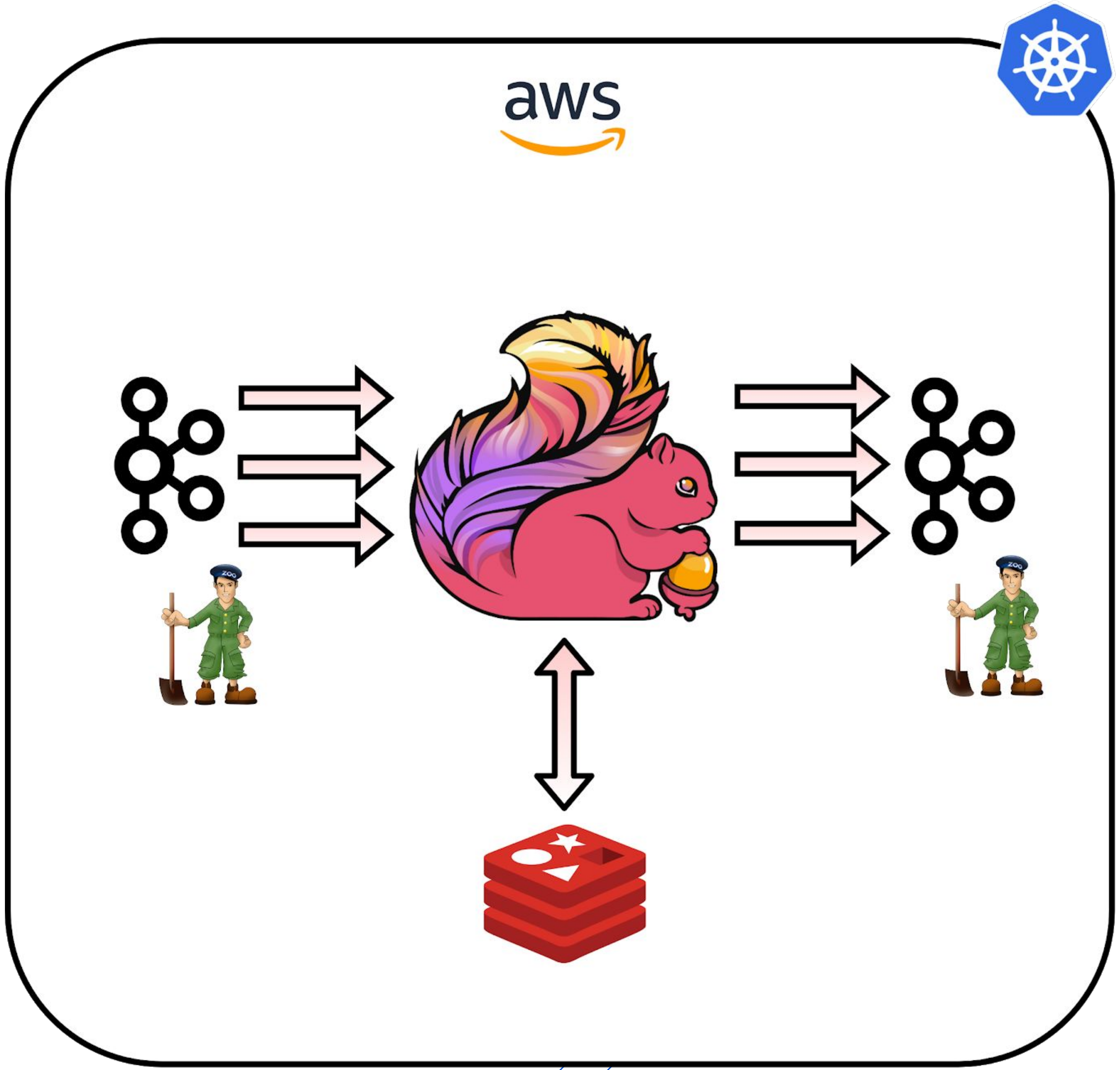
KAFKA STREAMS

- Different approach: *Kstreams* and *Ktable*
- Different ranking solution
- Parallelism
- *Suppress* in chaining mode limitations
- Custom Serde

Architecture

Architecture



- *m4.large EC2 instances*
  - 2,4 GHz Intel Xeon E5-2676 v3 Processor
  - 2 vCPU, 8GiB Mem
- *Kubernetes*
  - *Kafka*: 1 node per machine, 3 nodes with replication factor 3 on topics.
  - *Zookeeper*: 1 node per machine, 3 nodes.
  - *Flink*: 1 job manager, 8 task manager.

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Simulator

- Emulates data stream processing compressing time
- *NodeJS*
- *CreateDate* as tuple creation time

Evaluations

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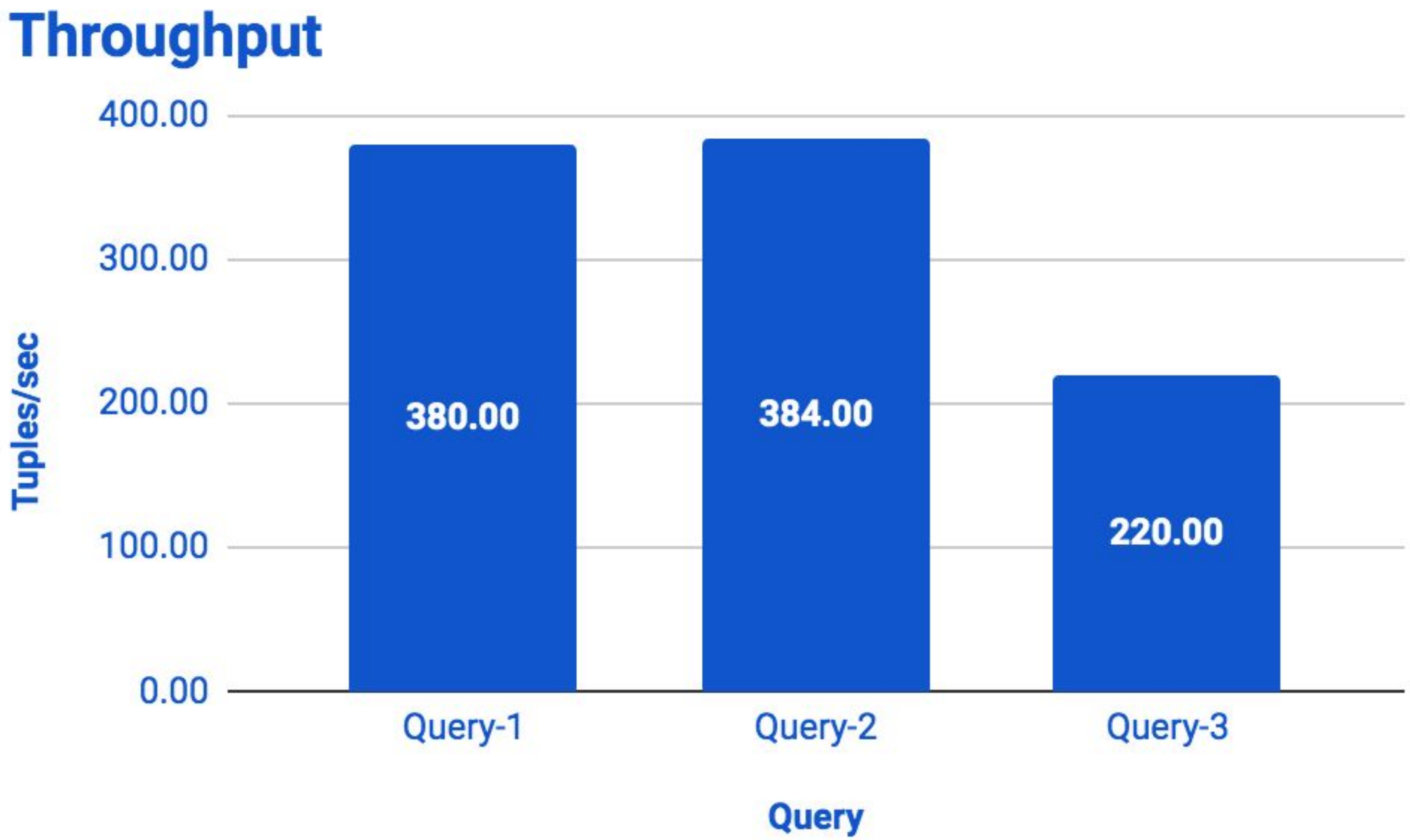
Apache Flink - Throughput



