

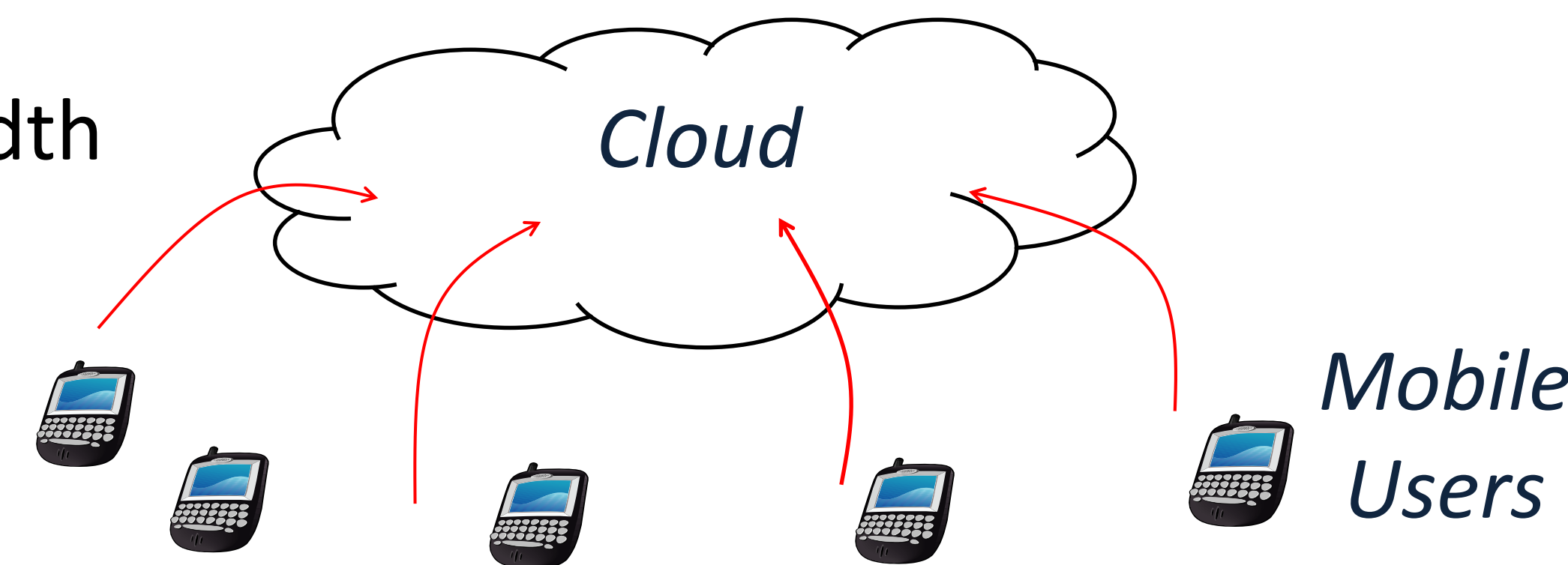
Enriching Mobile User Experience Through The Cloud

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Motivation

- Mobile devices are limited by:
 - CPU Performance
 - Energy
 - Storage
 - Bandwidth
- In contrast, the cloud has abundant:
 - Computing Power
 - Storage Capacity



- Strengths of the cloud can compensate for limitations of mobile devices
- Rich sources of user data can be used to make intelligent optimizations

Key Idea

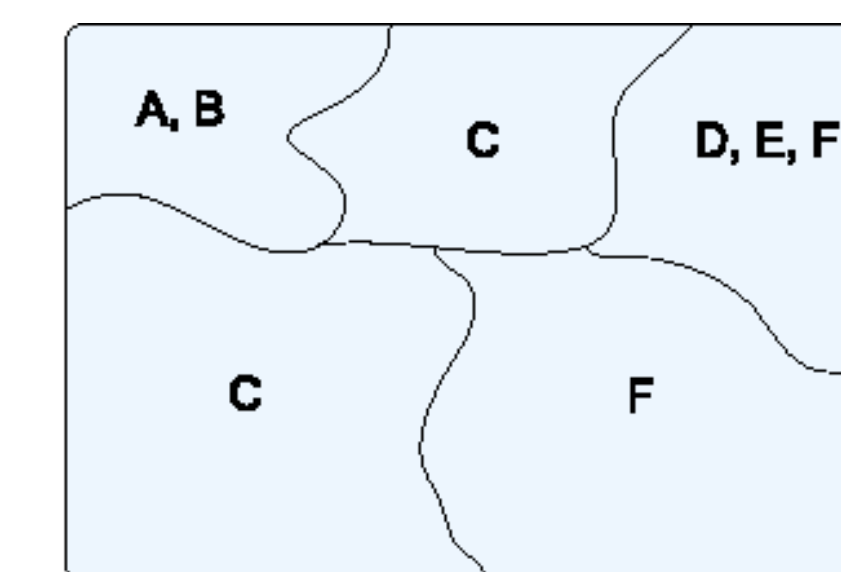
Improve mobile application experience through cloud-based user profiling.

