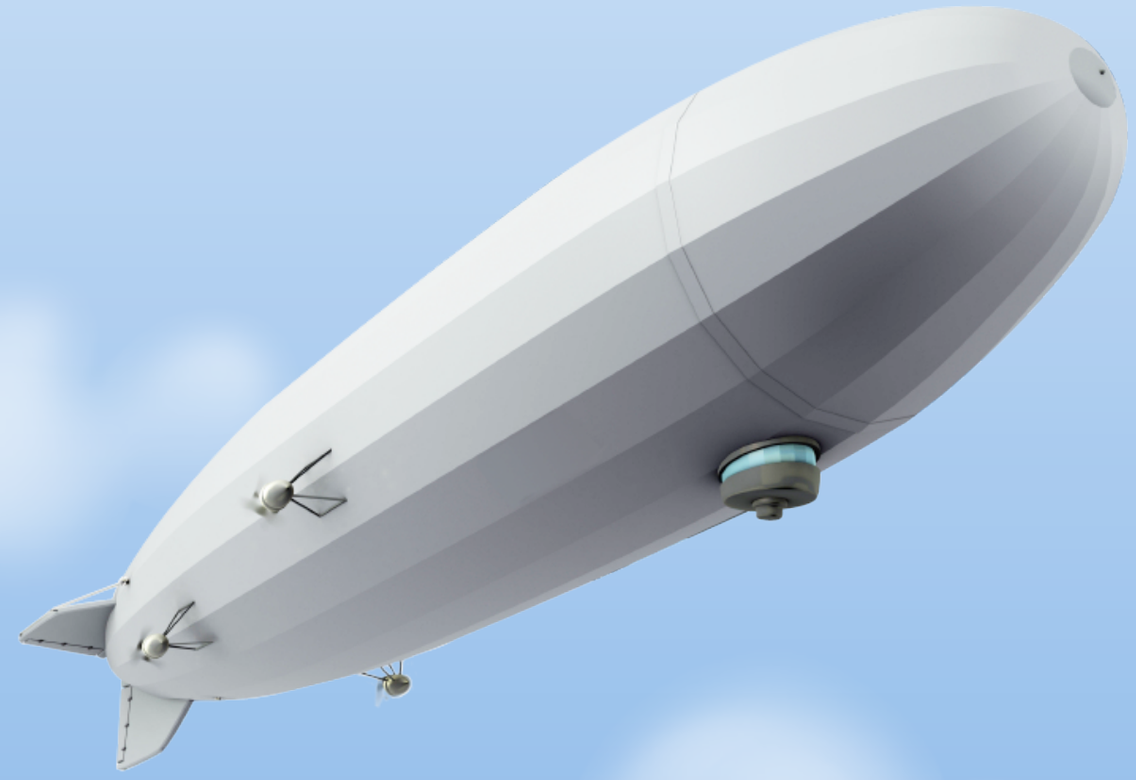

Uptime in High Volume Messaging Systems — Lessons Learned

QConSF, November 2011

Erik Onnen

About Me

- Director of Architecture and Delivery at Urban Airship
- Previously Principal Engineer at Jive Software
- 13 years writing Java, Python, C++ in highly distributed systems

In this Talk

- About Urban Airship and Lean
- Architecture Overview
- Key Learnings - Architecture, Engineering, Operations

What is an Urban Airship?

- Hosting for mobile services that developers should not build themselves
- Unified API for services across platforms
- Push, IAP, Entitlements, Content Delivery all at scale
- SLAs for throughput, latency

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- Doesn’t apply to just Engineering and Product - also Operations and Architecture

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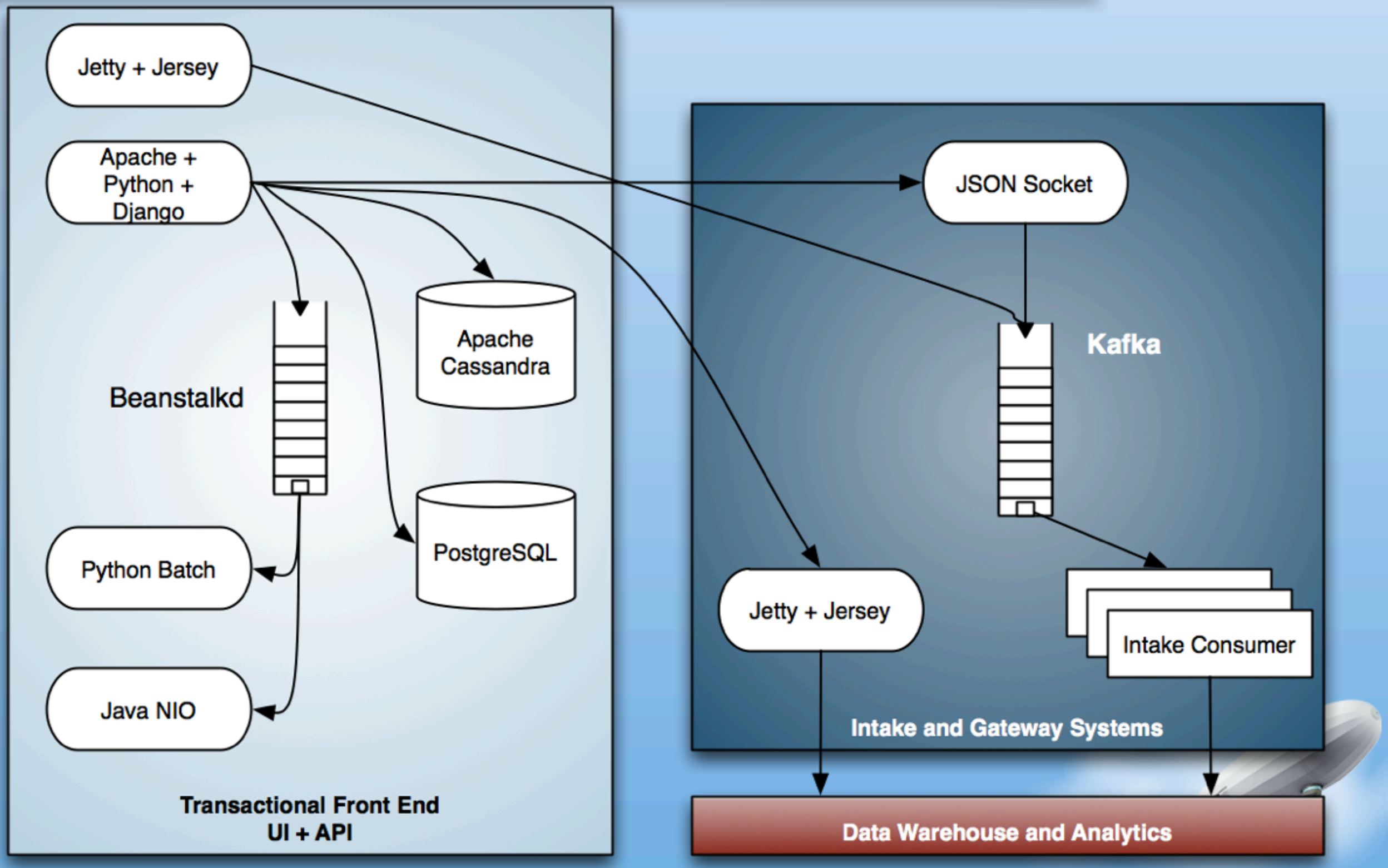

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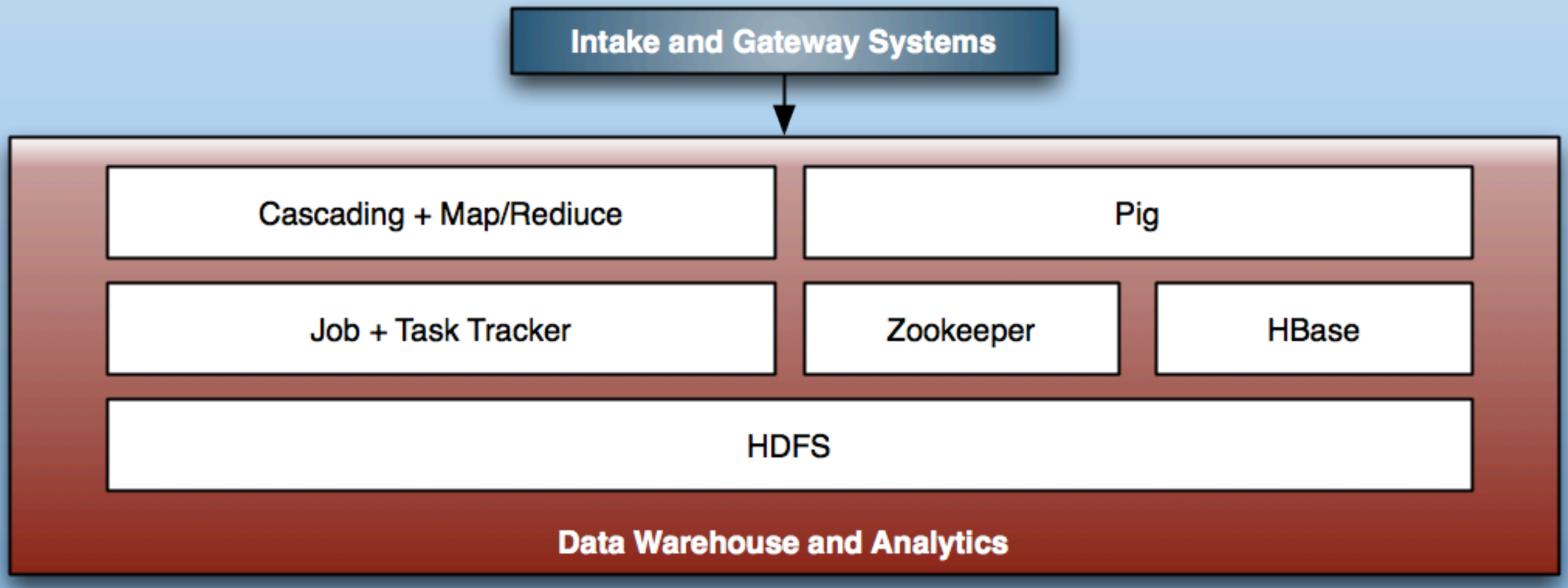

