

Hardware Acceleration and Data-Utility Improvement for Low-Latency Privacy Preserving Mechanism

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Privacy Protection on Published Data

Large amount of digital data

- ❑ Buying history, browsing history, location information, ...
- ❑ They are valuable for a marketing, researchers, and service providers.
- ❑ They are otherwise concealed or abandoned in spite of their value, because they involve "private information."

"Anonymization"

- ✓ It enables utilization of published data while preserving privacy

However...

It requires large calculation cost.

Accelerate with hardware, to process high-throughput data stream

Hardware Architecture

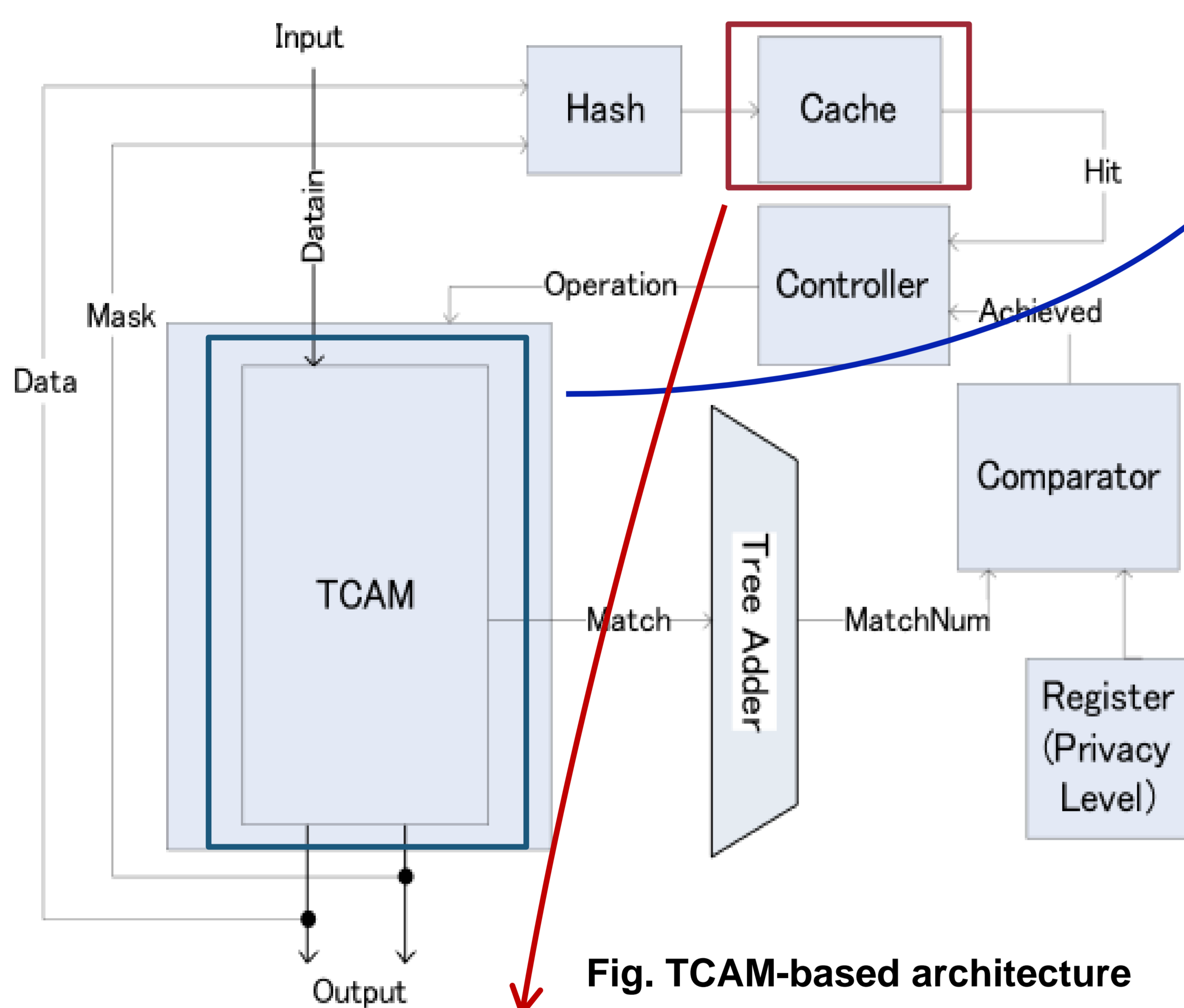


Fig. TCAM-based architecture

Acceleration using TCAM

- ✓ Fast search function
 - To find records to be anonymized
 - Completed in a single access
- ✓ Anonymization
 - Using the third matching state "Don't Care"