Key Techniques

- Aggregation:** Identify related user activities and batch them to improve efficiency
- Filtering:** Avoid sending unnecessary information to and from mobile devices
- Speculation:** Perform computations ahead of time, before they are needed by the user

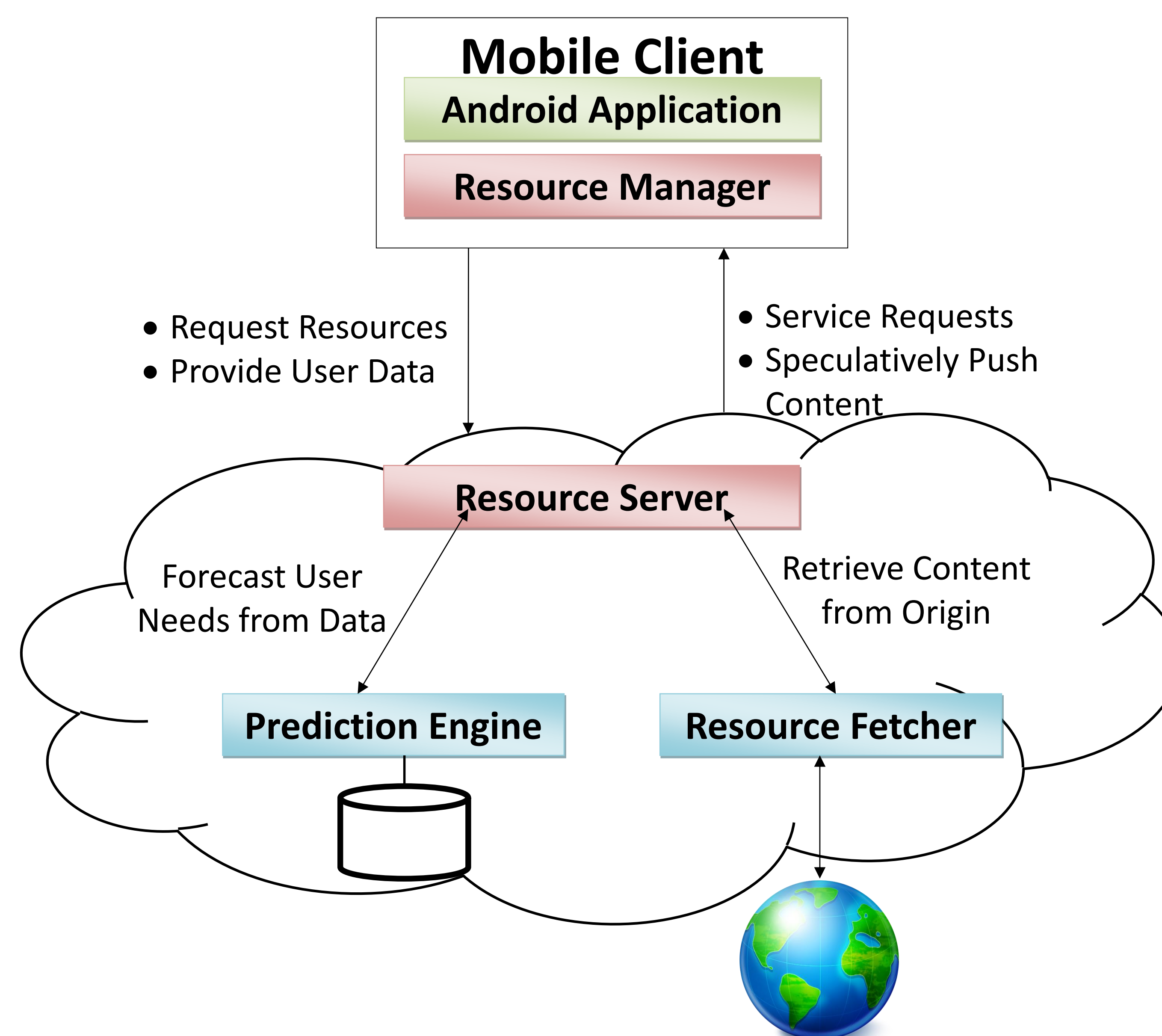
Key Abstraction: Region of Interest (ROI)