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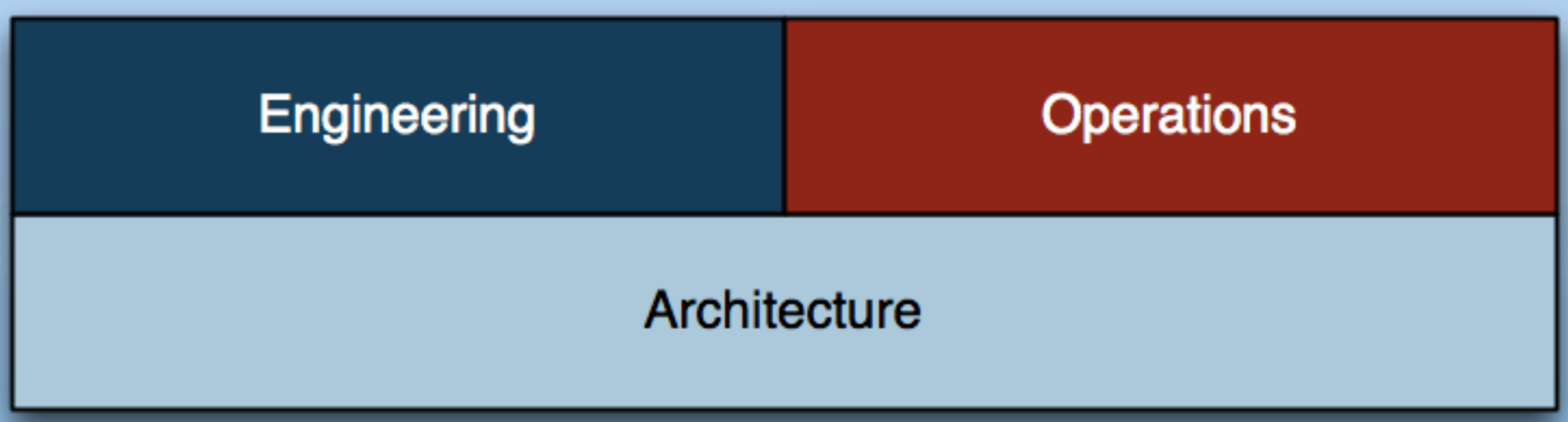

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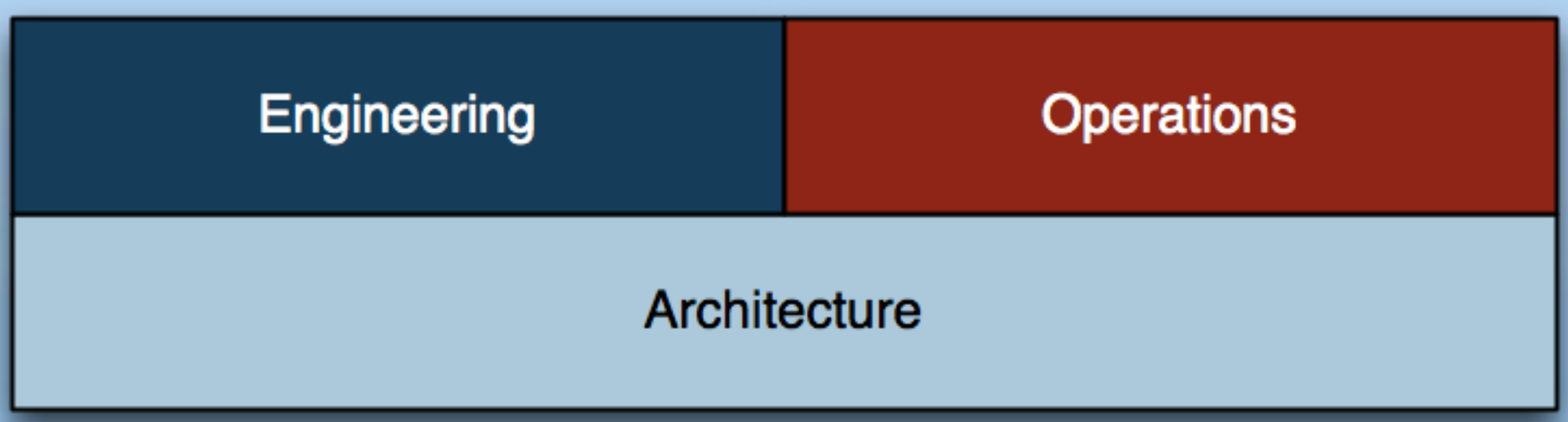

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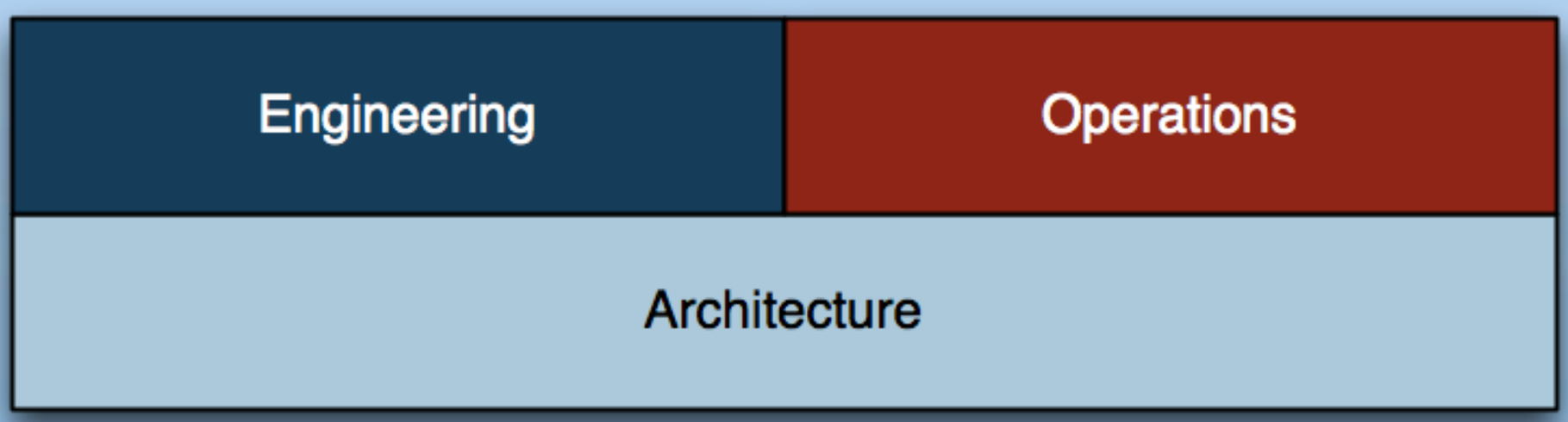

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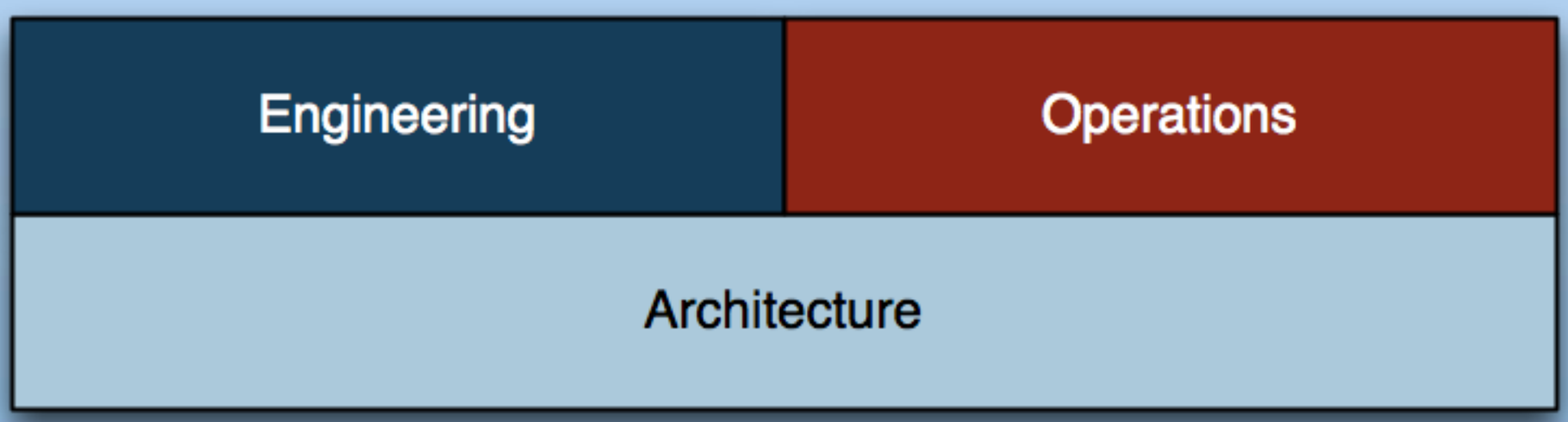

