

Aeris Filter

Robust range filtering through adaptivity

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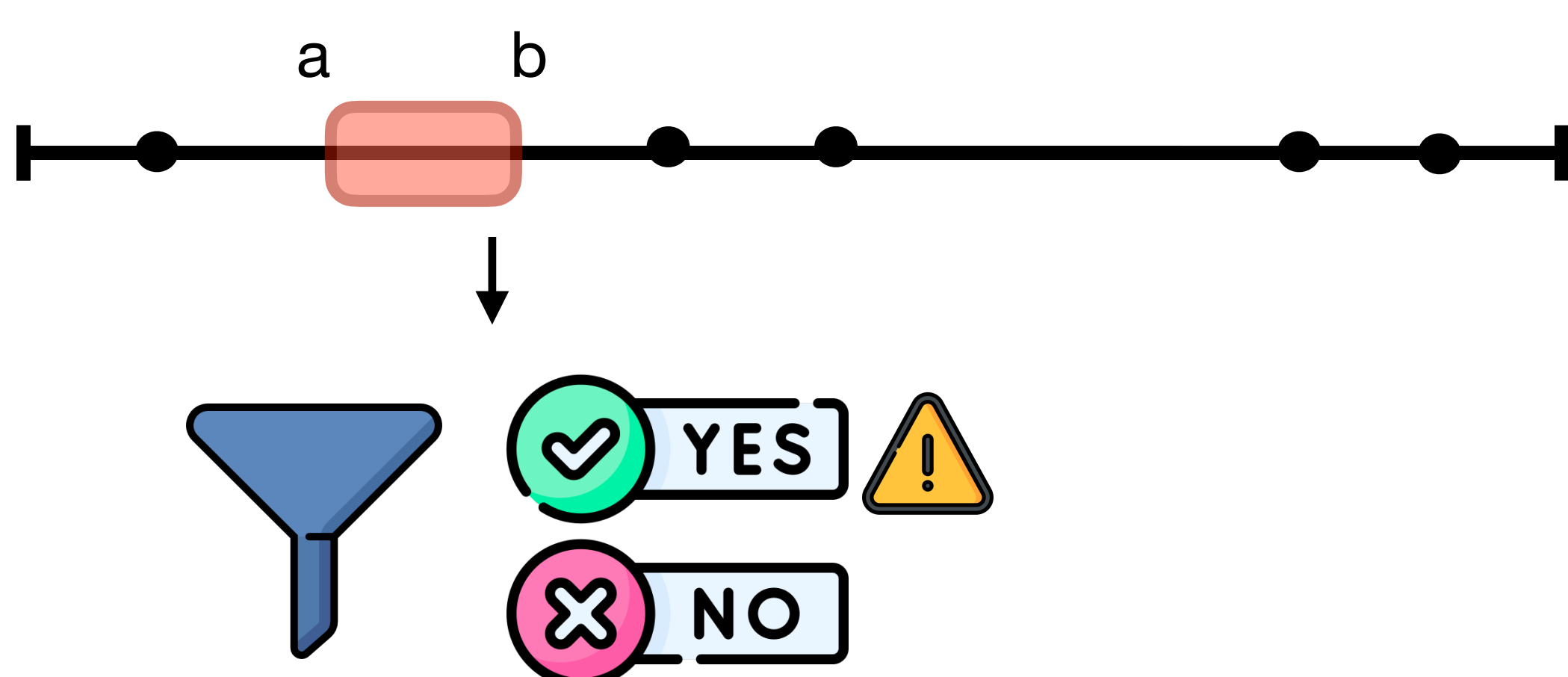