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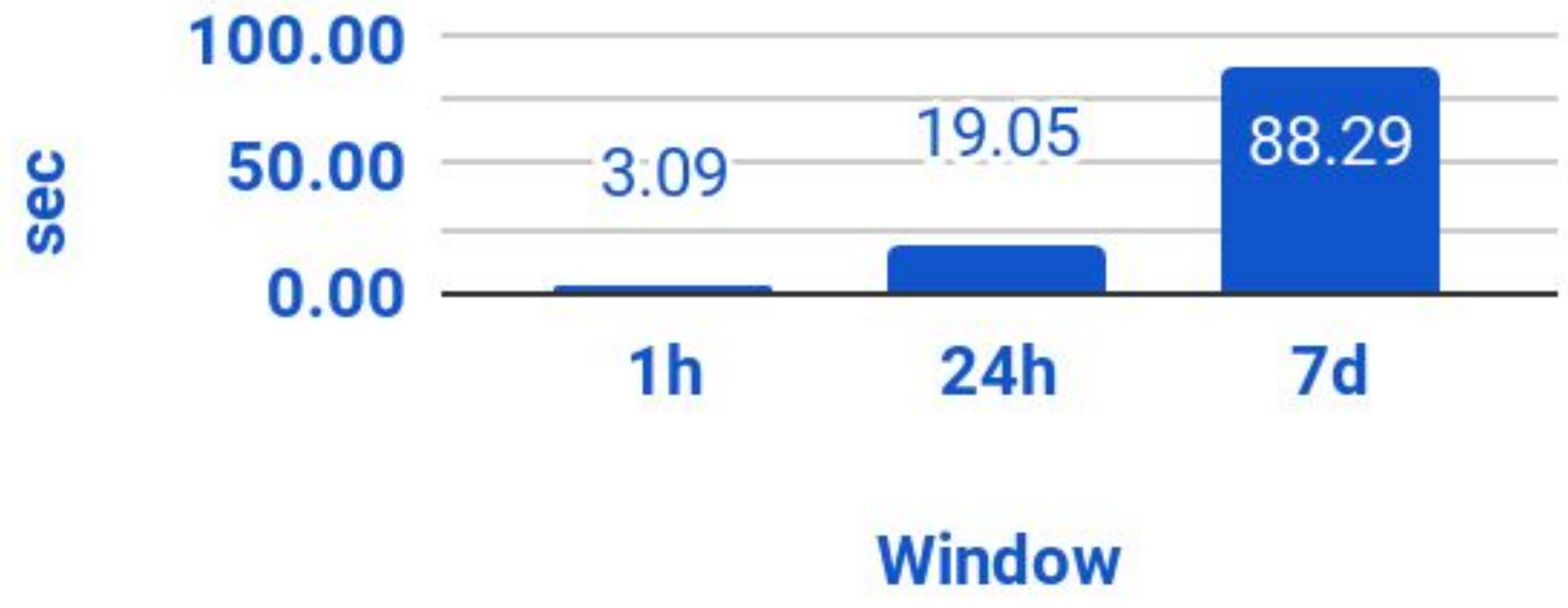
Apache Flink - Latency