Principles, Guidance
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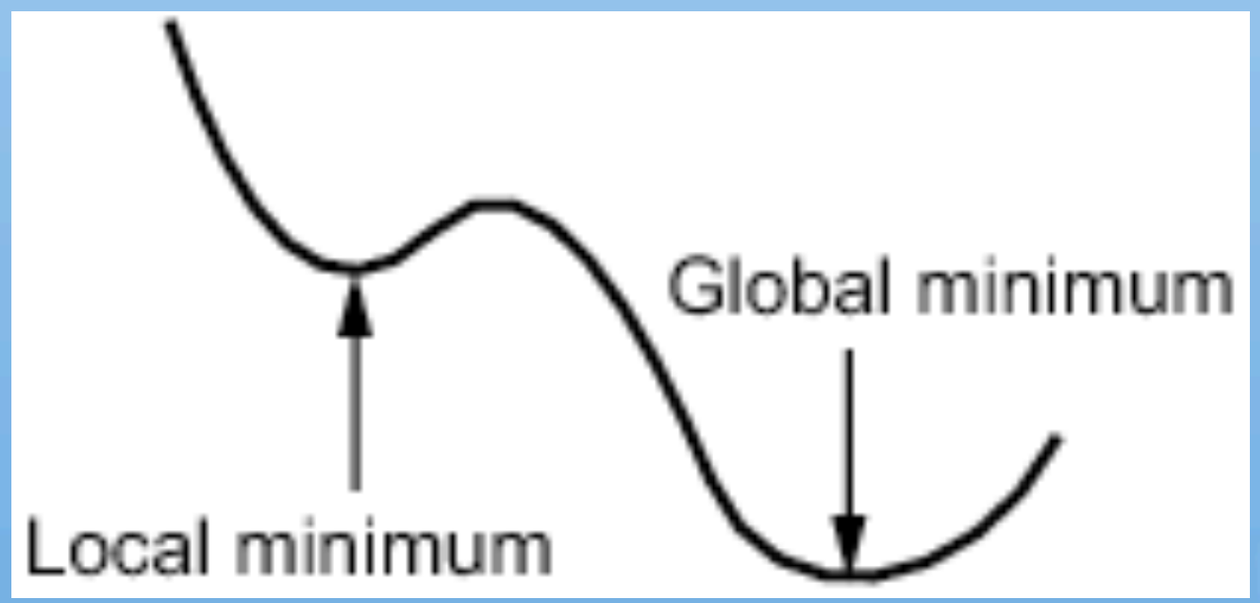

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  - Developer silos - avoid the bus factor

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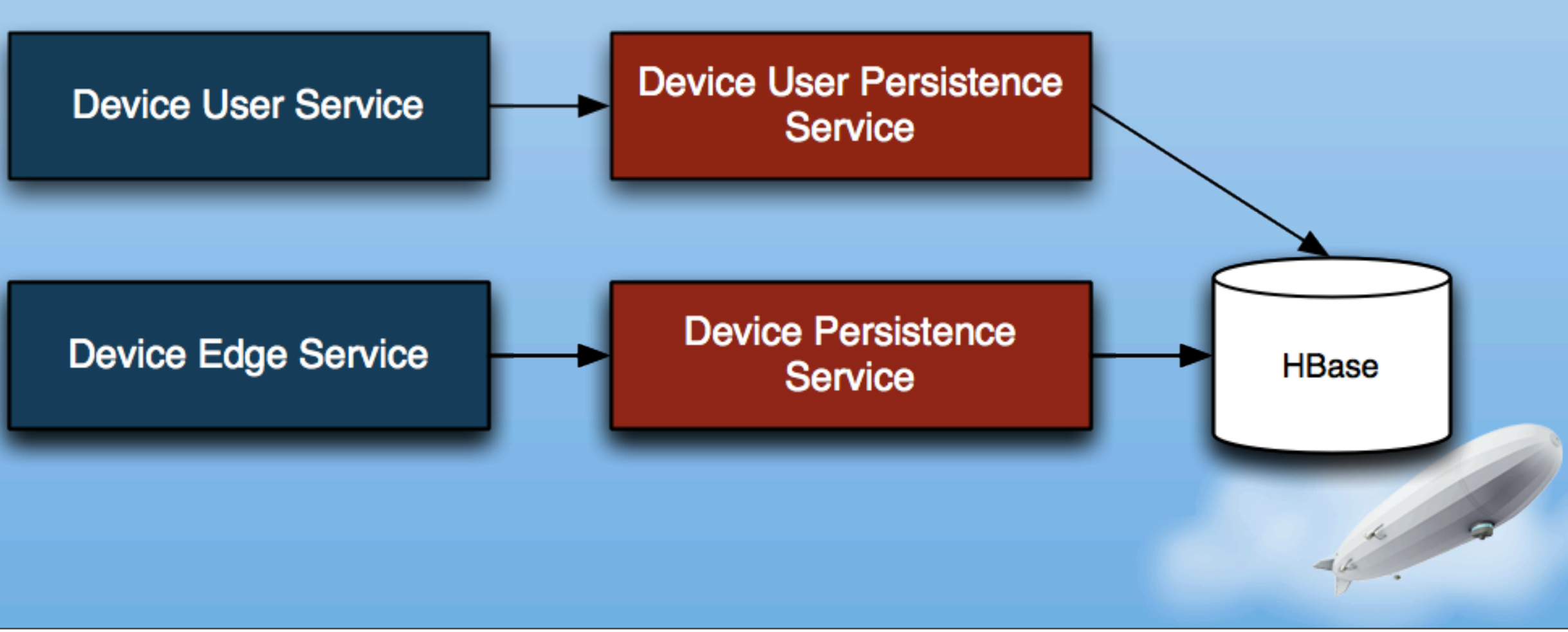

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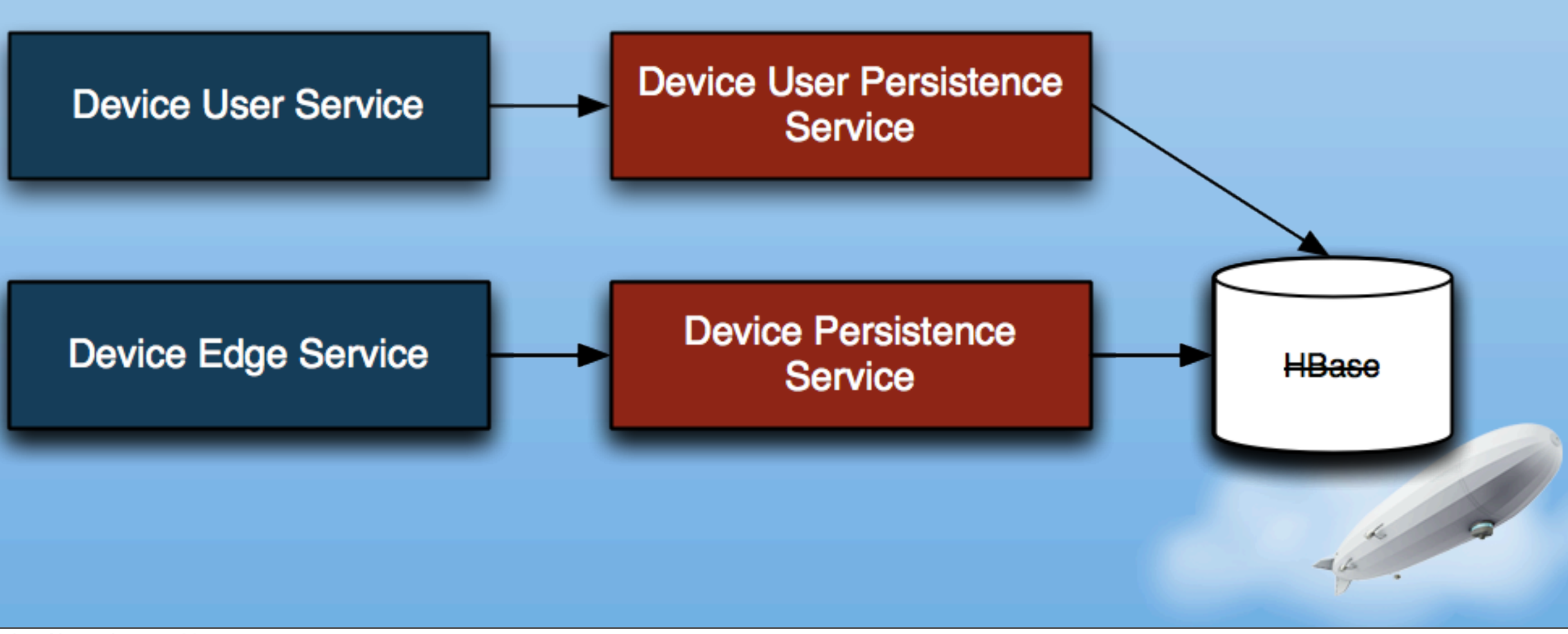

