

# Dynomite

# Dynomite

- Distributed key value store
- Modeled after Dynamo
- Designed to store large objects

# At Powerset

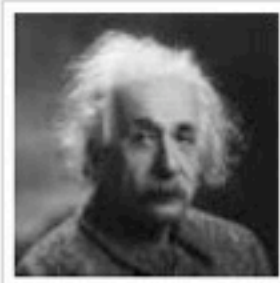
- Used to mirror wikipedia and freebase's images
- > 6 million image originals
  - + resizes
  - + metadata

## [Einstein \(US-CERT program\) - Wikipedia, the free encyclopedia](#)

**Einstein** also known as the **EINSTEIN** Program is an intrusion detection system that monitors the network gateways of government departments and agencies in the United States for ...

[en.wikipedia.org/wiki/Einstein\\_\(US-CERT\\_program\)](http://en.wikipedia.org/wiki/Einstein_(US-CERT_program)) · [Enhanced view](#)

### Learn more about **Albert Einstein** »



**Category:** Jewish, German-born theoretical physicist

**Date of birth:** March 14, 1879

**Date of death:** April 18, 1955

**Profession:** Physicist, Scientist, Writer, Philosopher

**Works written:** The Born-Einstein letters, Essential Einstein

**Awards won:** Nobel Prize in Physics, Copley Medal

[Source: Freebase](#)

### Listings for **einstein** near **San Francisco, California** » [change location](#)



1. [Diane Einstein Interiors](#) · (415) 565-0510  
2 Henry Adams St Ste M43 · San Francisco · [Directions](#)
2. [Noah's Bagels](#) · [Website](#) · (415) 925-9971  
170 Bon Air Ctr · Greenbrae · [Directions](#)  
★★★★☆ · 10 reviews

1 2 3 4 5 [Next](#)

# Dynamite at work

# Features

- Merkle tree replication protocol
- Cluster wide quorum settings
- Vector clock read-repairs
- Physical token partitioning
- Many protocol adapters
- Pluggable Storage

All was well until...

# MSFT

# Stop Pushing Code



# Tangled

# Hope?

# Meanwhile...

# Operational Experience

- High memory consumption
- Large queues merkle updates
- Which caused backed up sync jobs

# Merkle Trees

- Replaced with CouchDB B-trees
- Faster
- Simpler
- Reduced memory footprint

# Membership

- Rewritten completely
- Real time fault detection
- Rack aware replication
- Reactive gossip

# Bootstrap

- Explicit join mechanism
- Online redistribution
- Fault tolerant
- No downtime

# Other Enhancements

- Hibernate more processes
- Osmos storage engine
- Console introspection functions



Should I Use  
Dynamite?

Not right now.

# Not Until

- MSFT Opens the dev process back up
- Someone else steps up to be maintainer

# The Future

# The dynamo paper

(actually the past)

Storage was an  
afterthought

# Dynamo describes distributing state

Its core is generic



So why are we limited  
to building a database?