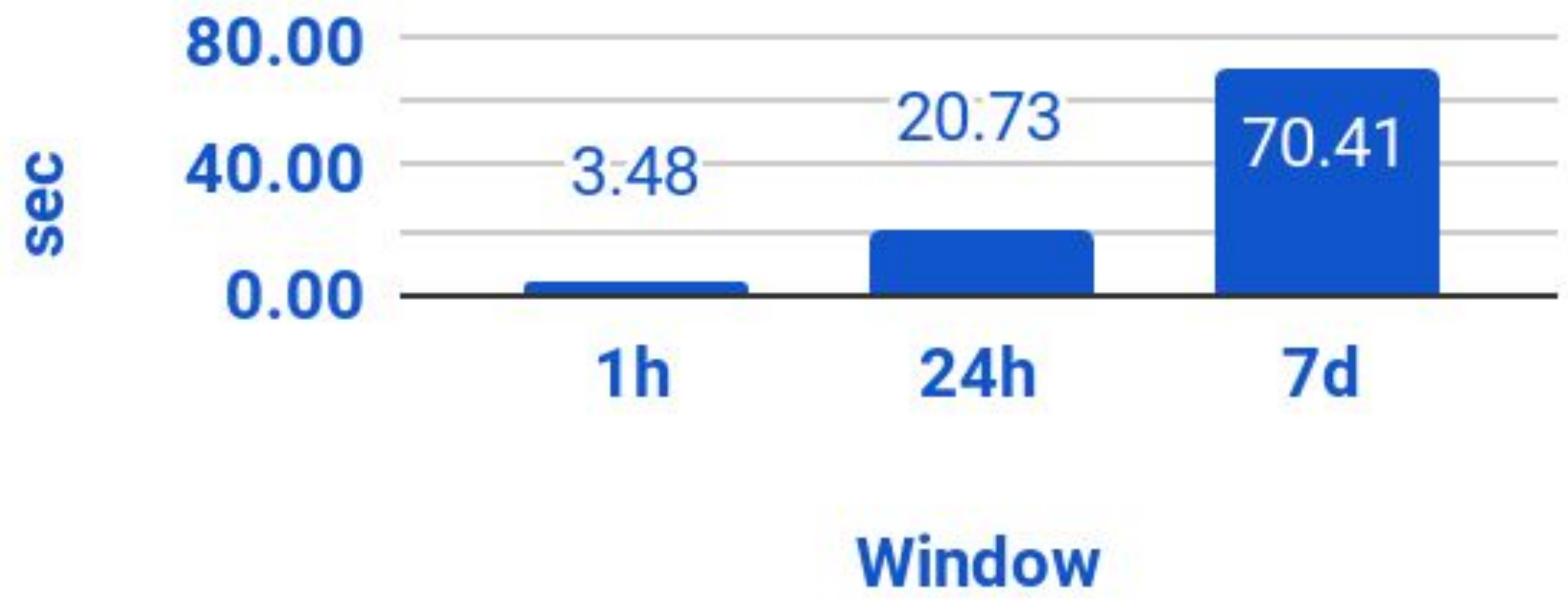
Query 1

10.000 compression



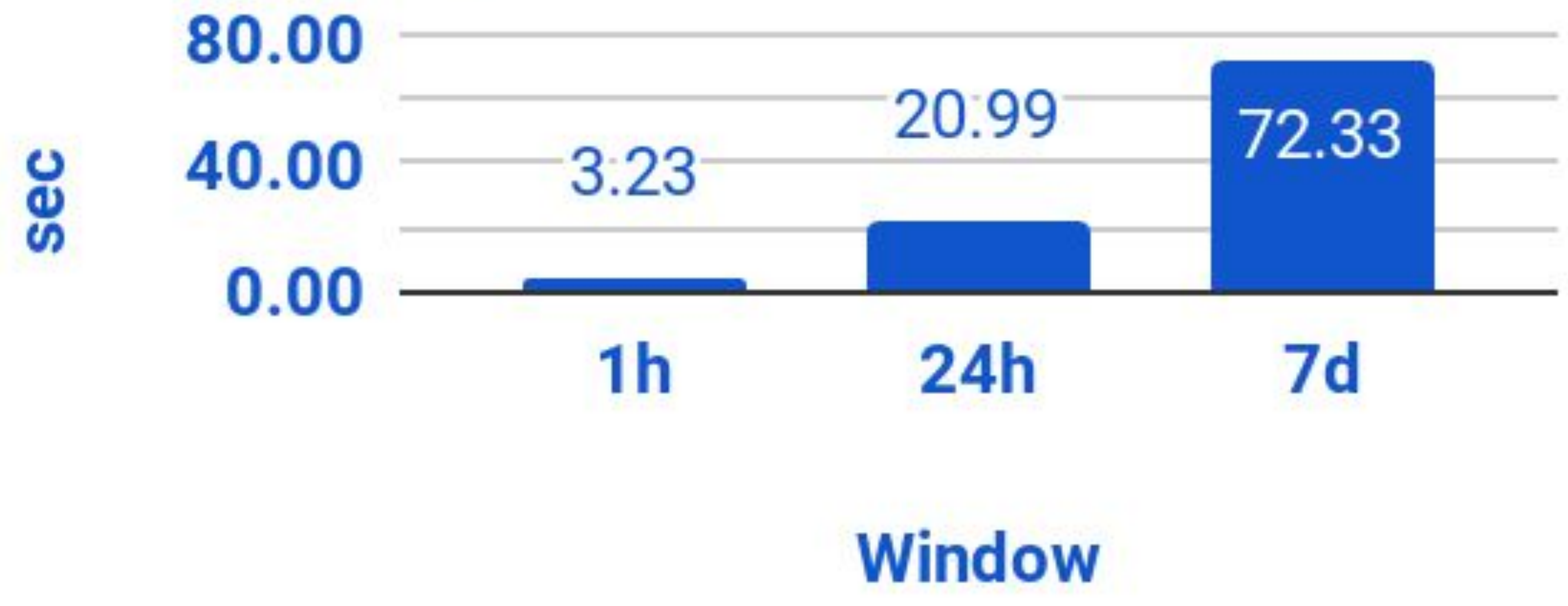
Query 1

50.000 compression



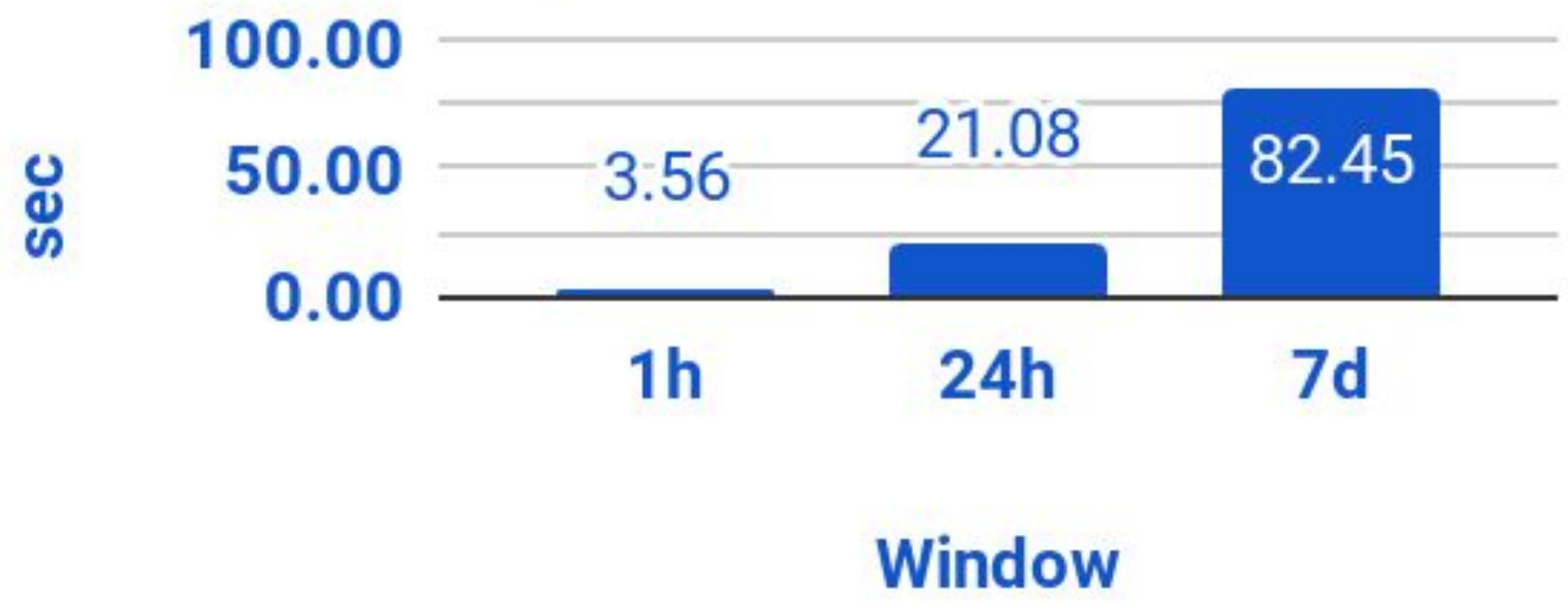
Query 1