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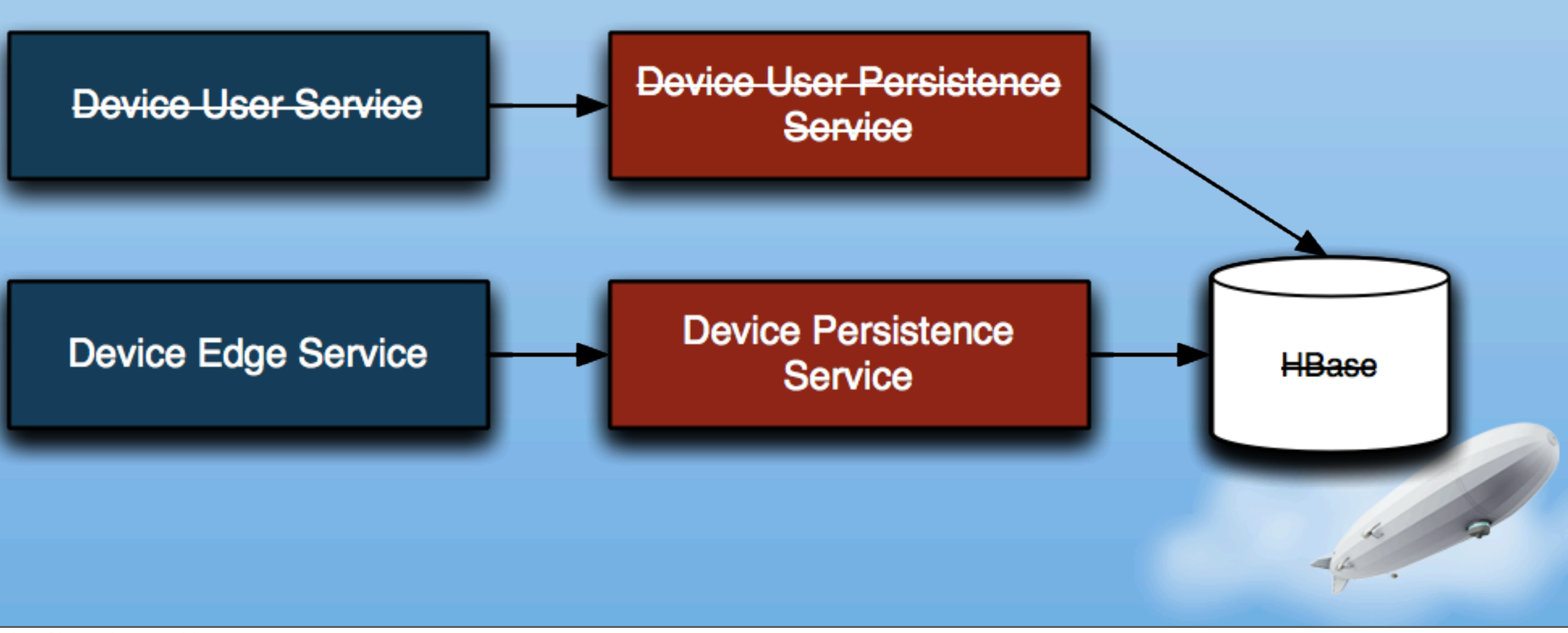

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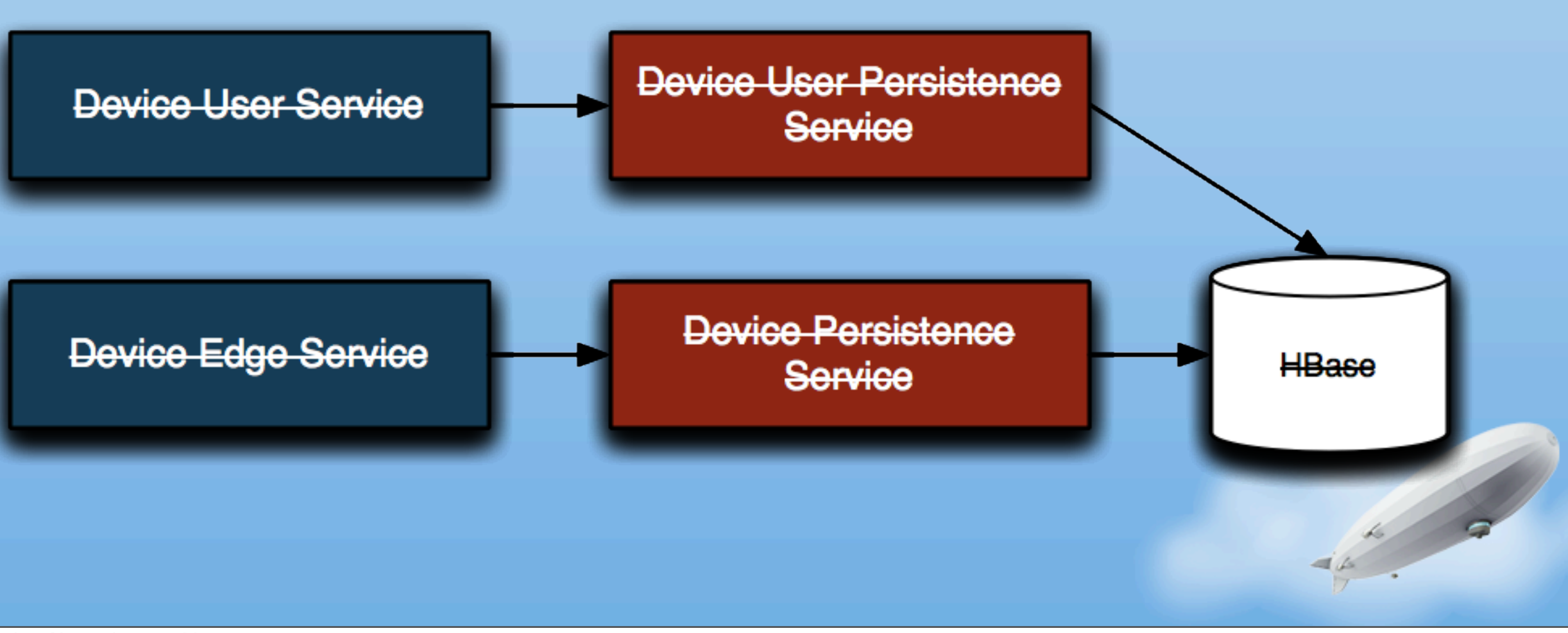

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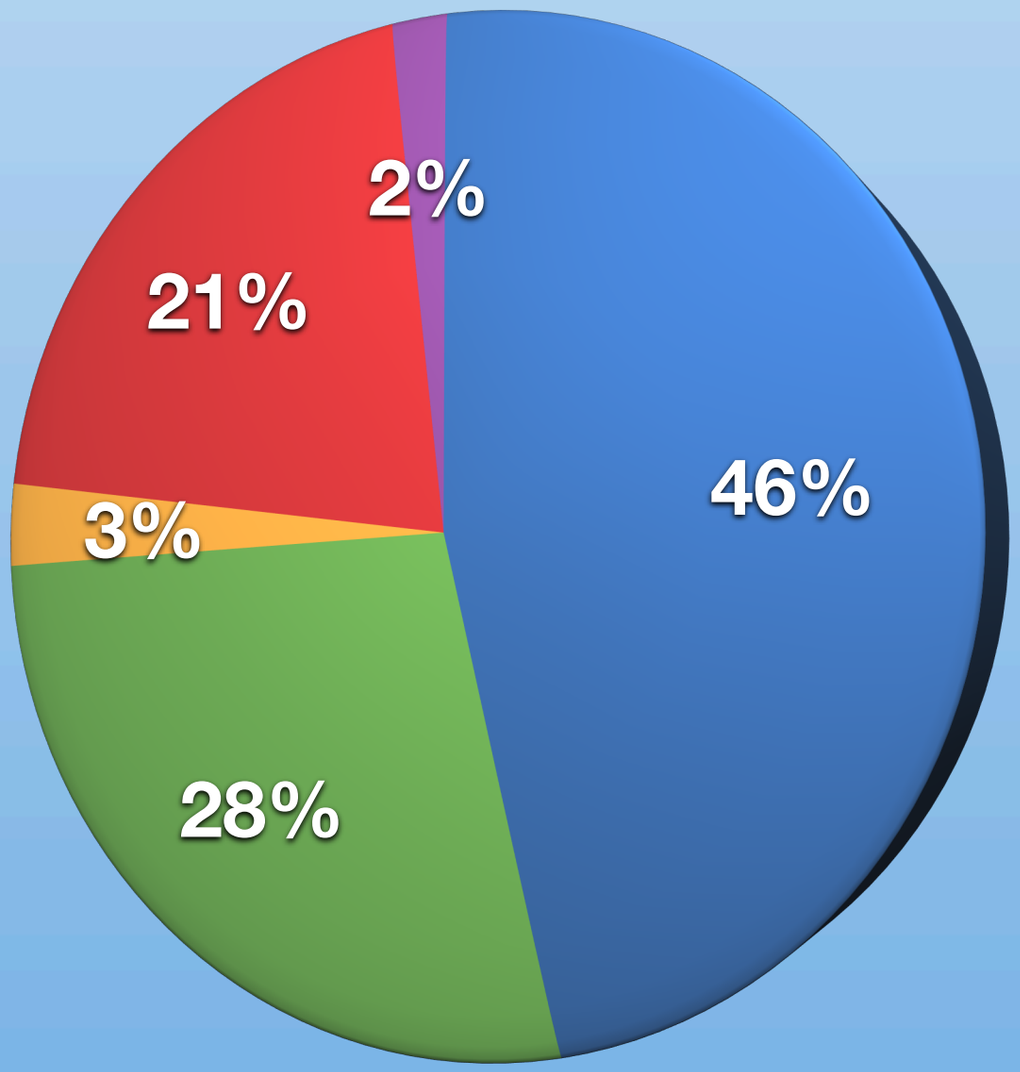
- Today - align fault domains w/ DNS, keep the distinct traffic classes separate

