**RAMCloud**
Scalable, Low-Latency
Datacenter Storage

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**100-1000TB at 5-10µs latency**

### The Basic Idea
- Storage for datacenters
- 1000-10000 commodity servers
- 32-64 GB DRAM/server
- All data always in RAM
- Durable and available
- Performance goals:
  - High throughput: 1M ops/sec/server
  - Low-latency access: 5-10µs RPC
  - Data model similar to key-value store

### Why Latency Matters

**Traditional Application: Single Machine**

- UI
- App.
- Bus.
- Logic

**Web Application: Datacenter**

- UI
- Bus.
- Logic

RAMCloud's goal: best of both worlds, low latency and large scale

### Example Configurations

<table>
<thead>
<tr>
<th></th>
<th>Today</th>
<th>5-10 years</th>
</tr>
</thead>
<tbody>
<tr>
<td># servers</td>
<td>2000</td>
<td>4000</td>
</tr>
<tr>
<td>GB/server</td>
<td>24GB</td>
<td>256GB</td>
</tr>
<tr>
<td>Total capacity</td>
<td>48TB</td>
<td>1PB</td>
</tr>
<tr>
<td>Total server cost</td>
<td>$3.1M</td>
<td>$6M</td>
</tr>
<tr>
<td>$/GB</td>
<td>$65</td>
<td>$6</td>
</tr>
</tbody>
</table>

Compare with Facebook:
4000 MySQL servers and 2000 memcached servers
200TB of non-image data

### Durability

Data is synchronously replicated to R backups, then asynchronously written in batch to disk.

### Cluster Organization

Untrusted

Trusted

 Coordinator

### Latency Today

Our tests show 11µs RTT possible (with no switches)