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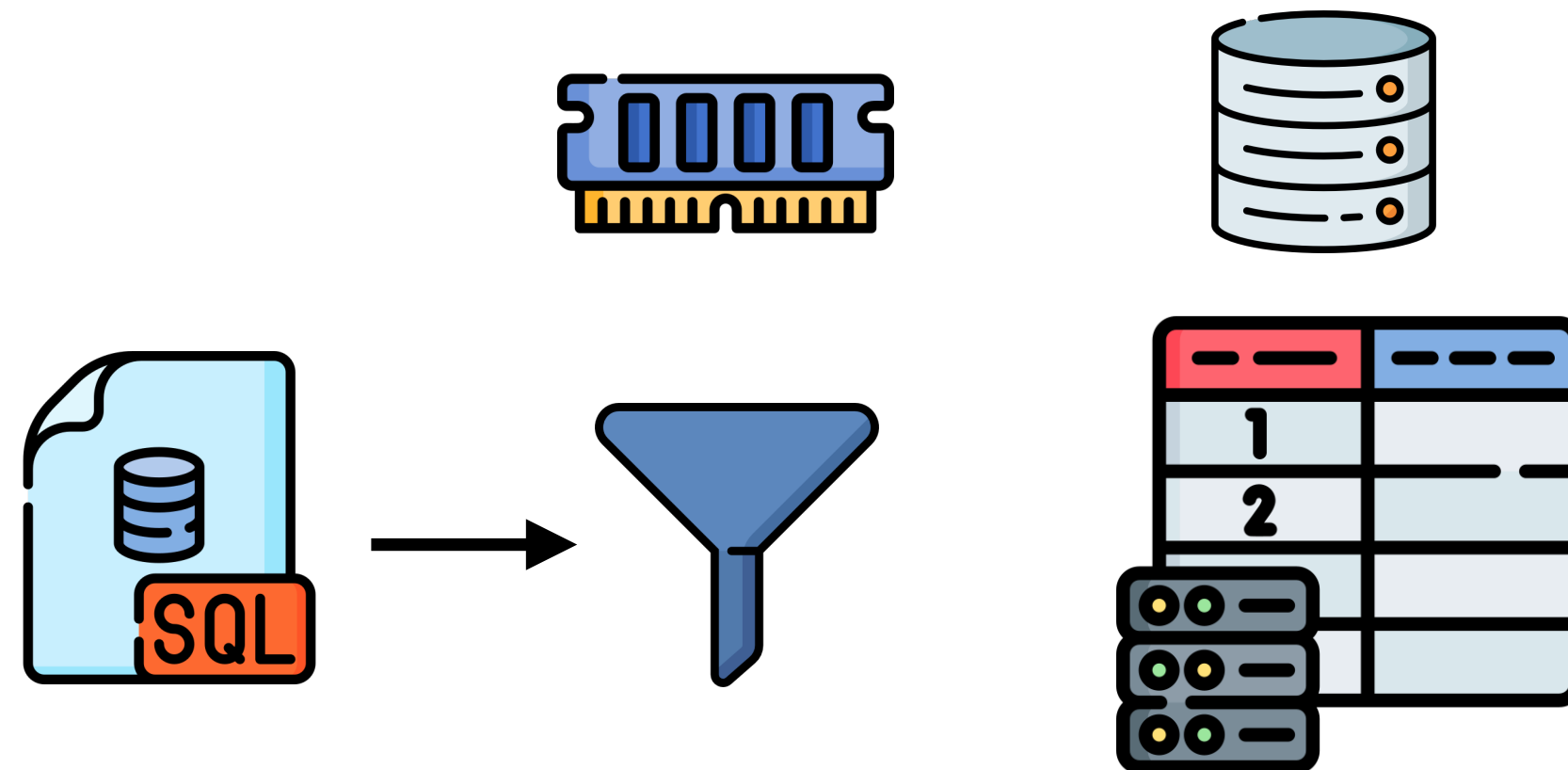