When we could  
distribute any stateful  
service

# The Dynamite Framework

A modest proposal

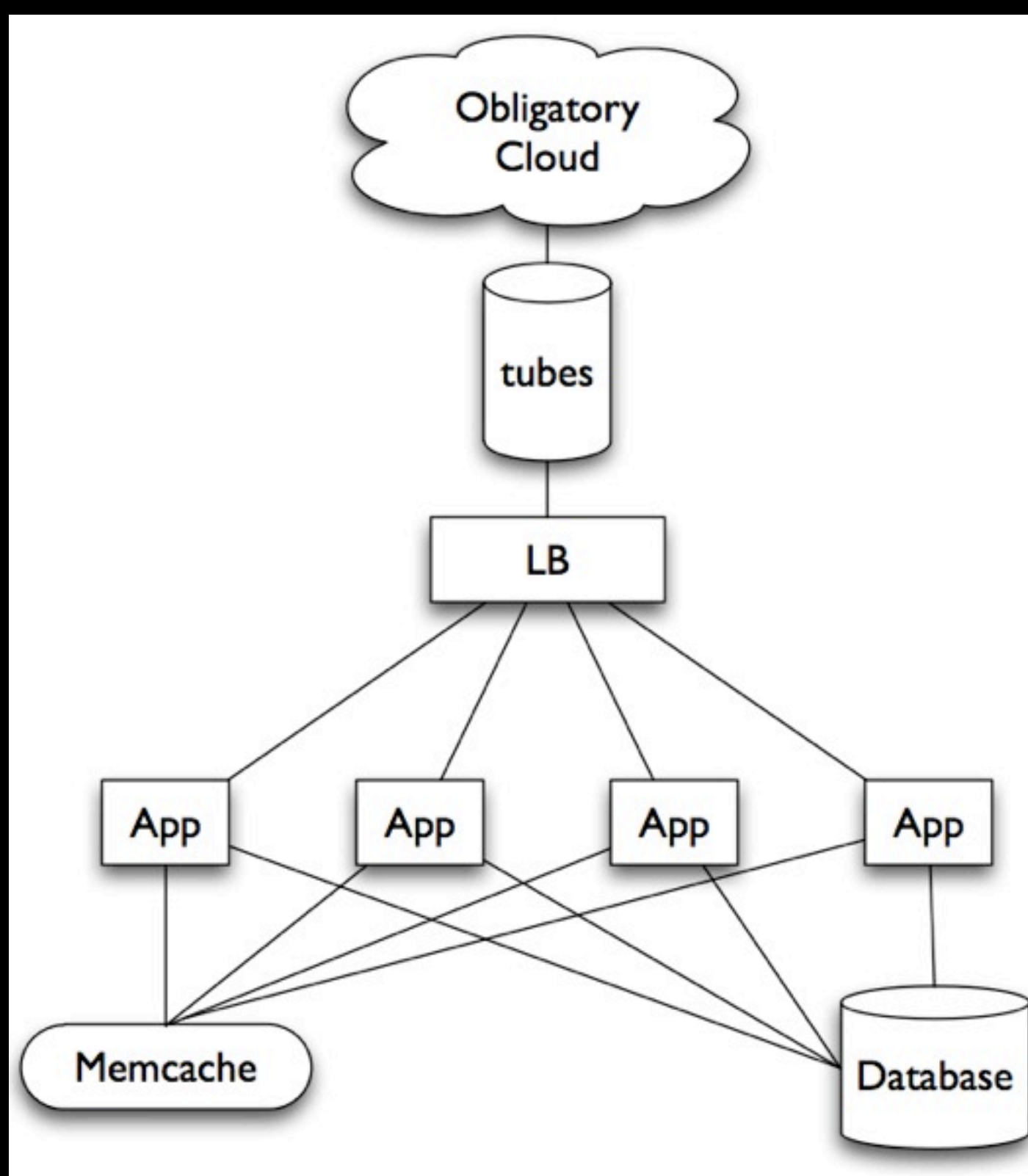
Distribute any data  
model  
(within reason)

What could we do with  
such a thing?