100.000 compression

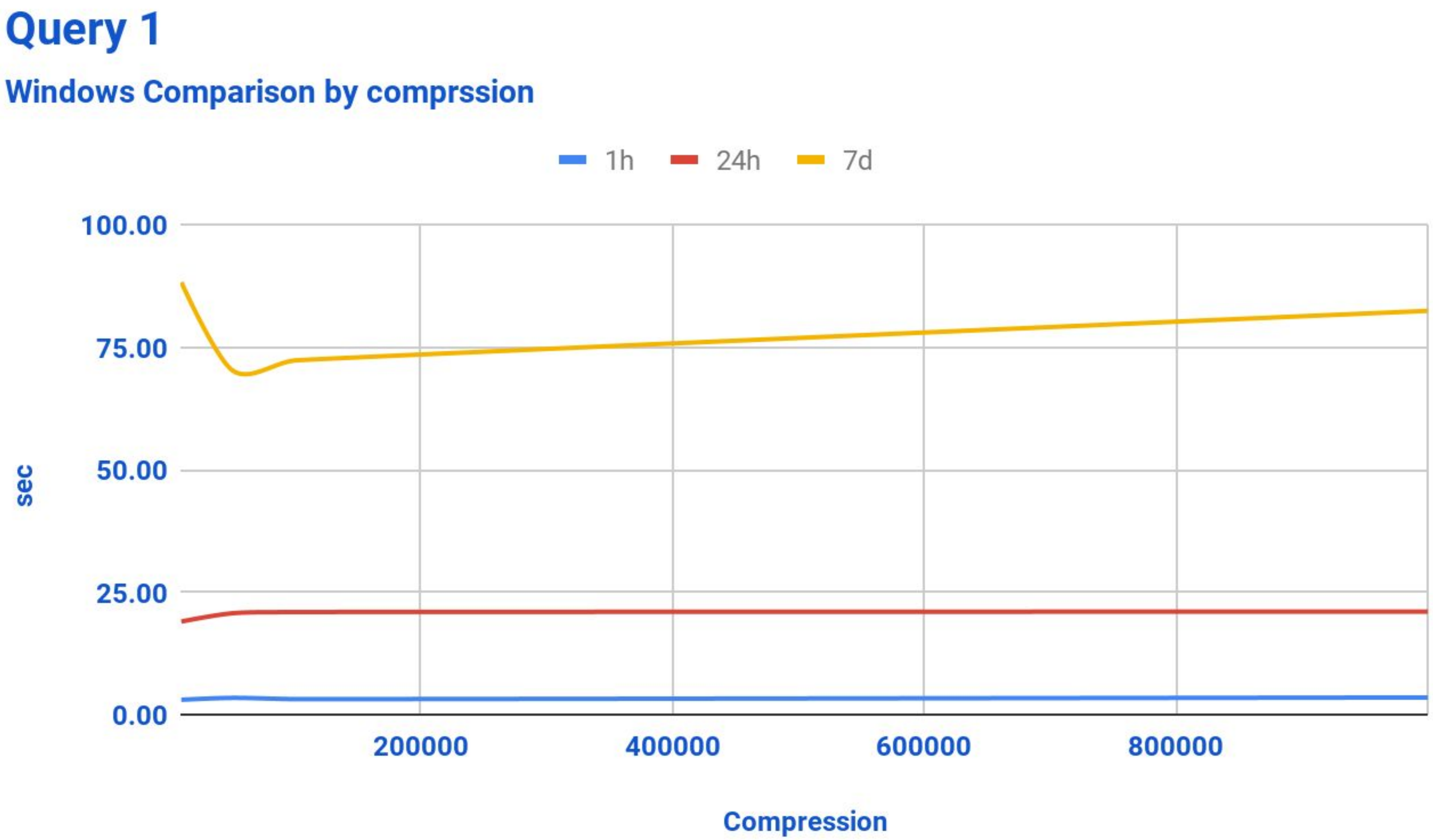


Query 1

1.000.000 compression



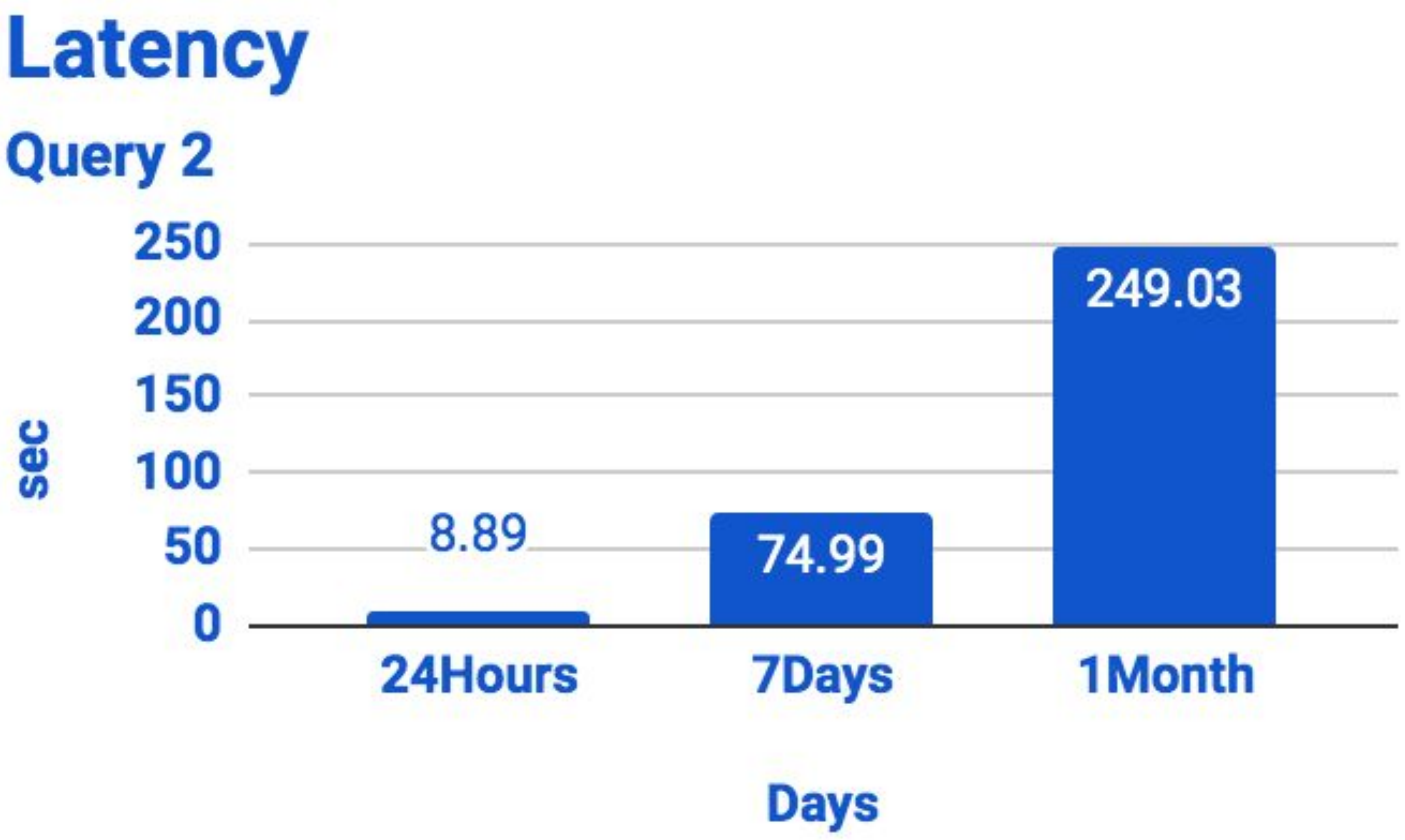
Apache Flink - Latency

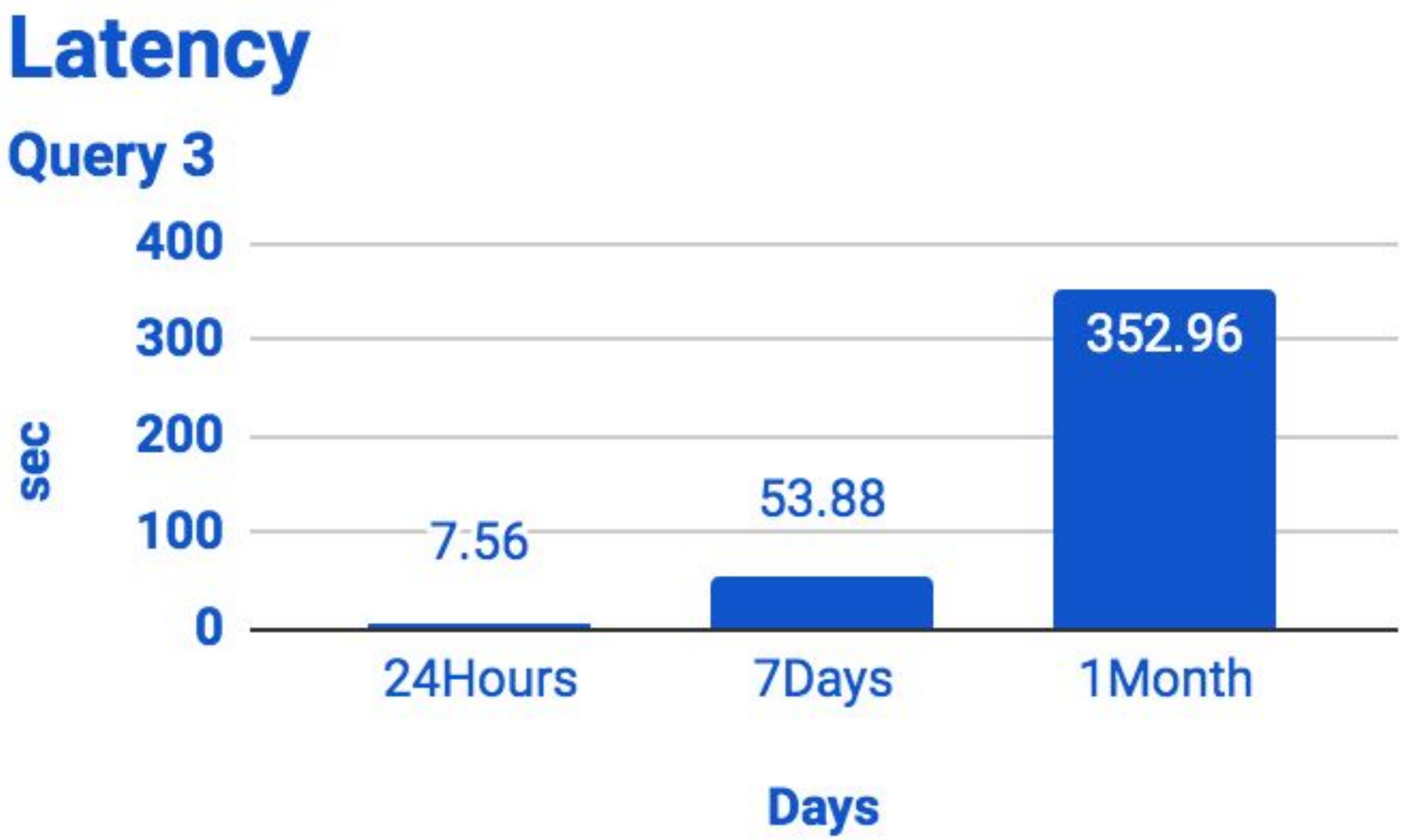