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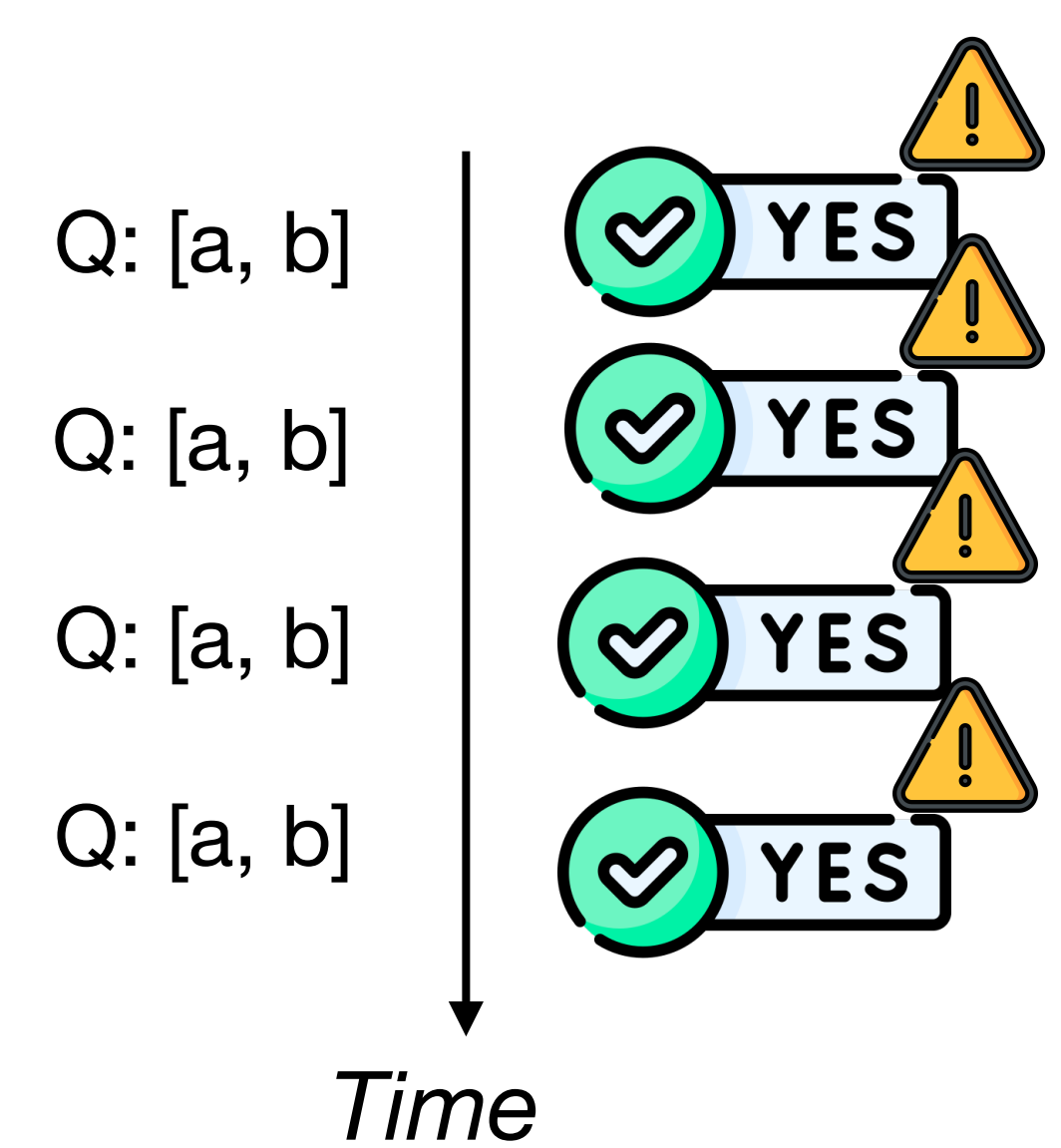
Background and problem statement