Engineering at UA

A Day in UA Engineering



- New Feature Development
- Sustaining Engineering
- IRC Tomfoolery
- Production Support
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Putting it all Together

```
public OpLogConsumer(RuntimeContext context, ServiceContext services, LagUpdater lagUpdater, Kaf
    super(tg, "OpLog Consumer " + workerCount.incrementAndGet());
    this.setDaemon(false);
    this.configuration = context.radonConfiguration;
    this.registry = services.getApidRegistry();
    this.clusterState = services.getStorageState();
    this.lagUpdater = lagUpdater;
    this.serviceContext = services;

    this.stream = stream;
    this.maxFaults = configuration.opLogMaxFaults;

    this.opLogLag = context.metricsRegistry.newHistogram(this.getClass(), "ConsumerLag", true);
    this.opLogSuccesses = context.metricsRegistry.newCounter(this.getClass(), "Successes");
    this.opLogFaults = context.metricsRegistry.newCounter(this.getClass(), "Faults");
    this.opLogHeartbeats = context.metricsRegistry.newCounter(this.getClass(), "Heartbeats");
    this.opLogMutations = context.metricsRegistry.newCounter(this.getClass(), "Mutations");
    this.opLogMutationRate = context.metricsRegistry.newMeter(this.getClass(), "MutationRate", "
}
```

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- Put the mechanics on the helicopters

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  - Use Kafka for pub-sub messaging
  - Generally favor pub-sub - easier to tack on listeners later - dovetails well into system-wide CEP

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- Requires extra discipline and careful thinking about how multiple versions of a thing coexist

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- Sometimes entire new services

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Example 5 Whys - 13-JUN-2011 Postgres Slave Delay

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Example 5 Whys - 13-JUN-2011 Postgres Slave Delay

1. **Why did we have a delay in replication?** There was an open connection in "idle in transaction" state for three days.

2. **Why was there an idle transaction?** There was a reports ETL task loading all the data, and it was somewhat slow. While it did work in batches, it did not commit or roll back.

3. **Why didn't we know about the delay in replication?** The slave replication monitors were misconfigured and not reading the correct data.

4. **Why were the replication monitors misconfigured?** After the deploy into production they were not properly reset to the new hostnames.

5. **Why did an idle transaction block replication?** Developer misunderstanding of how query result paging worked relative to PostgreSQL transactions.

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- First line of defense in on call rotation

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- DRY - an operator needs to be L1 & L2 support - consistency is key
- This has us to over 1200 services across > 100 servers and we’re still somewhat sane

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  - Undocumented limitations - Network, VPC, ELB

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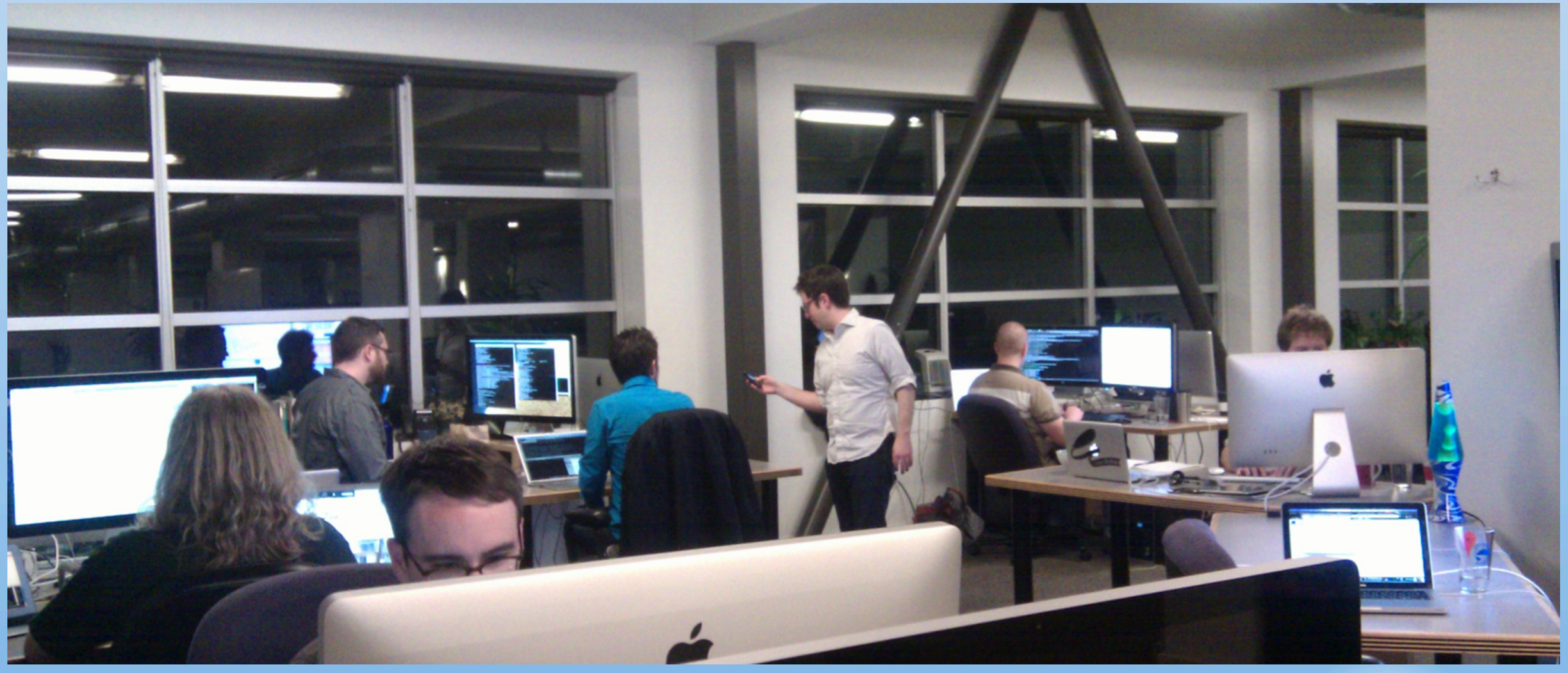
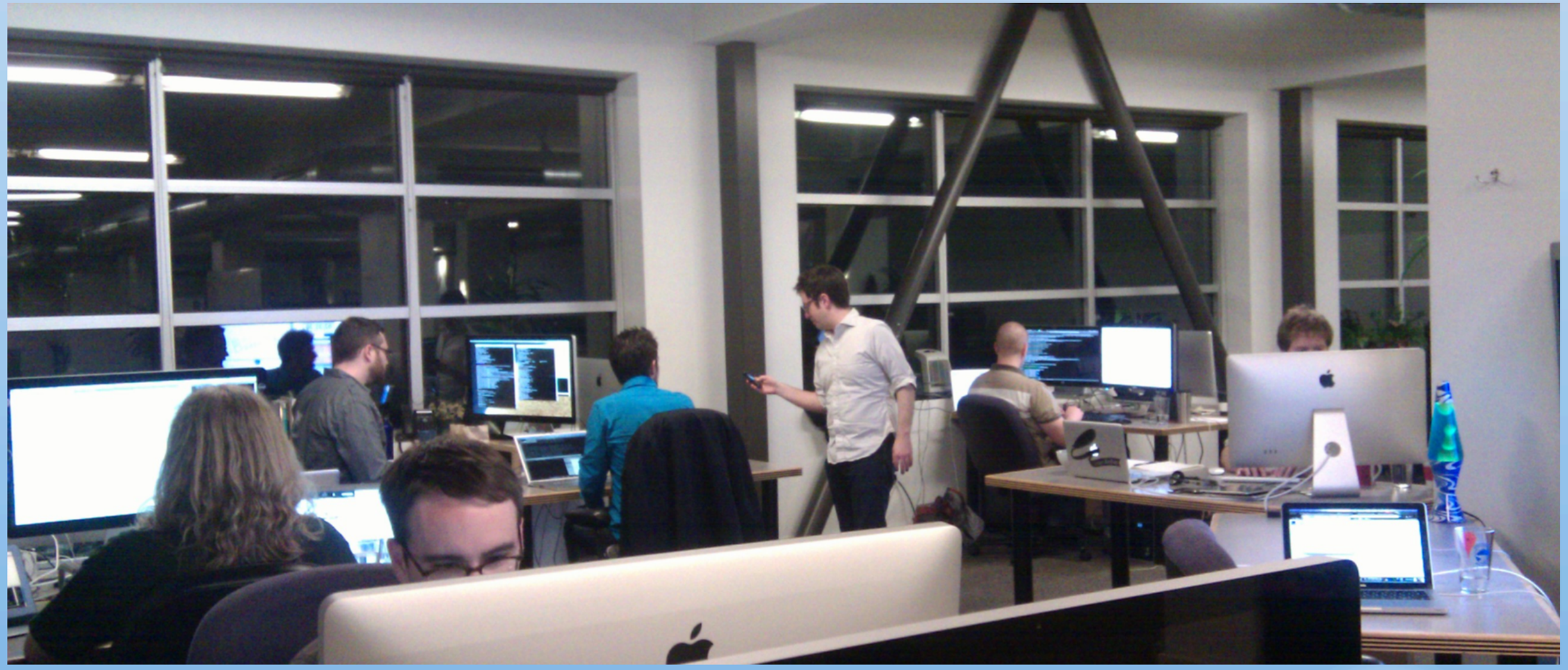
- Keep the same automation approach across both environments during the transition