- User's focus of interest: semantics, time, space
- Learned via past interactions



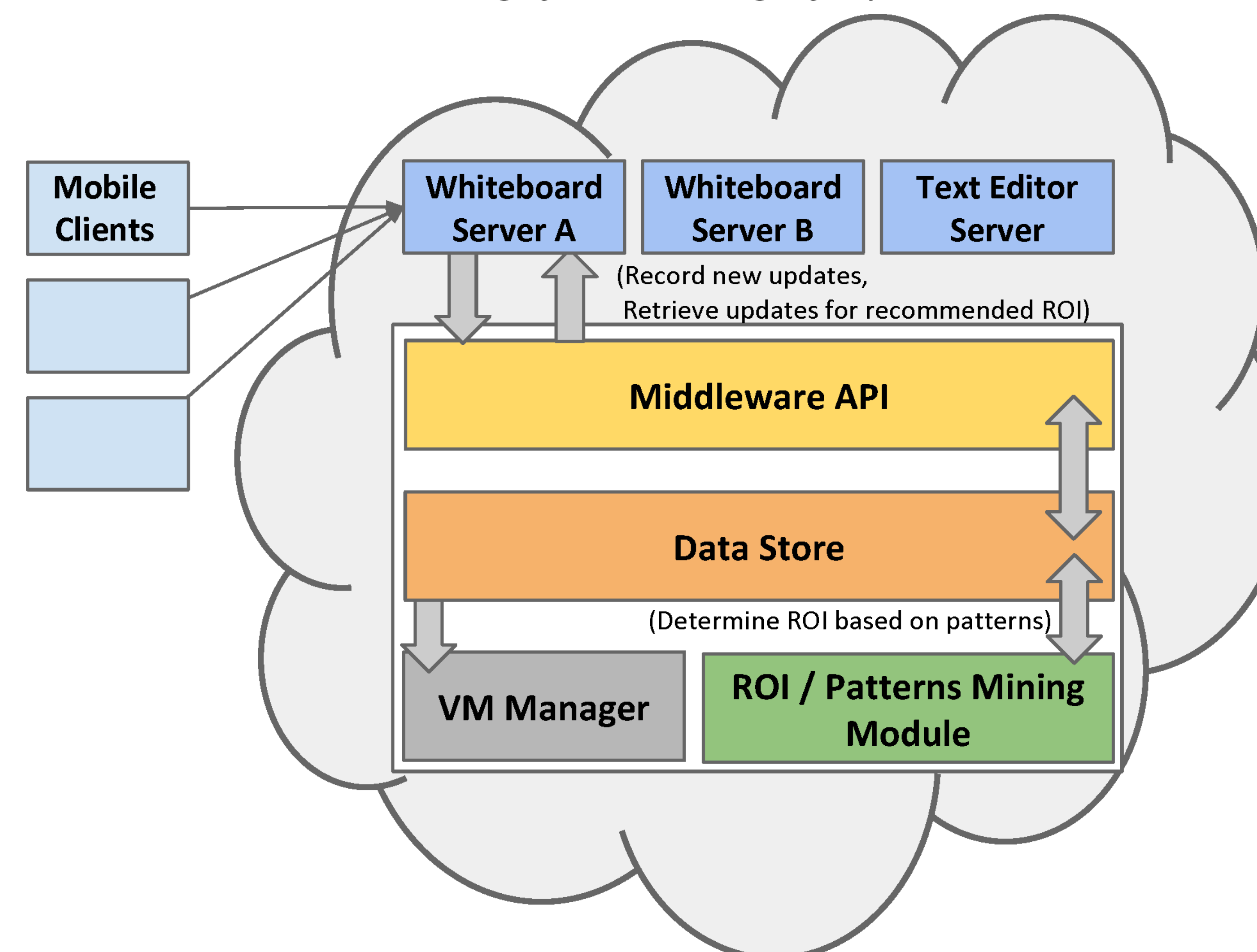
Personalized Content Aggregation

- Retrieving content has a cost: latency, energy, network communications
- Mitigate this with precomputation, prefetching