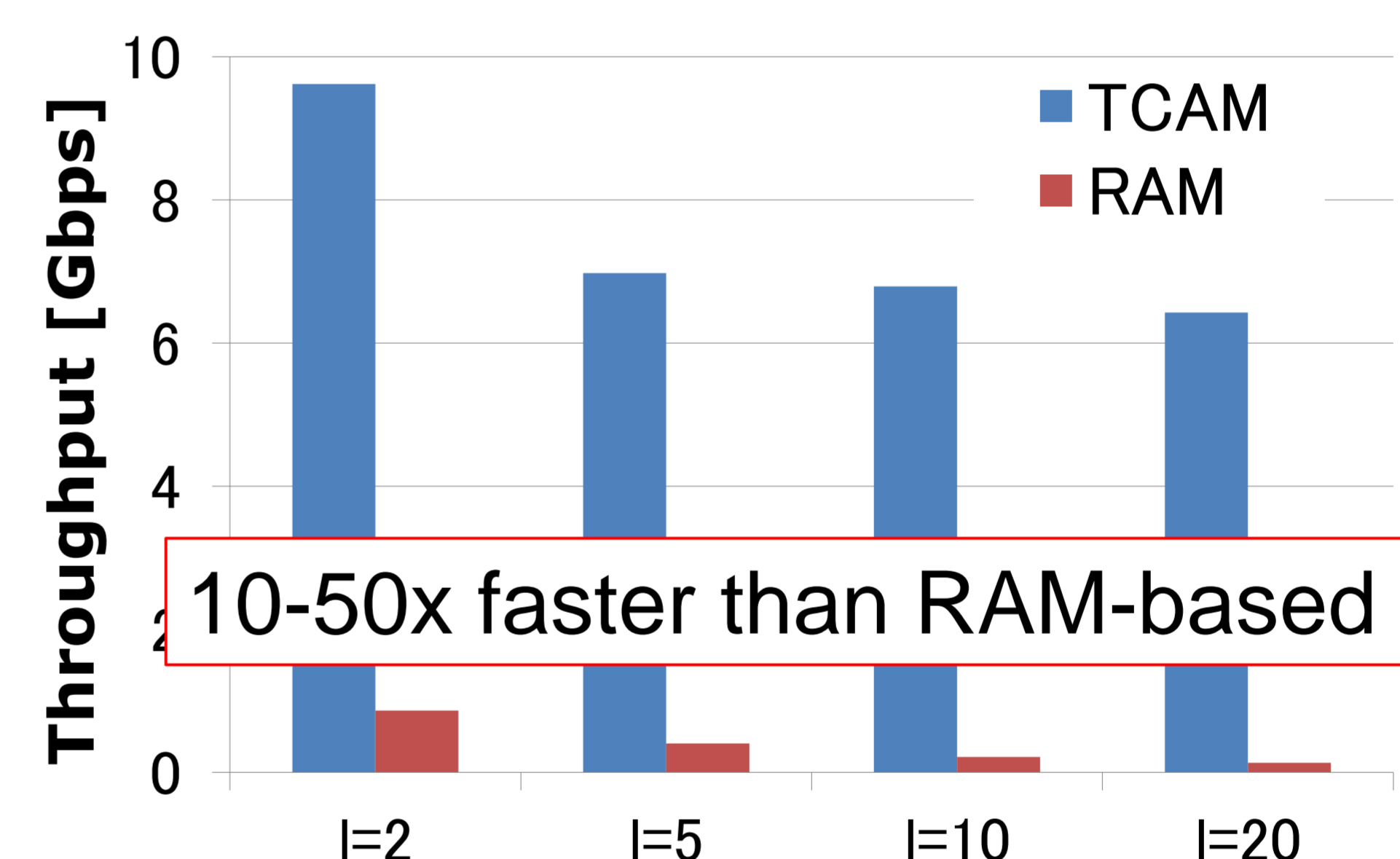


Fig. Throughput comparison against RAM-based

Cache Mechanism

Without Cache

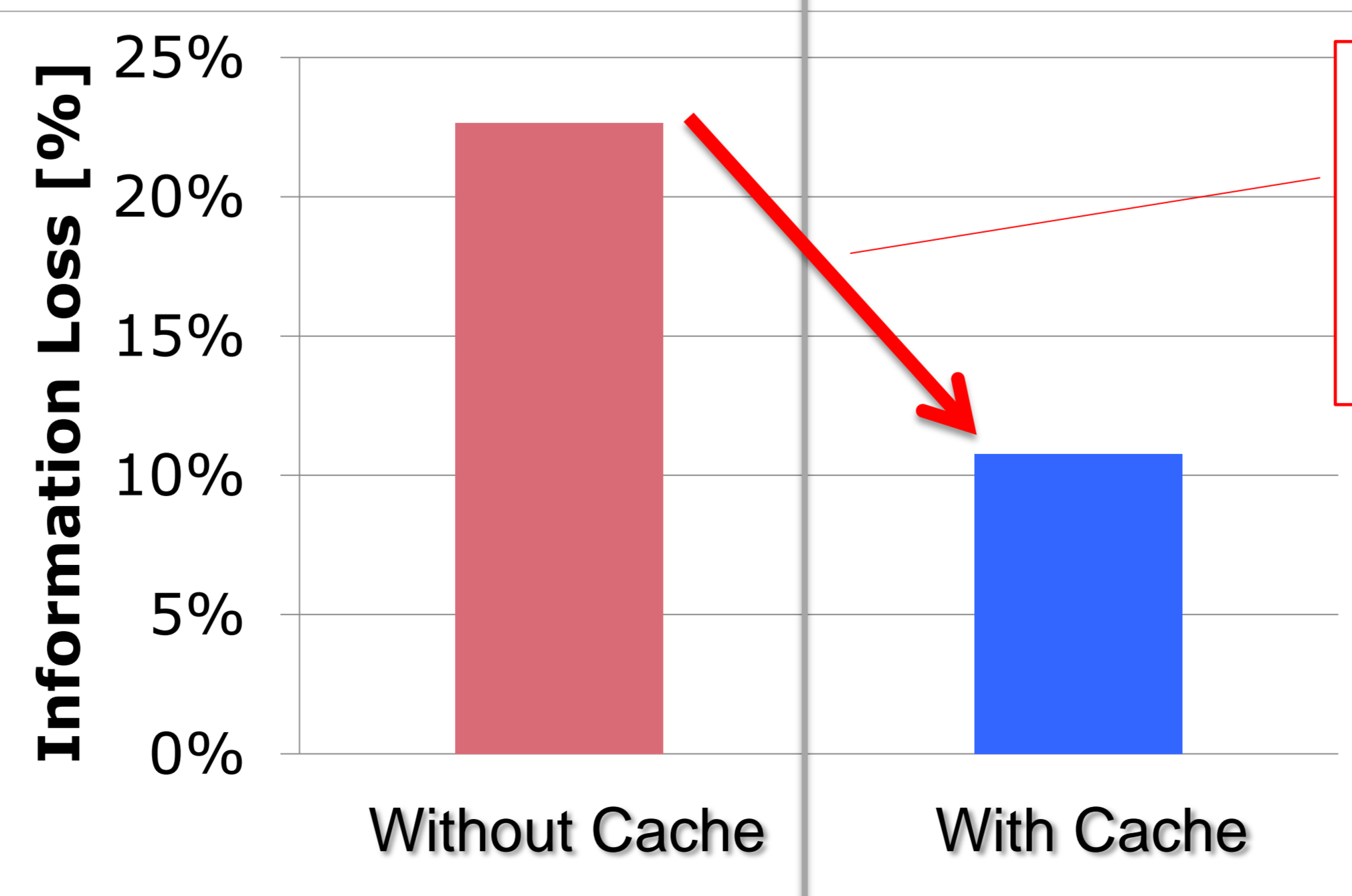
- ✗ Constraint of TCAM size deteriorates the rate of information loss

- Masked (anonymized) part of data
- Since masked data has less useful information, the information loss is desirable as low as possible

Birth	ZIP
199*	213**
199*	213**
1989	18***
1989	18***

With Cache

- ✓ Stored results are referred in future processes to improve information loss



The rate of the information loss is eliminated approx. 50% using cache mechanism

Fig. Information loss improvement using cache mechanism

Acknowledgement

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