Ops. Continuous Improvement



Ops. Continuous Improvement

One night in Portland...



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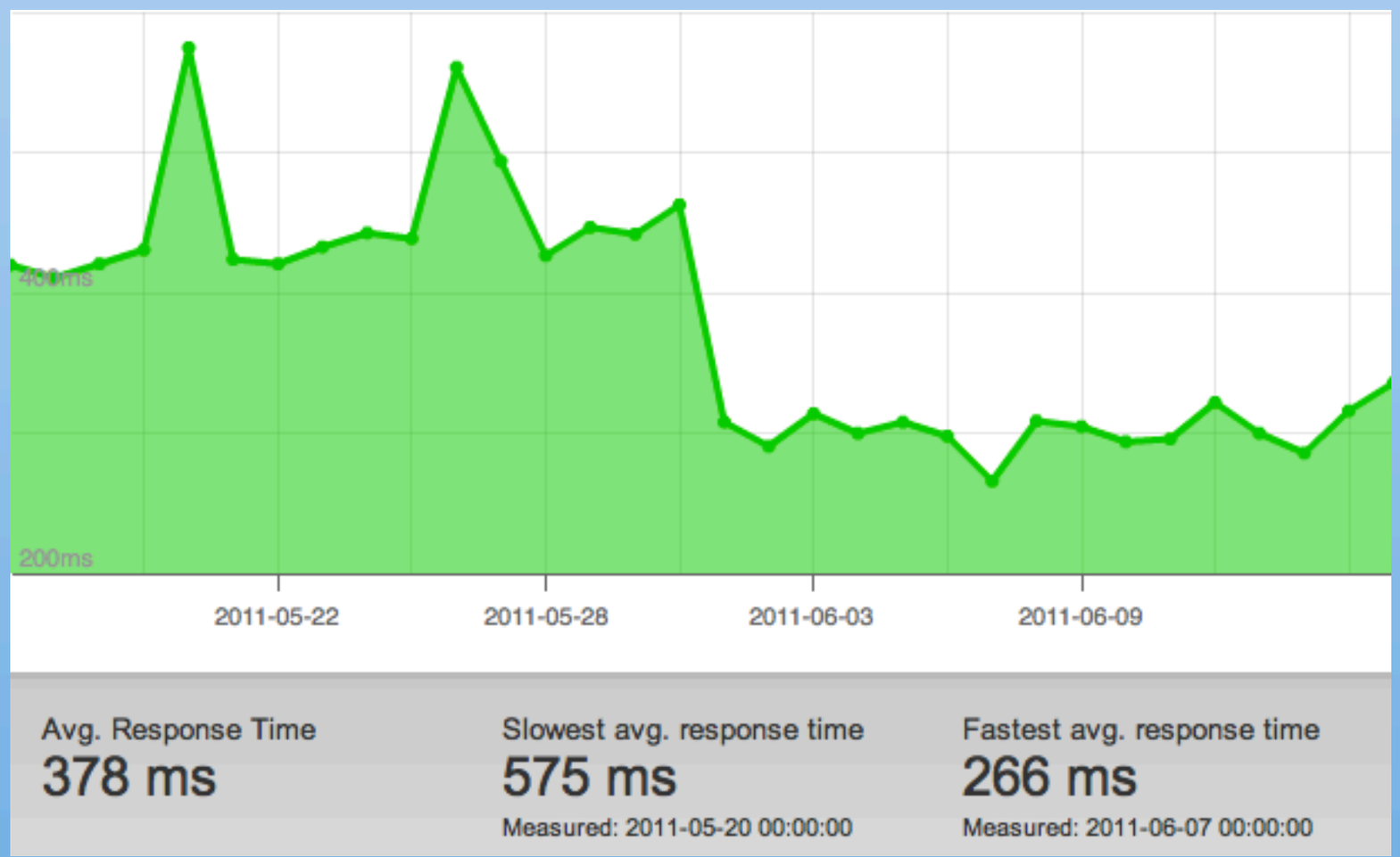

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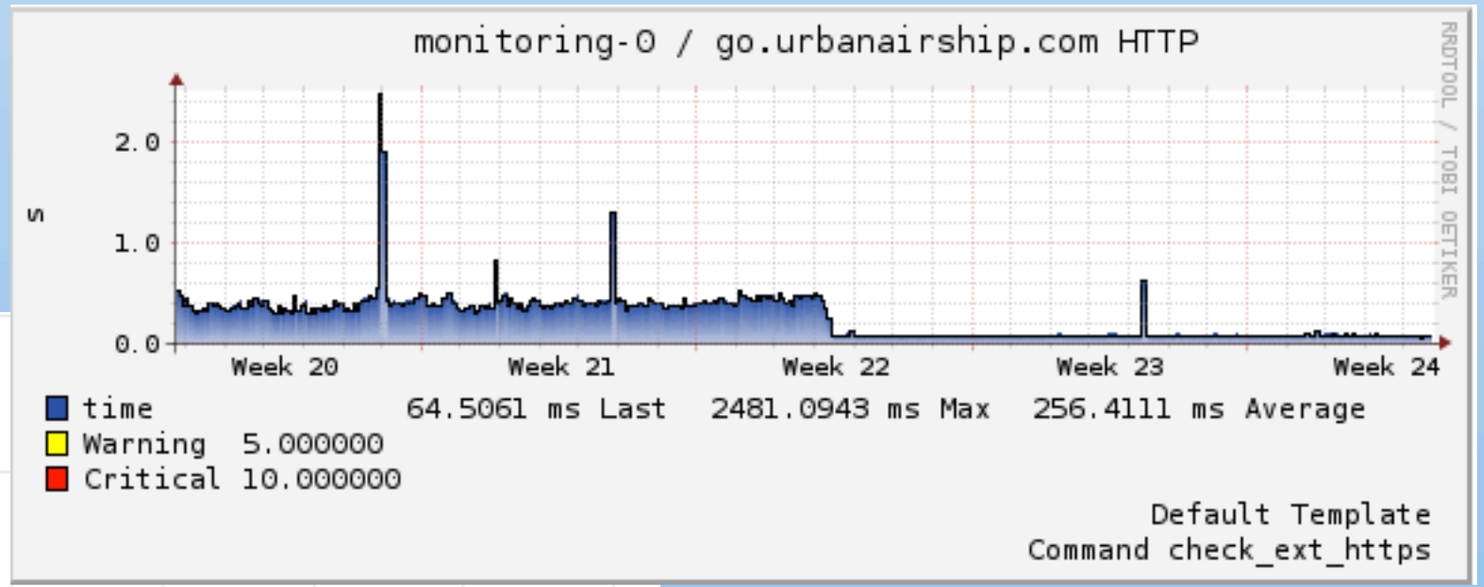