- ROI: content filtering based on user interest*



Real-time Collaborative Editing

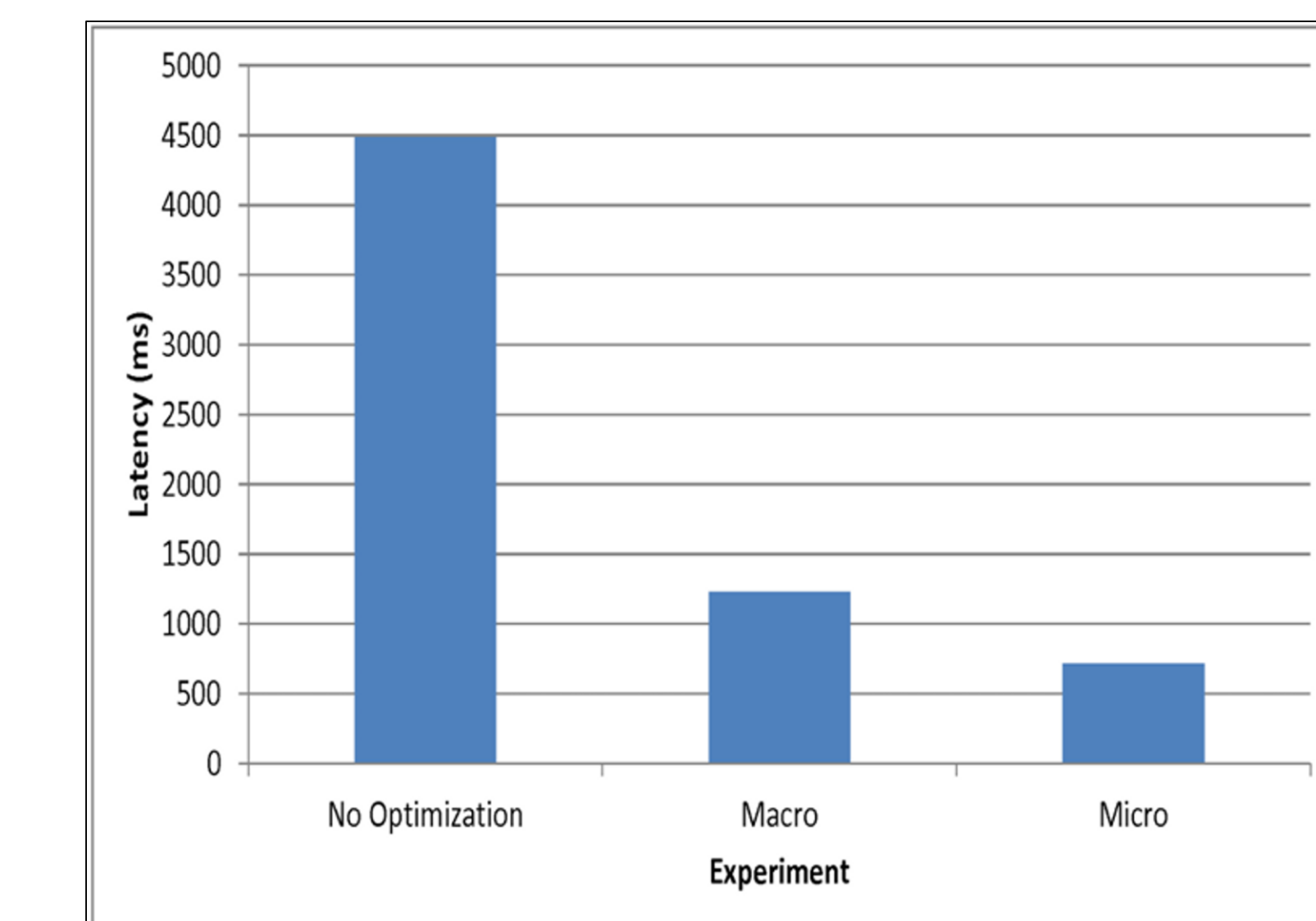
- Collaborative mobile apps: Whiteboard, Text Editor, Slideshow, Design Editor
- Communication-intensive, users may receive unnecessary updates from others
- ROI: smart batching, forwarding of updates*