# Use Cases

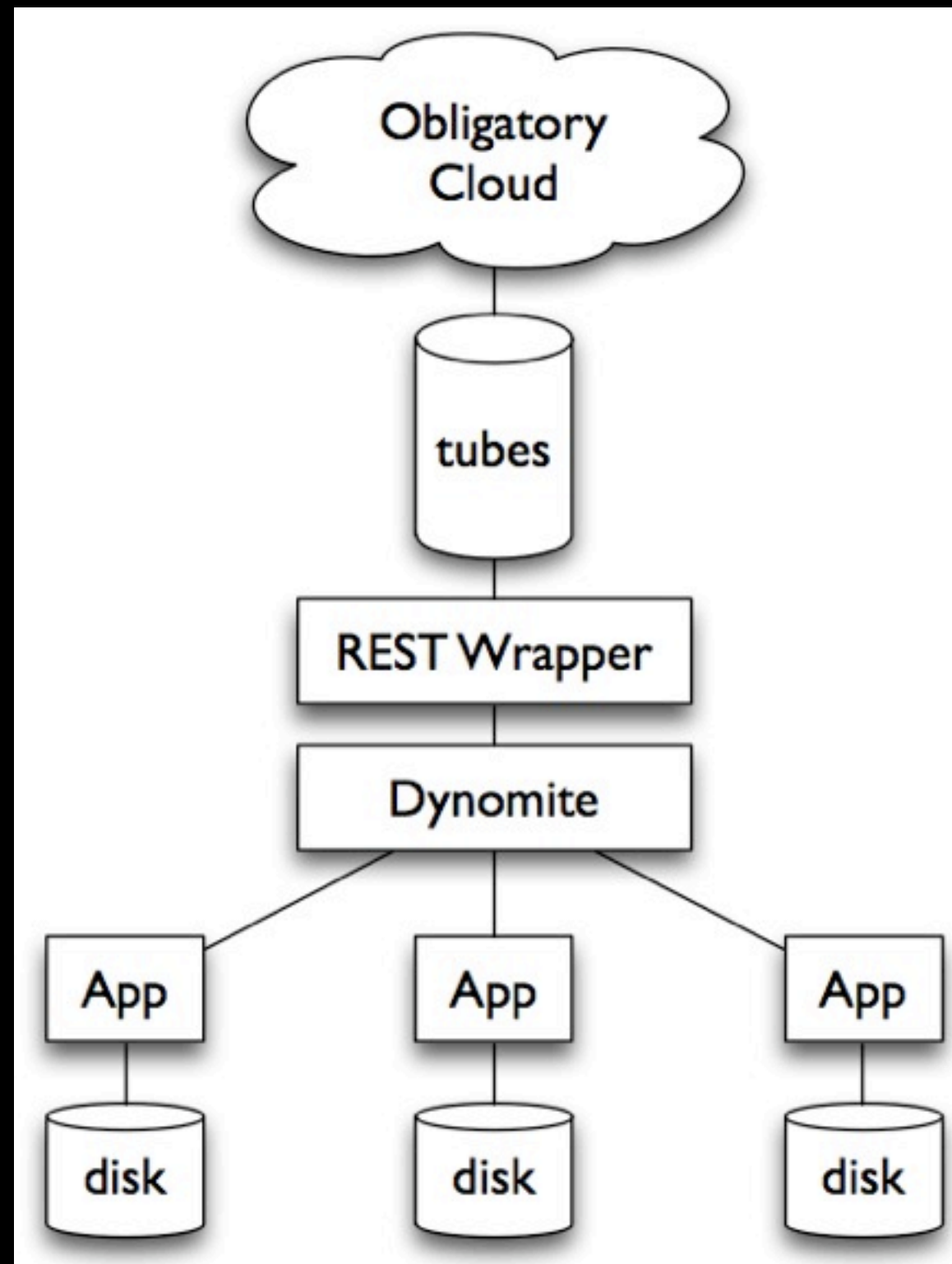
- Databases (duh)
- Message Queues
- Tuple Spaces
- Web Application Servers (wait what?)

Did you say app server?



# Traditional web arch





# With Dynomite

# Persist any Data Model

Even if it is a blog, CRM, car parts store, etc.

A REST app is merely a  
stateful service

# Advantages

- Lower latency (less hops)
- No more stateless app server
- Hyper local cache
- Tune your app's 99th percentile directly

# Disadvantages

- Only works with REST apps
- Read repair could be non trivial
- Work gets duplicated

# Stateful Service

- Persists data according to its data model
- Runs queries locally
- Provides a means to stitch data back together during read repair
- Can provide hashing
- Publishes its own API

# Dynomite

- Distributes queries and updates to nodes
- Invokes the correct read repair phase
- Handles node membership transparently
- Provides network interface for clients
- Versions data

# API Negotiation

- Storage Engine Publishes an API
- API Methods declare
  - Data Types
  - Conflict resolution
  - Result Collation
  - Partition Strategy



# Client Protocol

- Dymomite is a front end to storage
- Clients can query API capabilities
- Mediator follows distribution semantics
  - Single partition
  - Range of partitions
  - Quorum requirements

- <http://github.com/cliffmoon/dynomite>
- <http://wiki.github.com/cliffmoon/dynomite>
- @moonpolysoft
- also on IRC

Q and or A