Range filters answer 'range emptiness queries' with false positives

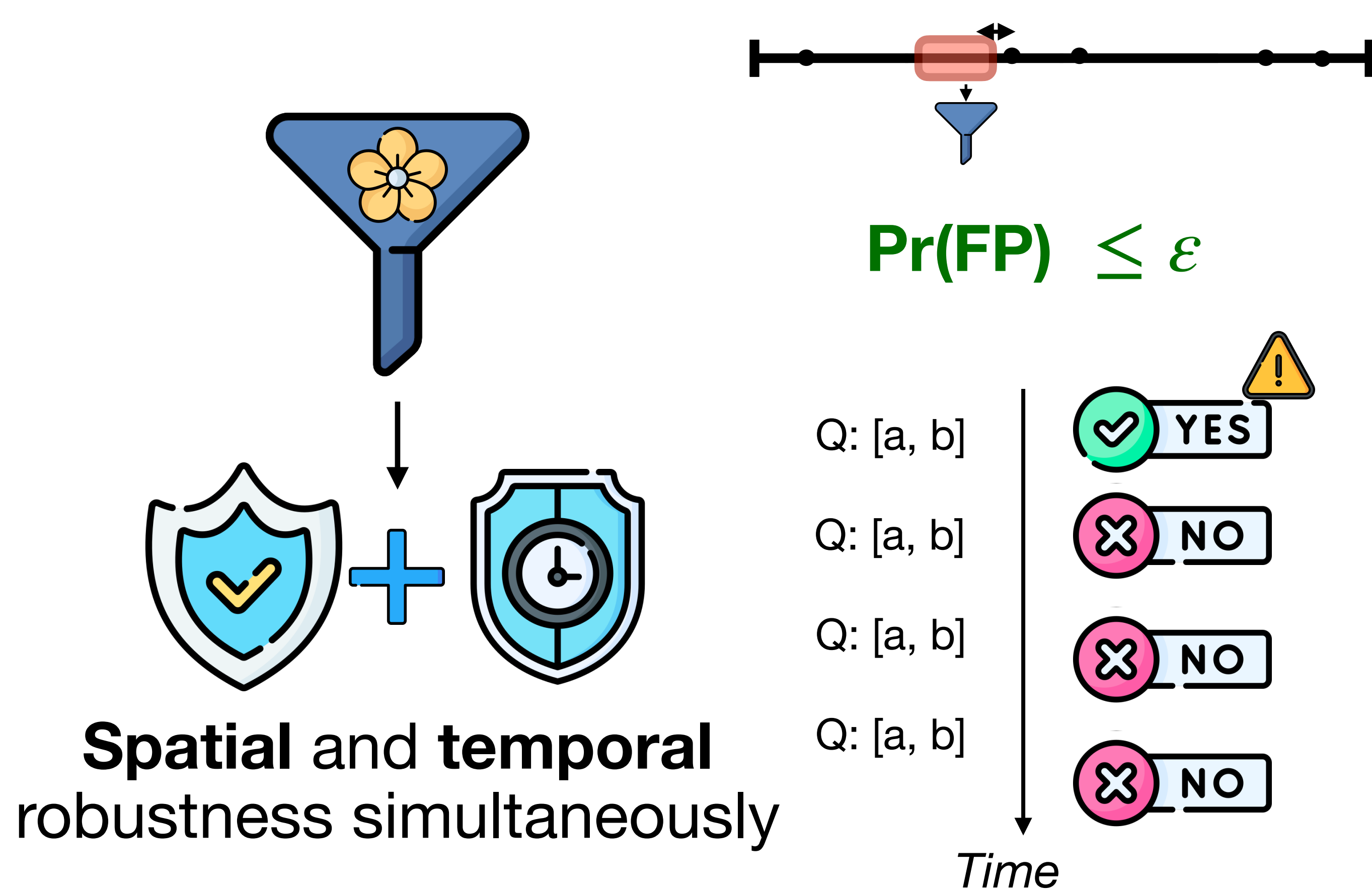


False positives allow filter to fit in memory and prevent disk I/Os for empty range queries