Query 1

Windows Comparison by comprssion

Apache Flink - Latency





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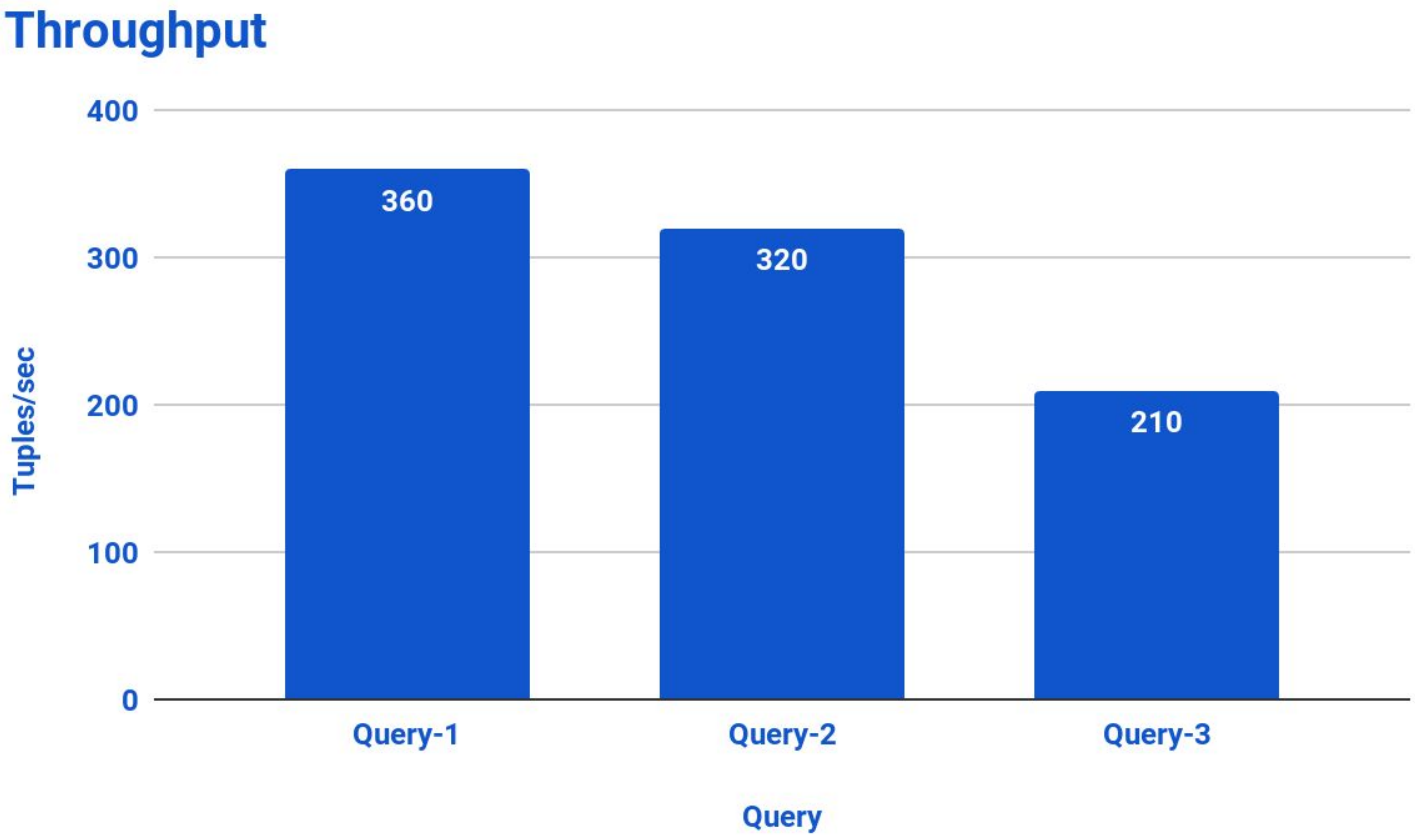
KafkaStreams - Throughput