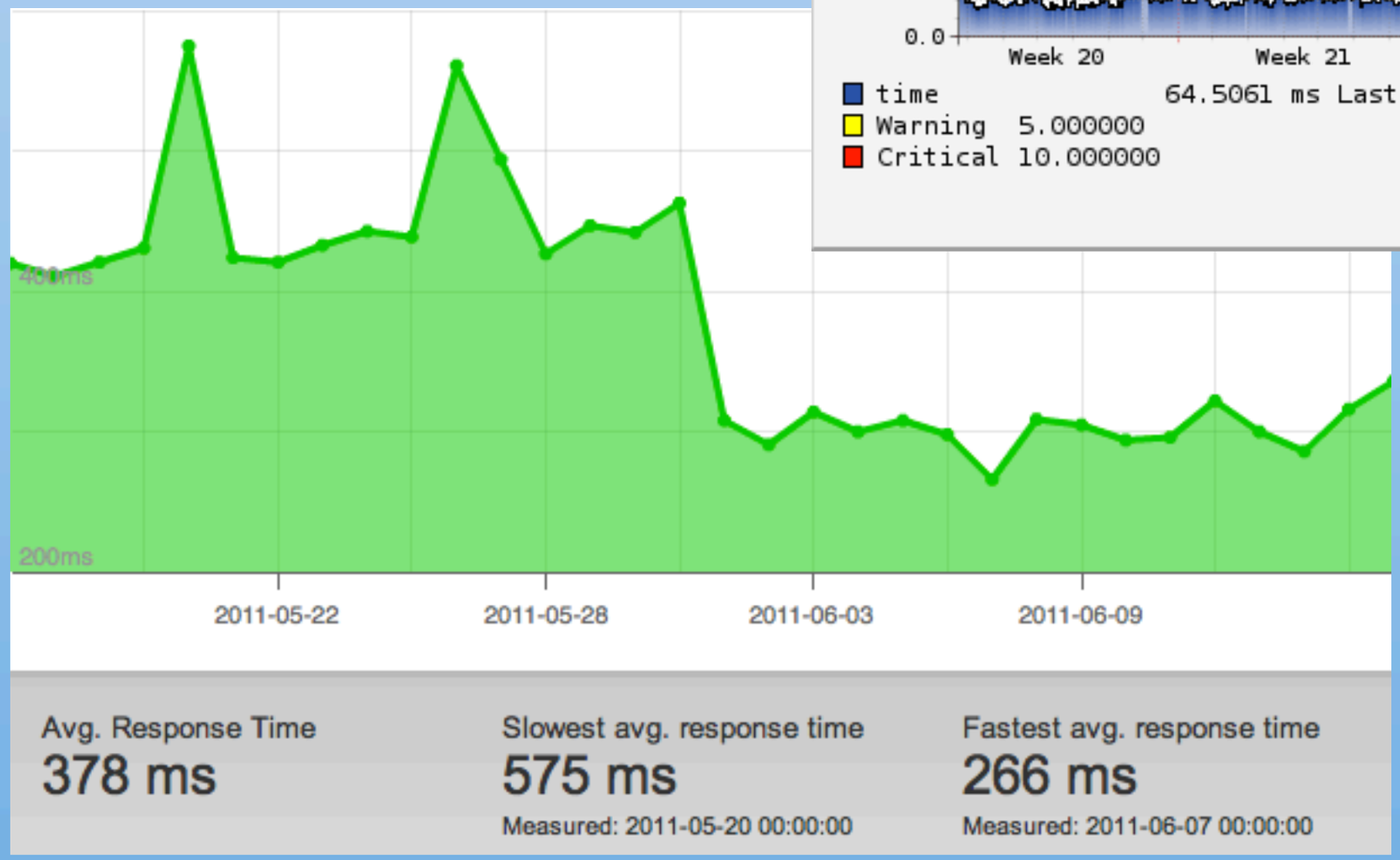

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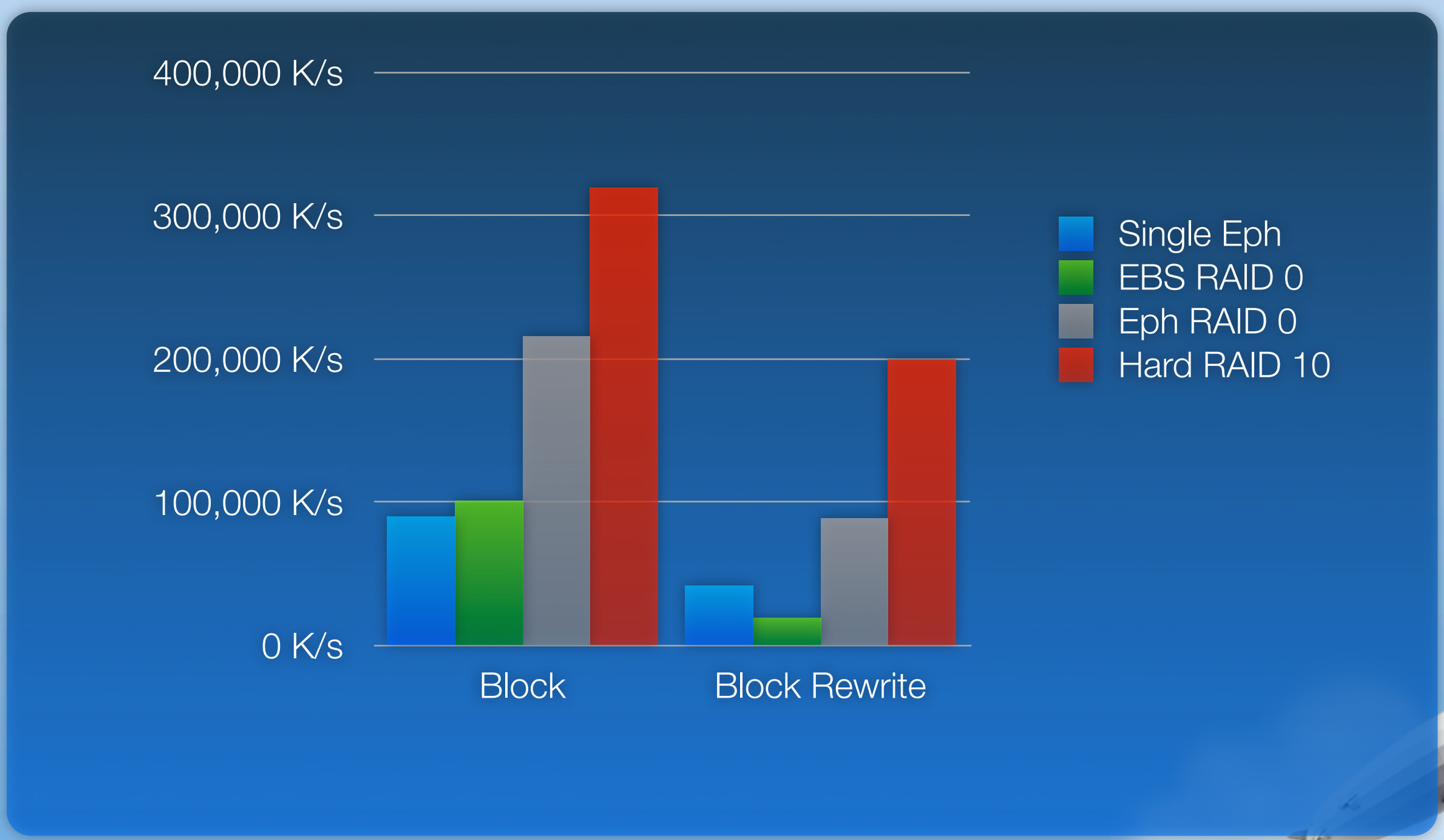
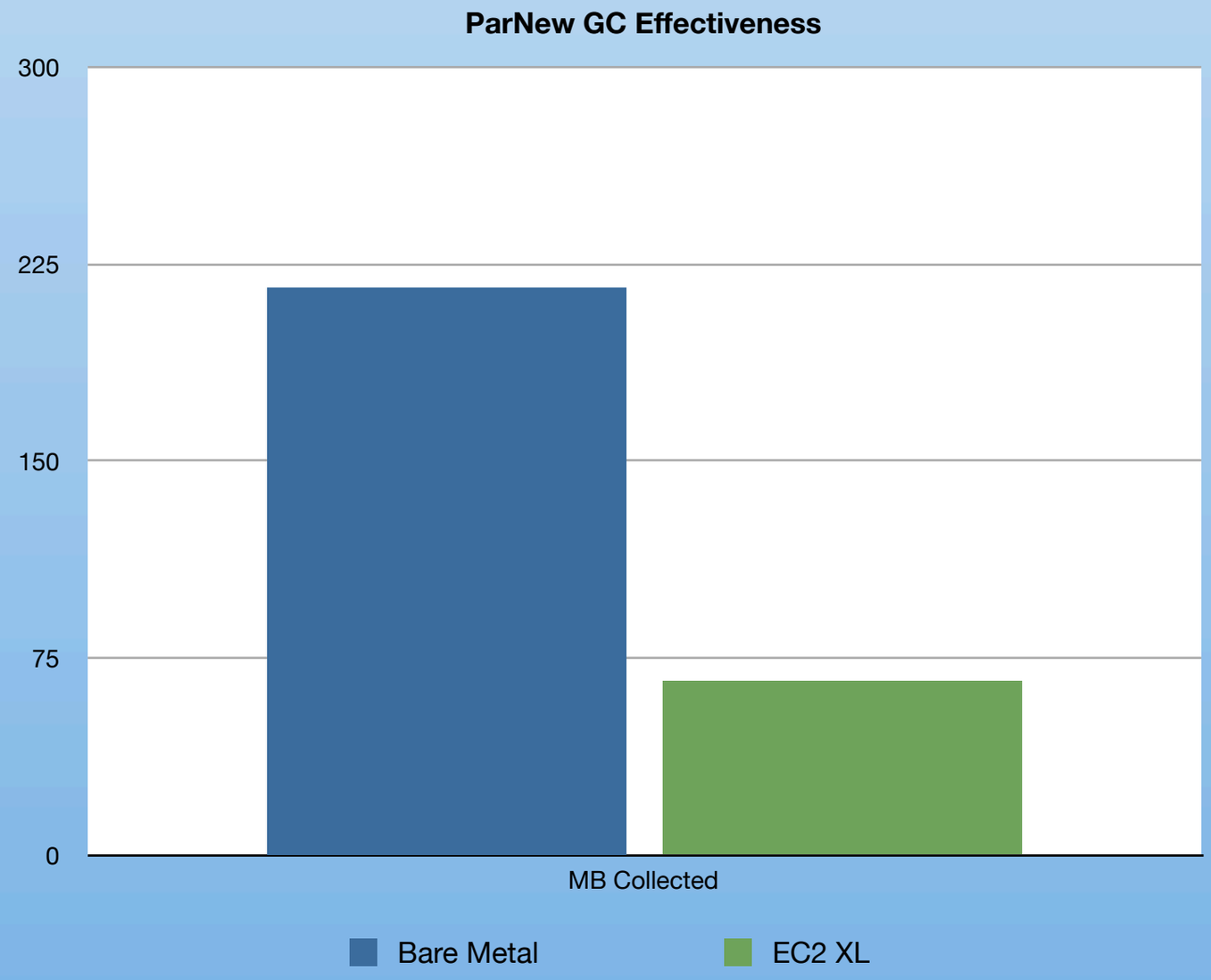
Sequential Block Writes