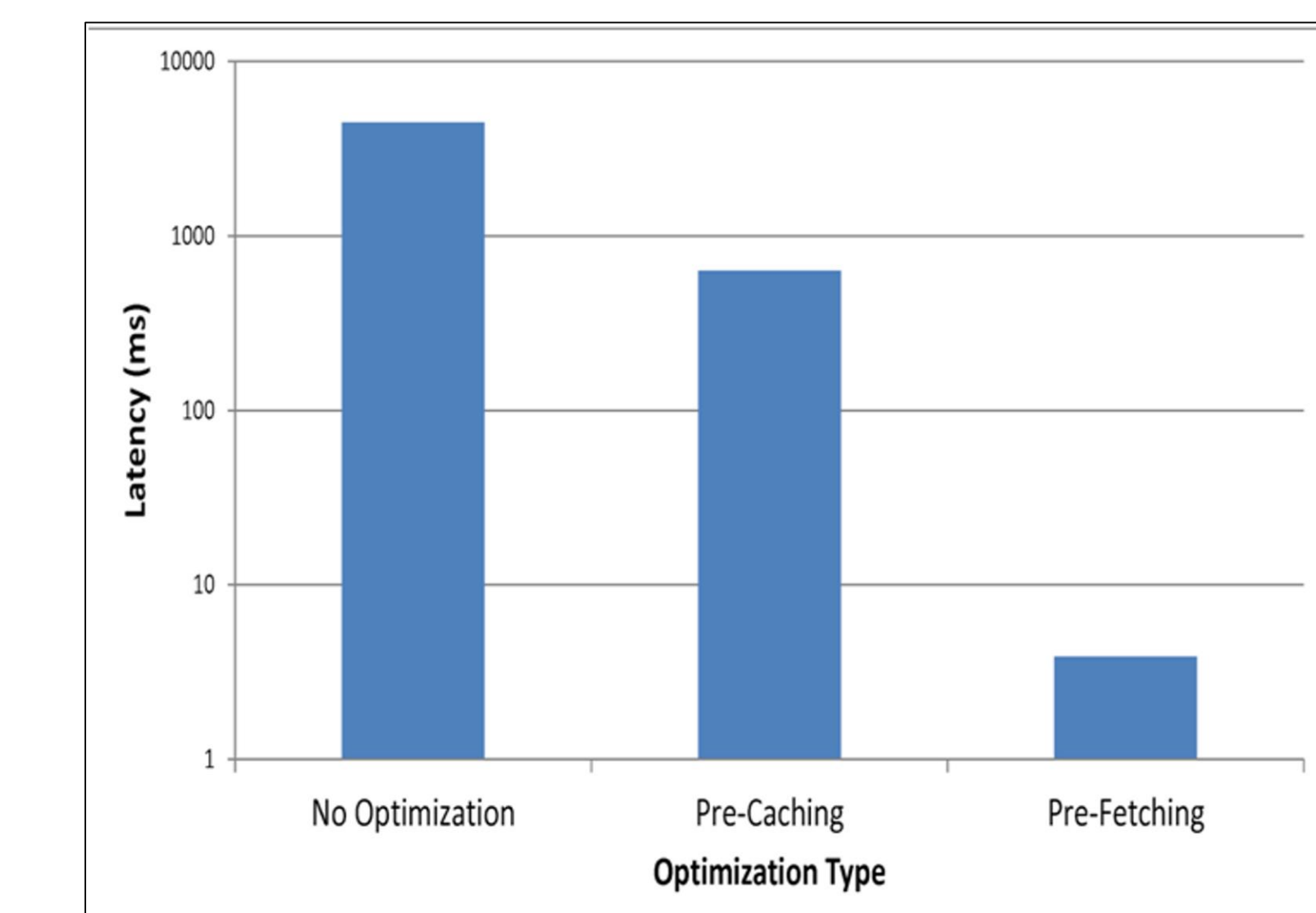
Results

Content Aggregation

Twitter News Streams



Combined Benefit of Optimization

