An Analysis of Facebook Photo Caching

Instrumented Stack

Deep and Distributed
1. 4 layers of cache and storage.
2. ~12M user IPs, ~20 Point-of-Presence, 4 Datacenters.

Browser (millions)
- 77.2M user reqs
- 65.5% hit ratio
- 65.5% reqs share

Edge (dozens)
- 26.6M reqs
- 58% hit ratio
- 20% reqs share
- Routing factors:
  - Latency
  - Edge capacity
  - Peering cost

Origin (one)
- 11.2M reqs
- 31.8% hit ratio
- 4.6% reqs share
- Routed by consistent hashing

Haystack
- 7.6M reqs
- 9.9% reqs share
- Prefers local Haystack

Workload

At top layers, req popularity follows a power-law dist., but curve flattens as reqs tunnels deeper.

Cache Performance

Traffic Share by Photo Popularity
Cache traffic share drop for less popular items.
1. Top 1K photos attract 25% traffic.
2. Cache serves 99.93% reqs for them.
3. Haystack handles the tail.

Browser Caching
1. Clients with <10 reqs send 37% traffic.
2. Active clients have higher hit ratio.
3. Increasing cache size helps.

Edge Caching & Origin Caching
1. Request from clients are often routed to remote Edges.
2. Collaborative Edges (collab bar) increases hit ratio by 18%.
3. S4LRU increases hit ratio significantly both at Edge and Origin.