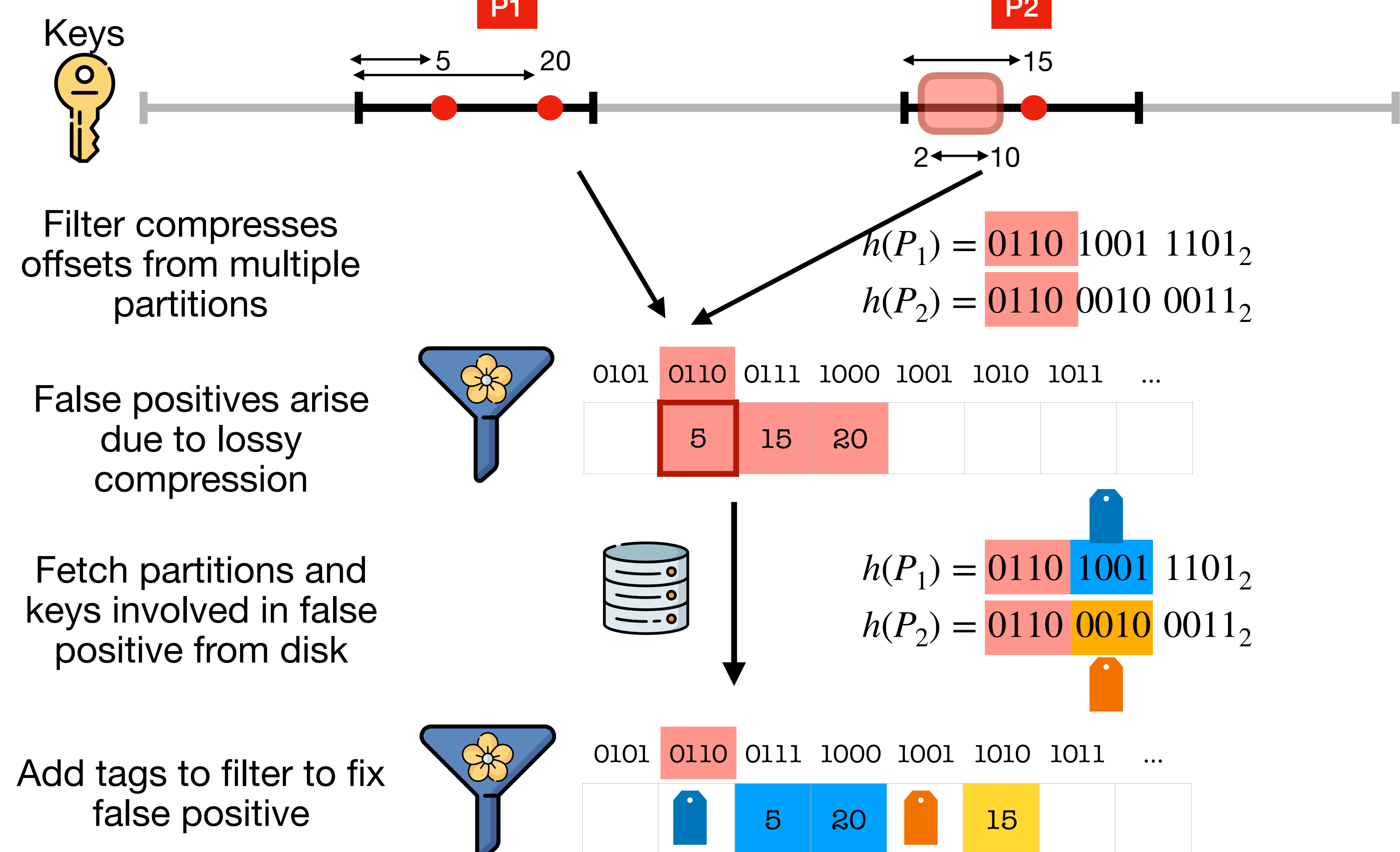


Problem: Repeated queries can result in high false positives