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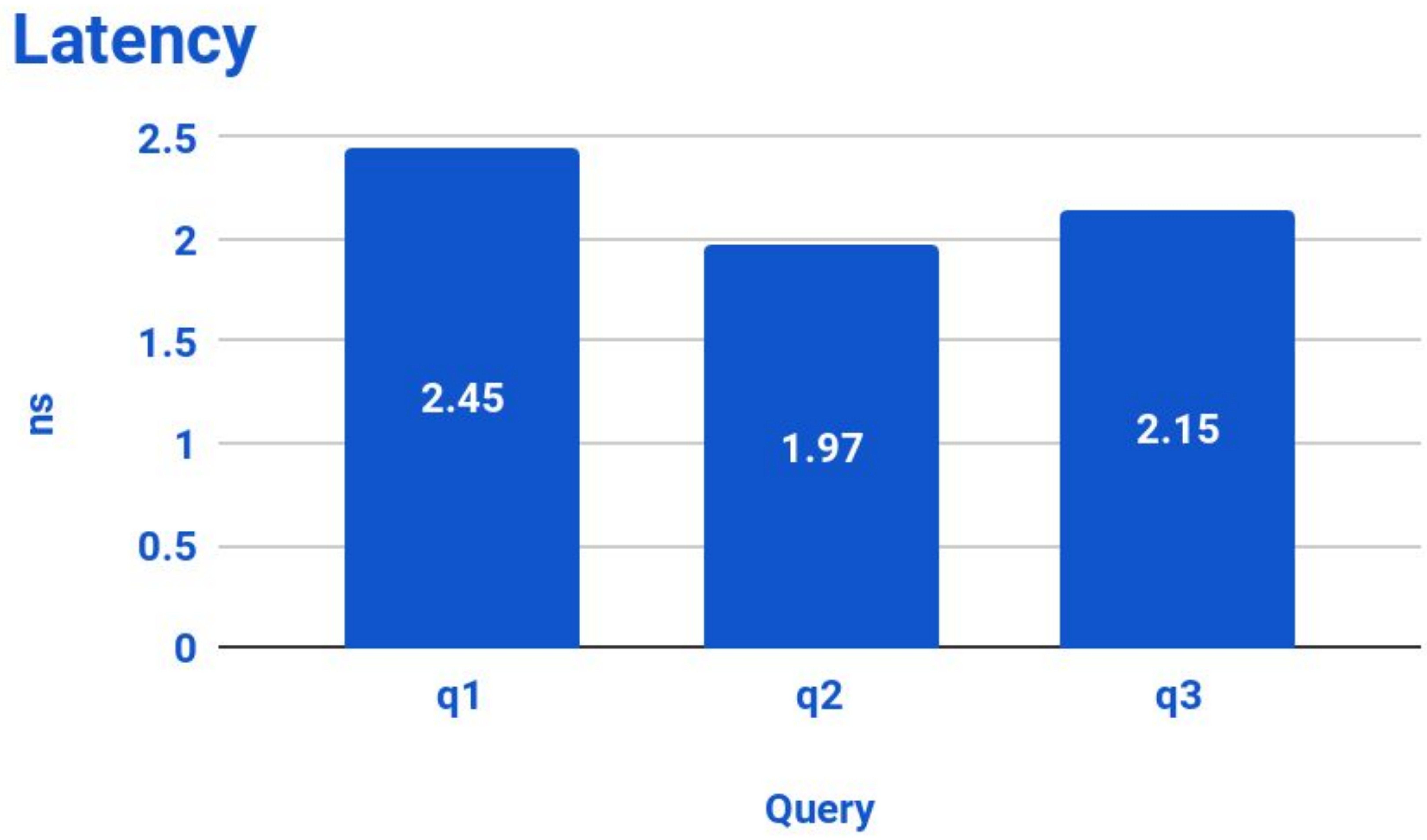
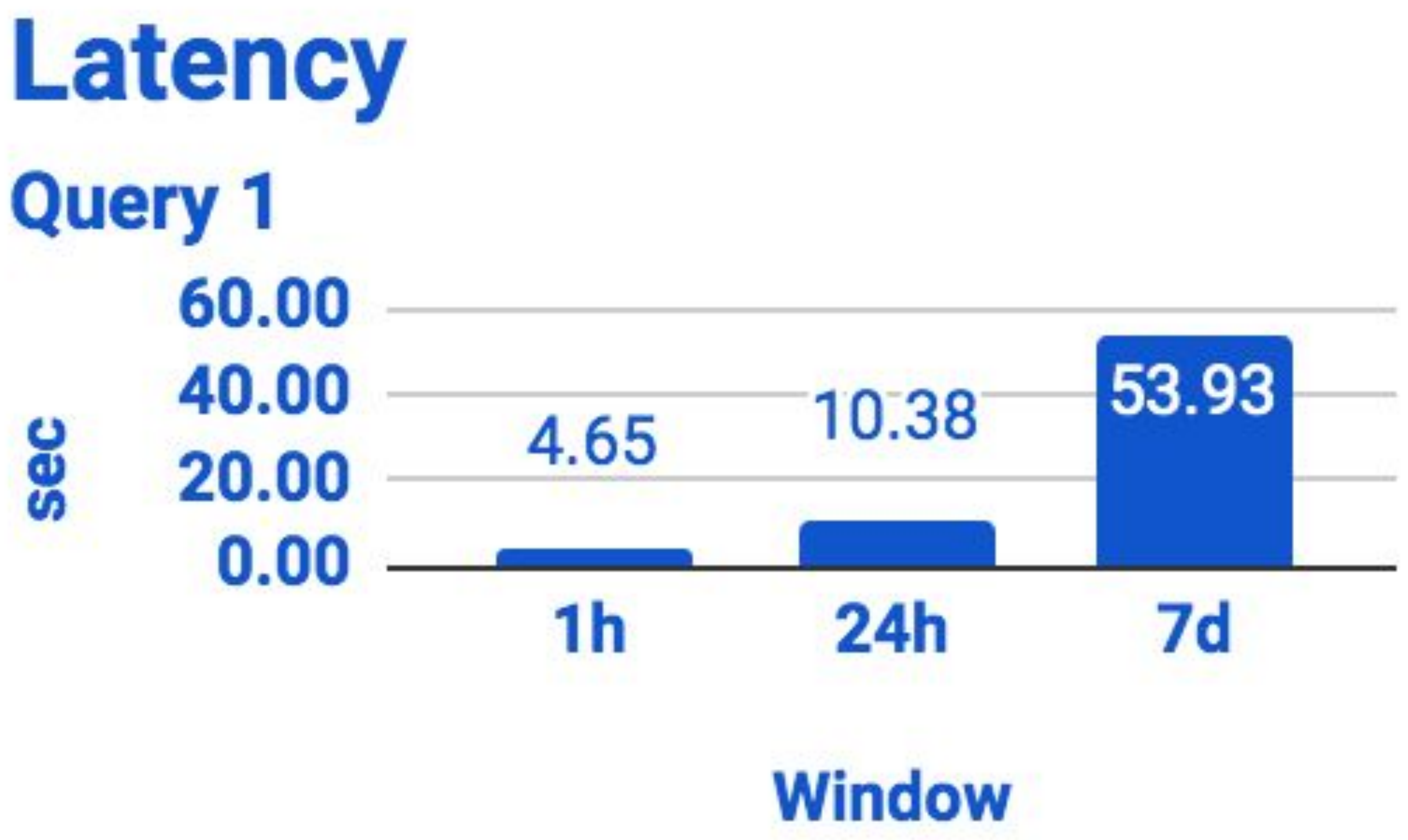