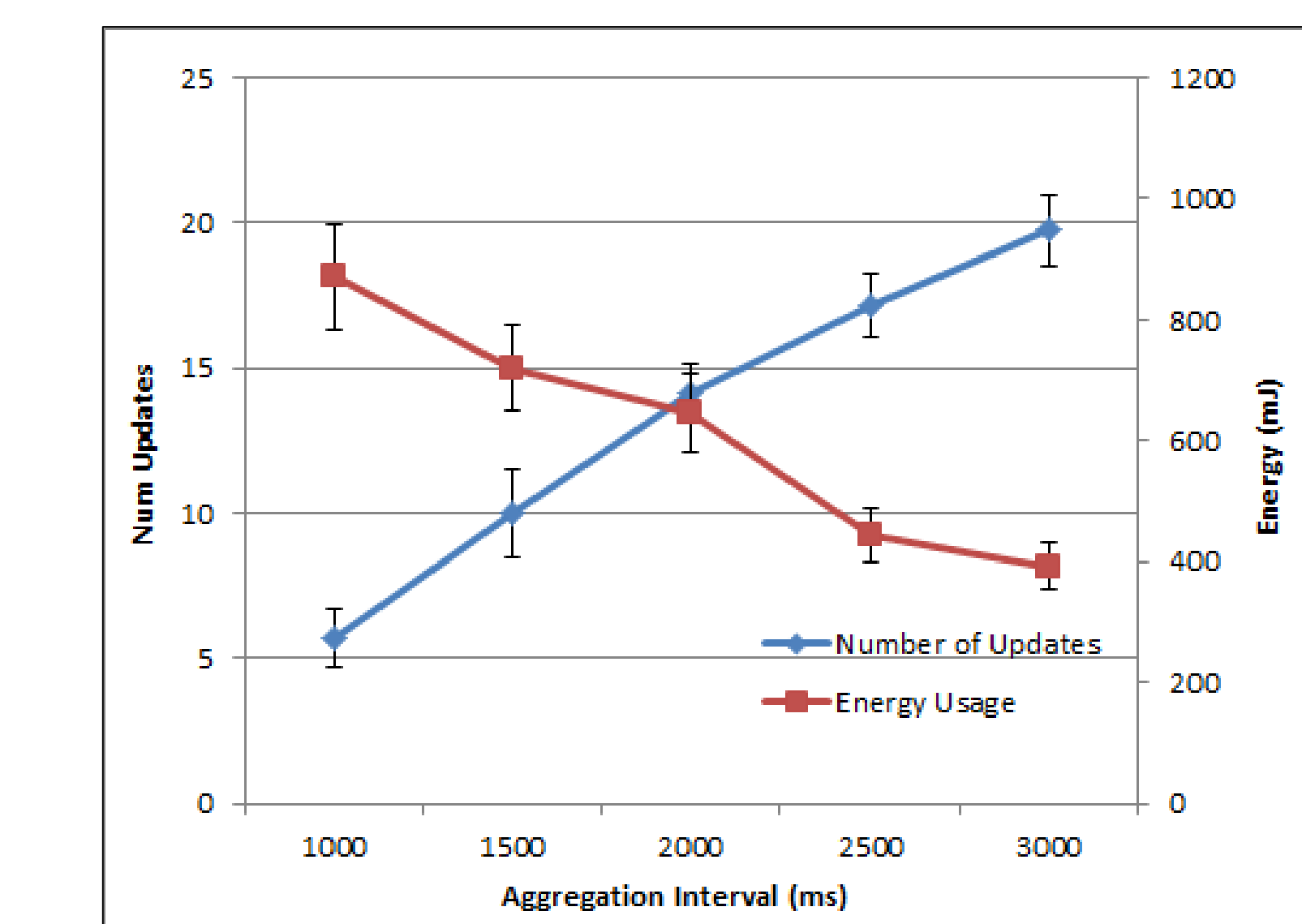


Optimization Comparison

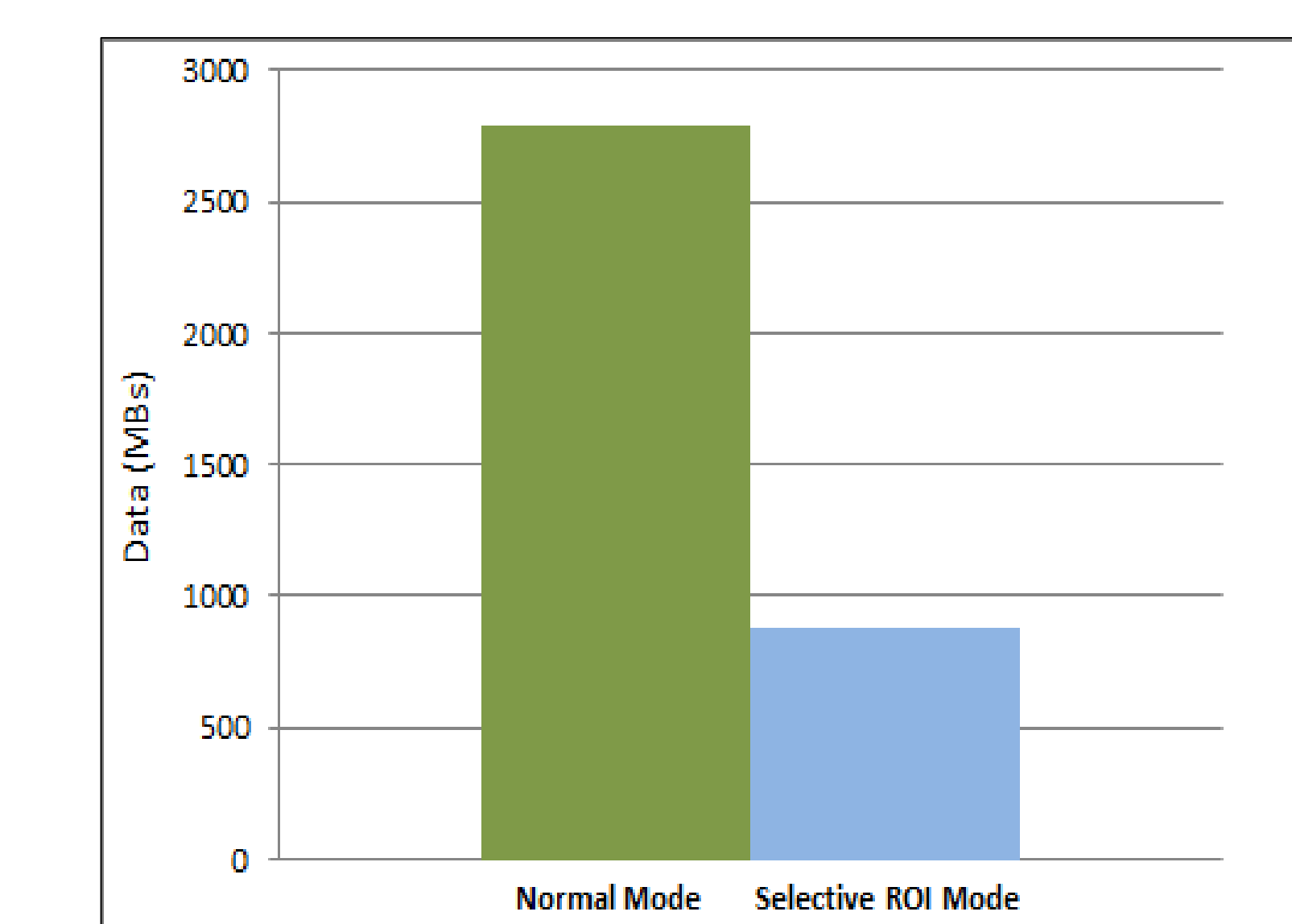
- Significant reduction in latency

Collaborative Editing

Wikipedia Article Edits



Consistency Energy Tradeoff



Overall Benefit Across Users

- Overall reduction in data transfer