The Aeris Filter



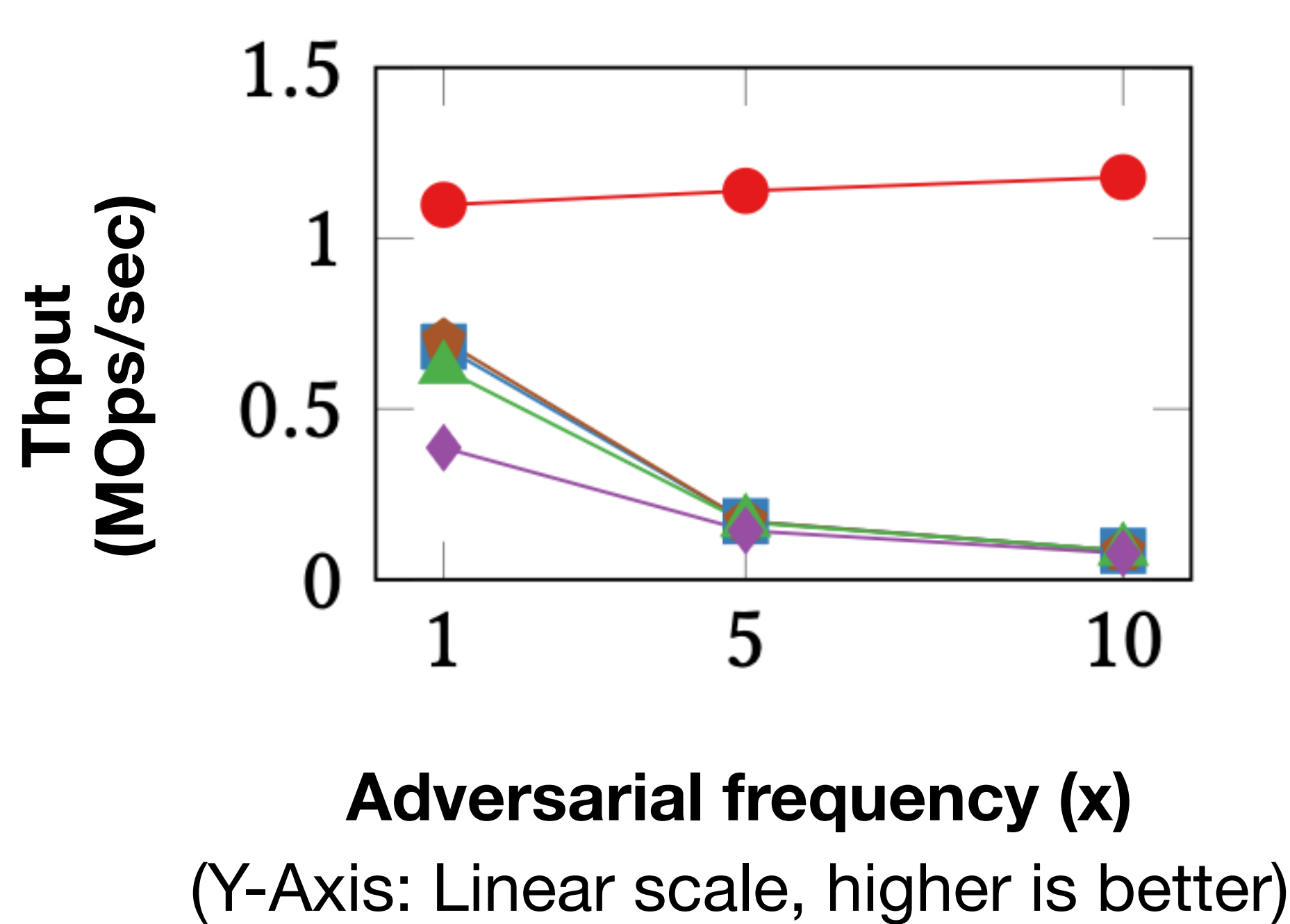
Spatial and temporal
robustness simultaneously