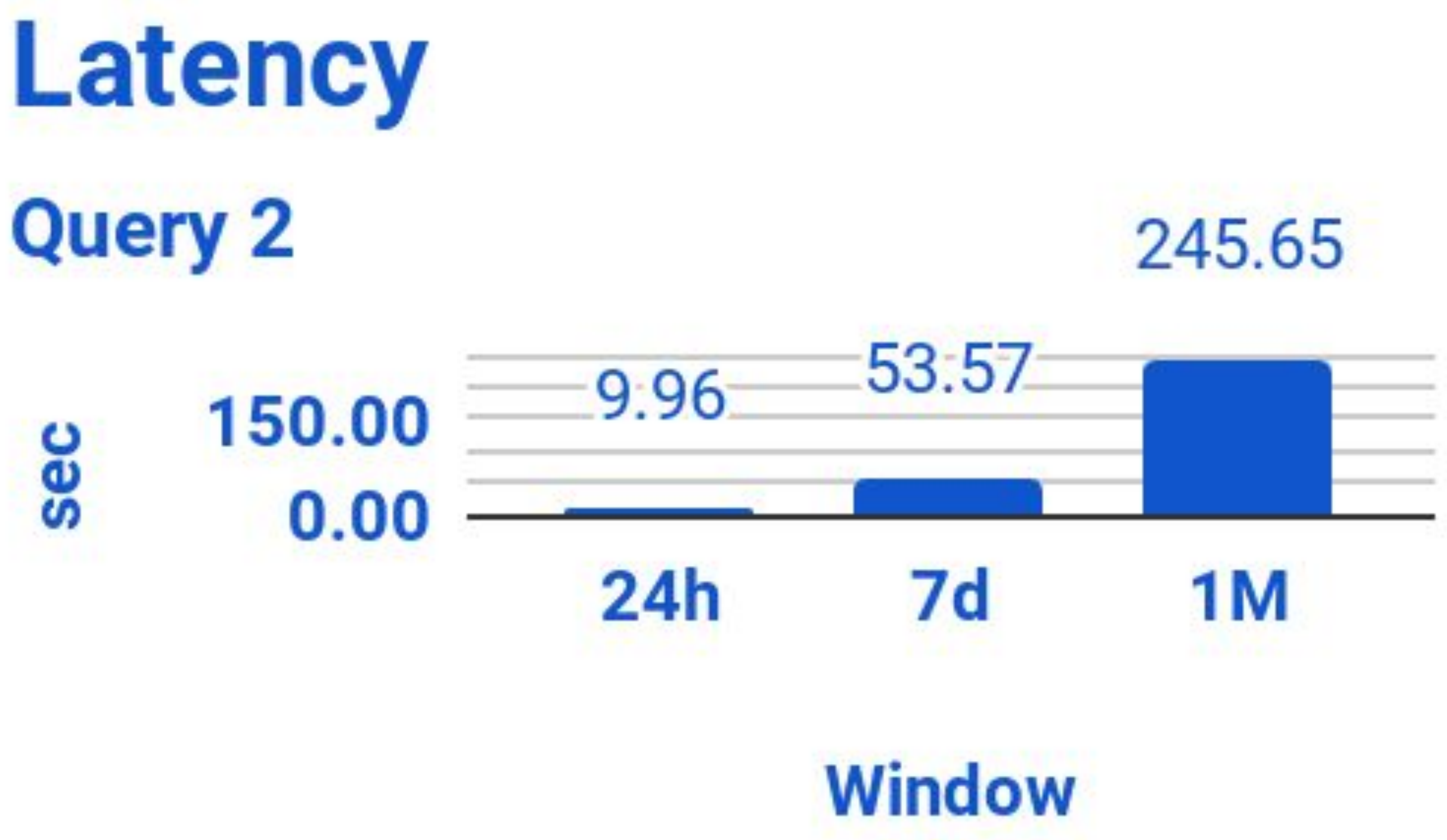
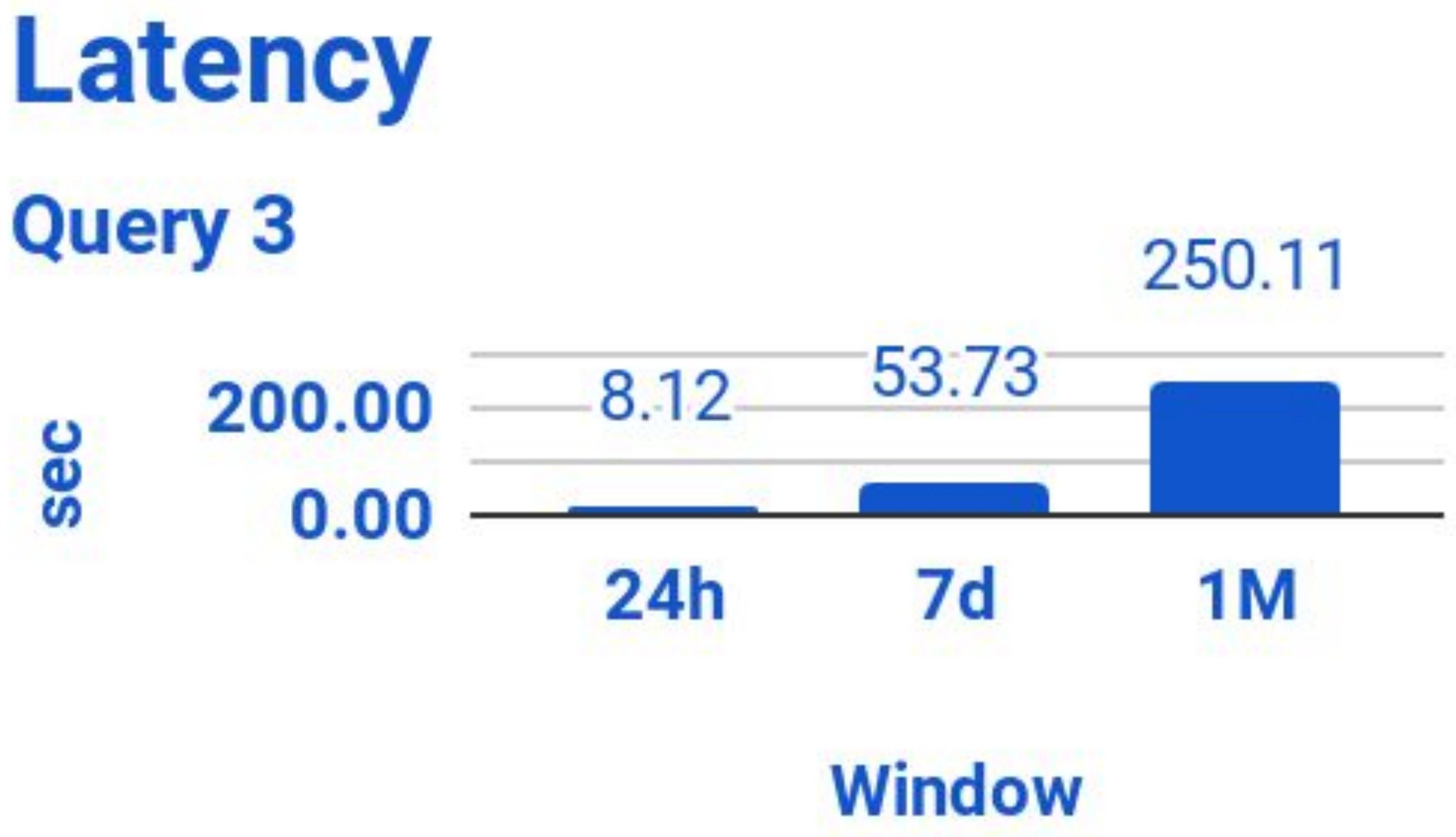
KafkaStreams - Latency