Ops. Continuous Improvement

Performance of Real CPUs - GC Effectiveness



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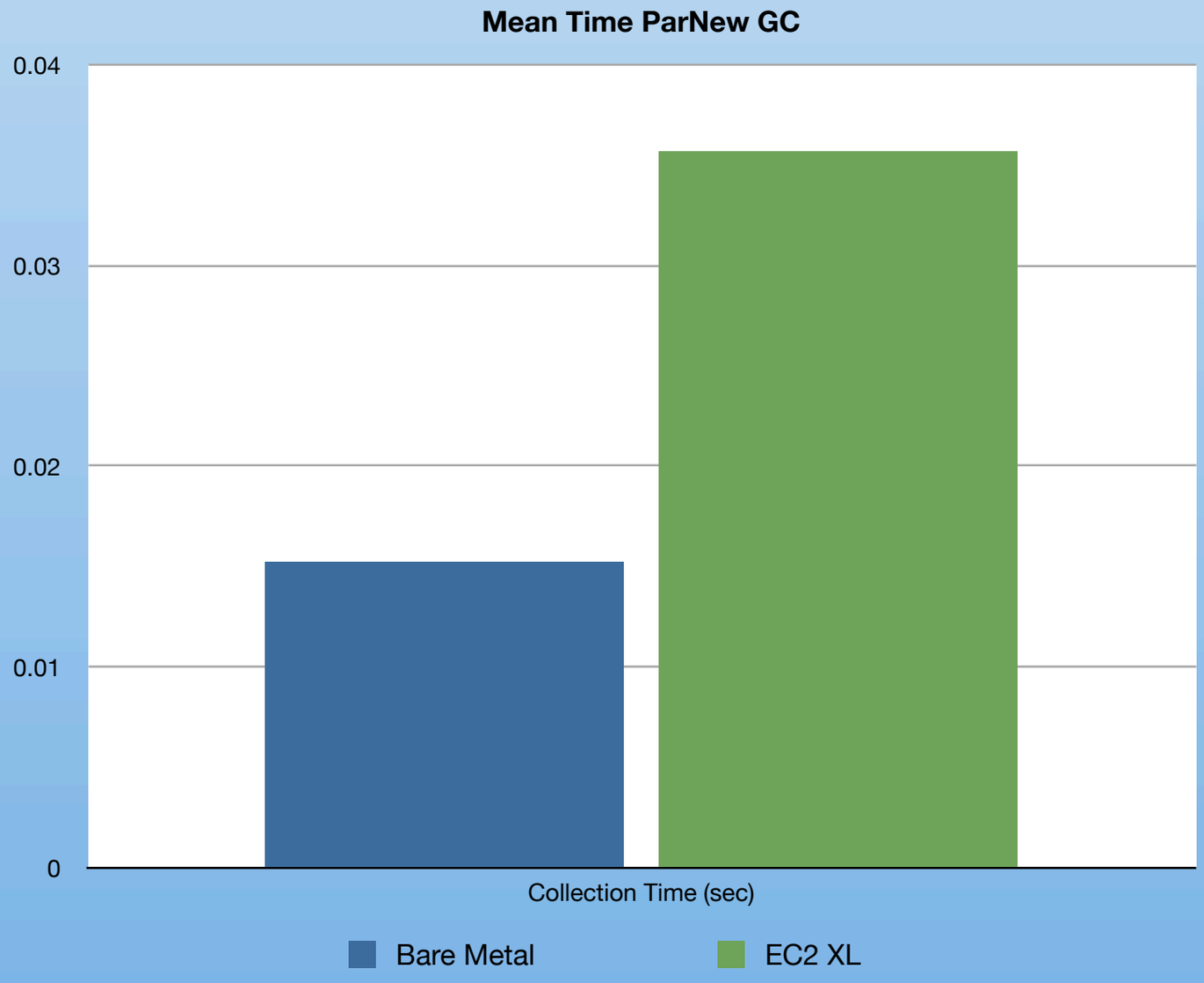

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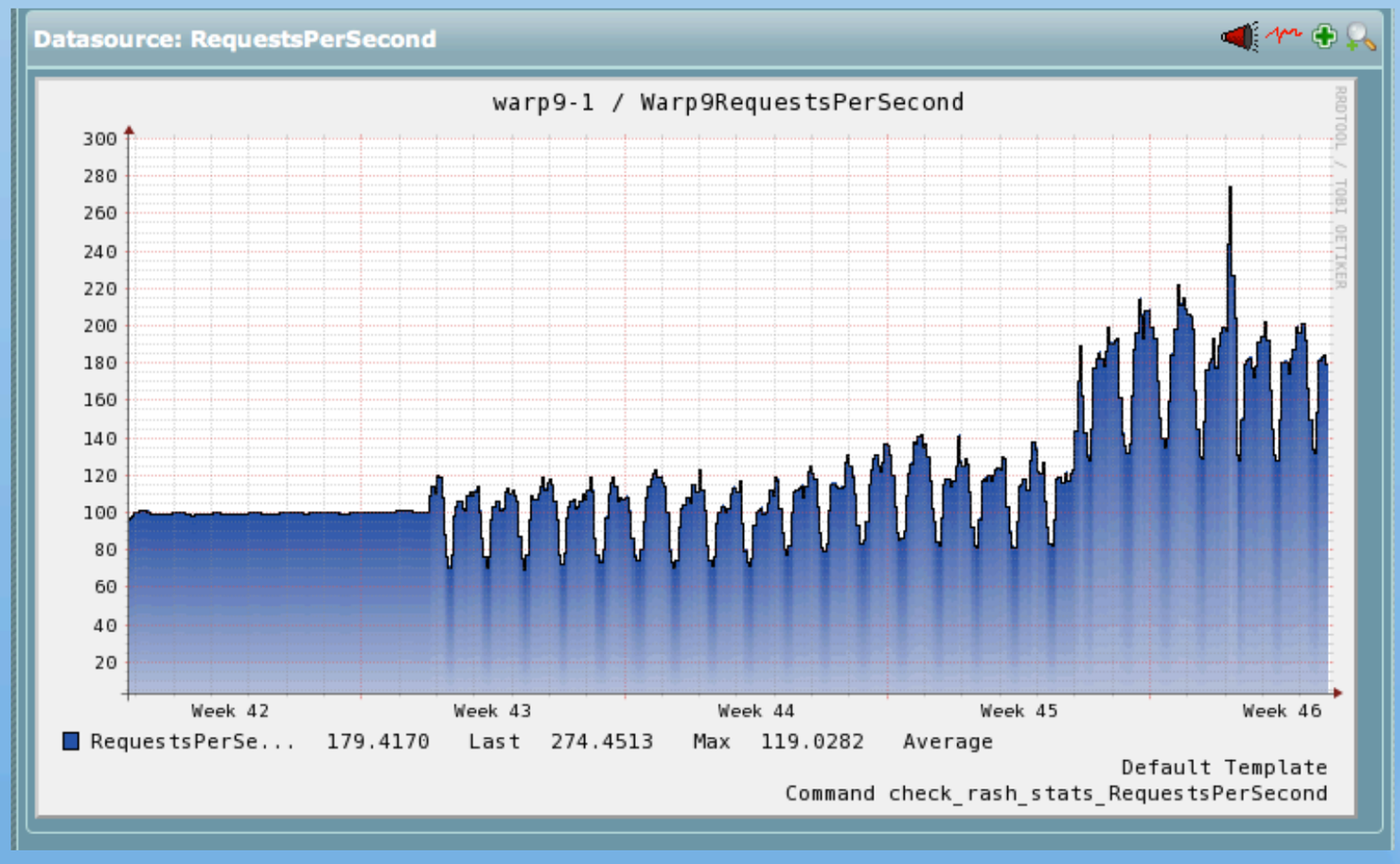

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  - Extra CPU when we need it - currently using it for SSL offload

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- Balancing keeping engineers interested and need for specialization

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Thanks!

- Urban Airship http://urbanairship.com/
- Me @eonnen or erik at
- We're hiring! http://urbanairship.com/company/jobs/