Experimental Results

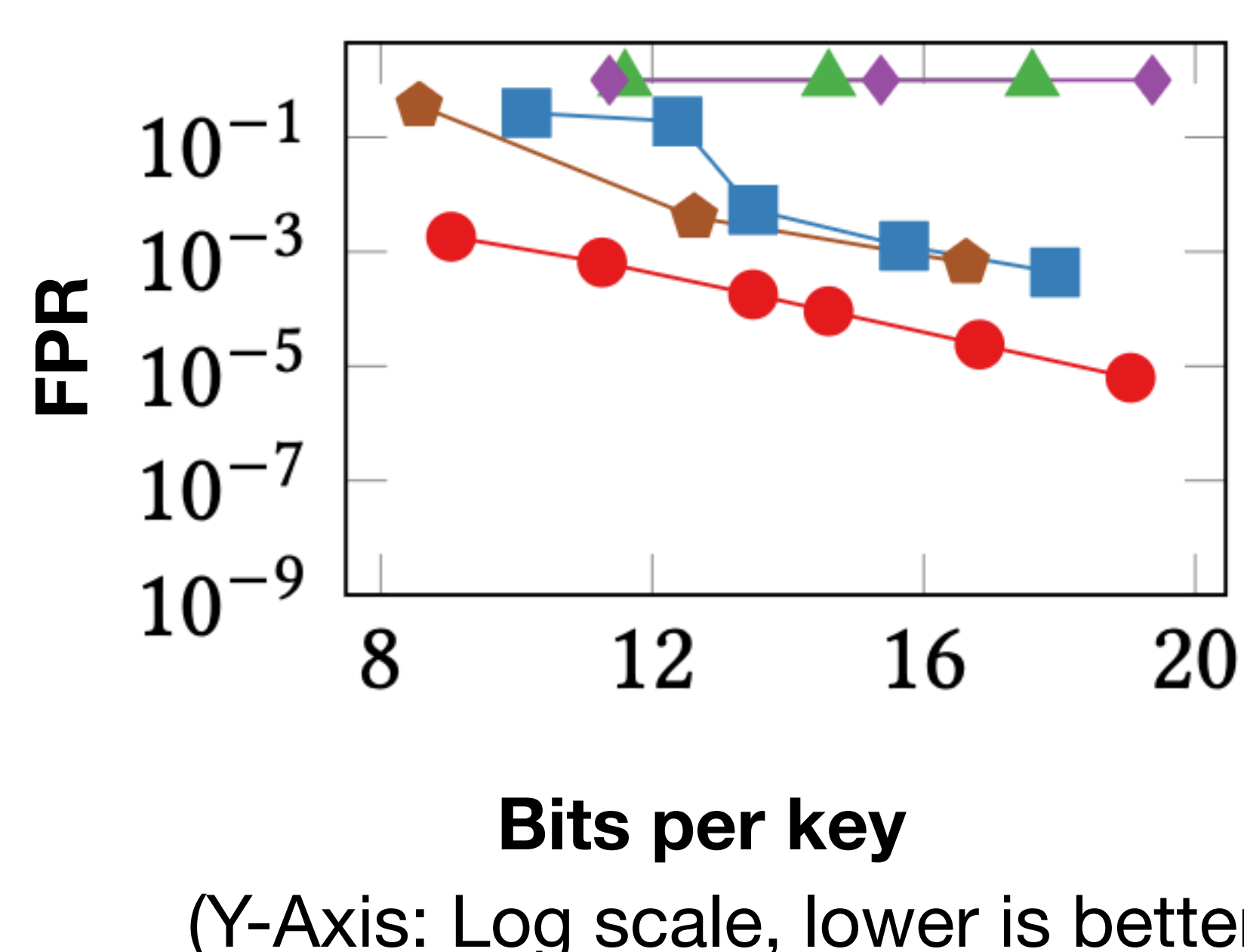
—●— Aeris filter —■— Memento filter —◆— Grafite —▲— SuRF —◆— SNARF