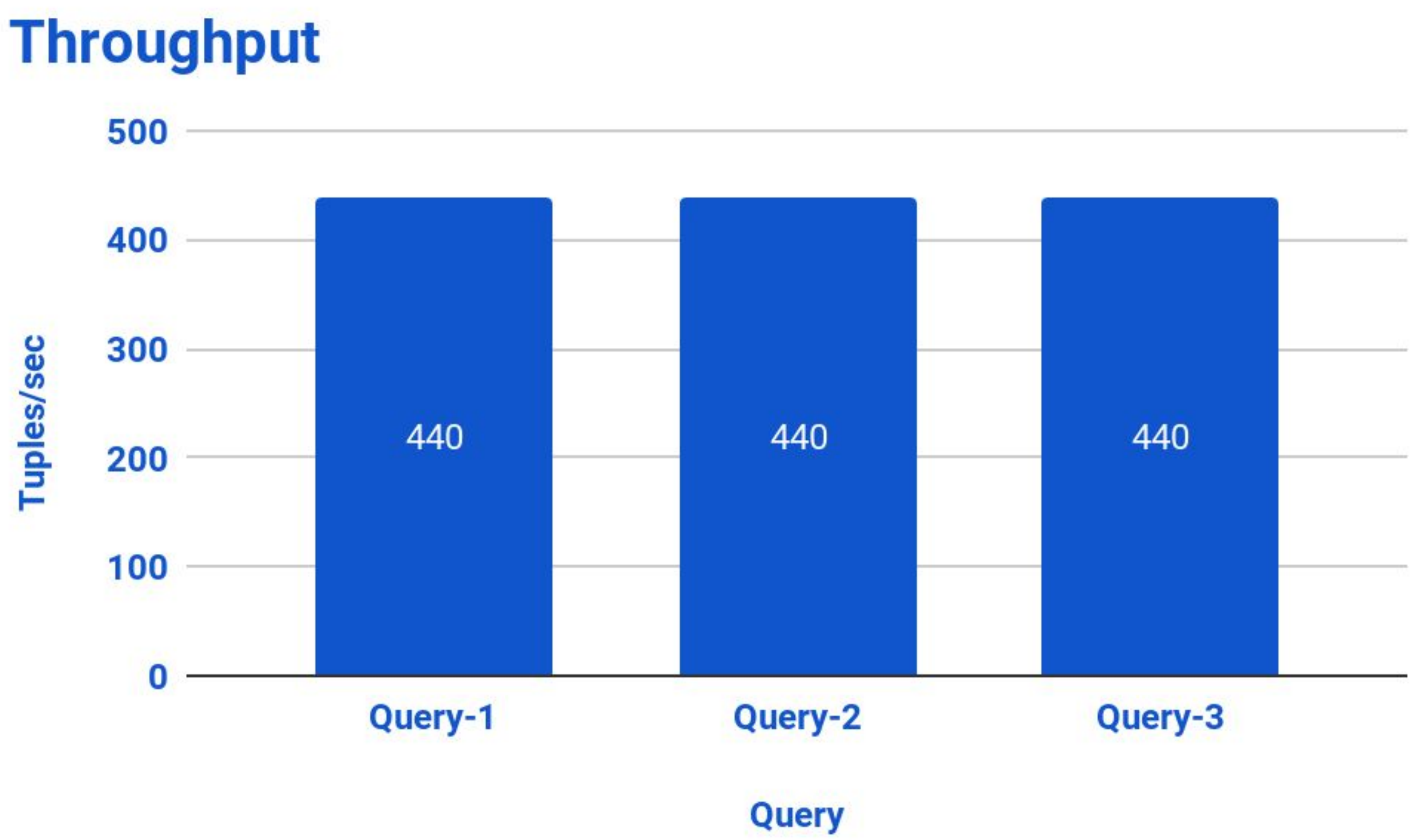


Apache Flink - Cluster evaluation









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Thank You!