System benchmarks

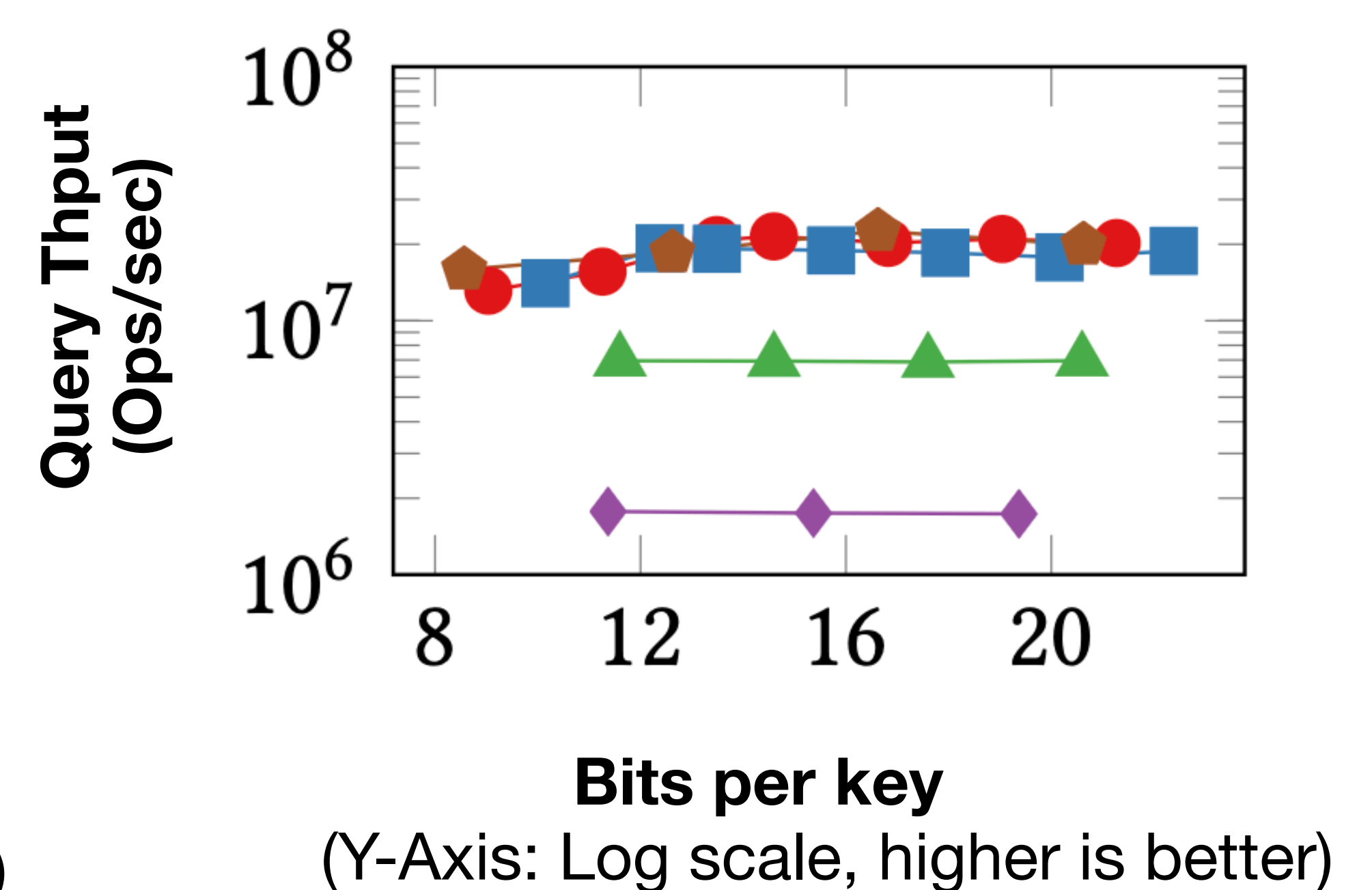


(Y-Axis: Linear scale, higher is better)

Microbenchmarks



(Y-Axis: Log scale, lower is better)



(Y-Axis: Log scale, higher is better)

Takeaways

First to achieve **both spatial and temporal robustness**

10x lower FPR on skewed workloads;
8x higher throughput on adversarial workloads
Similar space/CPU usage over baselines

Optimizes reverse map and filter expandability (3x faster)

Paper



Code

