

# Leveraging Multiple Regions to Improve Site Reliability

Lessons Learned from Jet.com

Andrew Duch, Jet.com / Walmart Labs

# Background



Andrew Duch  
Tech Lead, Cloud Platform @ Jet



E-Commerce Website focused on saving you money  
Run in Azure, Event-sourcing design, Microservices



Jet Engineering now part of Walmart Labs

# Not so long ago...

**tech** BUSINESS CULTURE GADGETS FUTURE STARTUPS

Connect

## Costco-meets-Amazon company Jet.com launches

by Hope King @lisahopeking  
 July 22, 2015: 10:55 AM ET

Jet.com

Arizona suspends Uber's self-driving car tests after fatal crash

Remington, one of America's oldest gun makers, files for bankruptcy

UBER Uber quits 8 countries in Southeast Asia, selling out to rival Grab

TIFFANY & CO.

0:17 / 4:54

Shopping club Jet.com launches in the U.S.

The Costco-meets-Amazon company Jet.com launched Tuesday.

There's been a lot of anticipation about Jet because of who the founder is, and how the business could threaten Amazon and Costco.

In July 2015, Jet.com launched

Focused on going live

We were running only **one** Azure region

# Then...



## INTERNET RETAIL

### Jet.com reportedly suffering outages on desktop, mobile

Javier E. David | @TeflonGeek

Published 9:47 AM ET Sat, 15 Aug 2015 | Updated 9:53 AM ET Sat, 15 Aug 2015



Source: Jet.com

Unstart online retailer Jet.com appeared to be suffering some website

By August 2015, we experienced our first **major outage...** and **people noticed.**

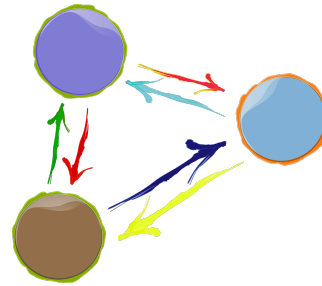
With **Cyber Monday** looming just **3mos** away... we new we had to **take action.**

So we decided to invest in building out in a second Cloud region...

# Why did we go multi-region?



Tolerate Regional  
Failure Modes



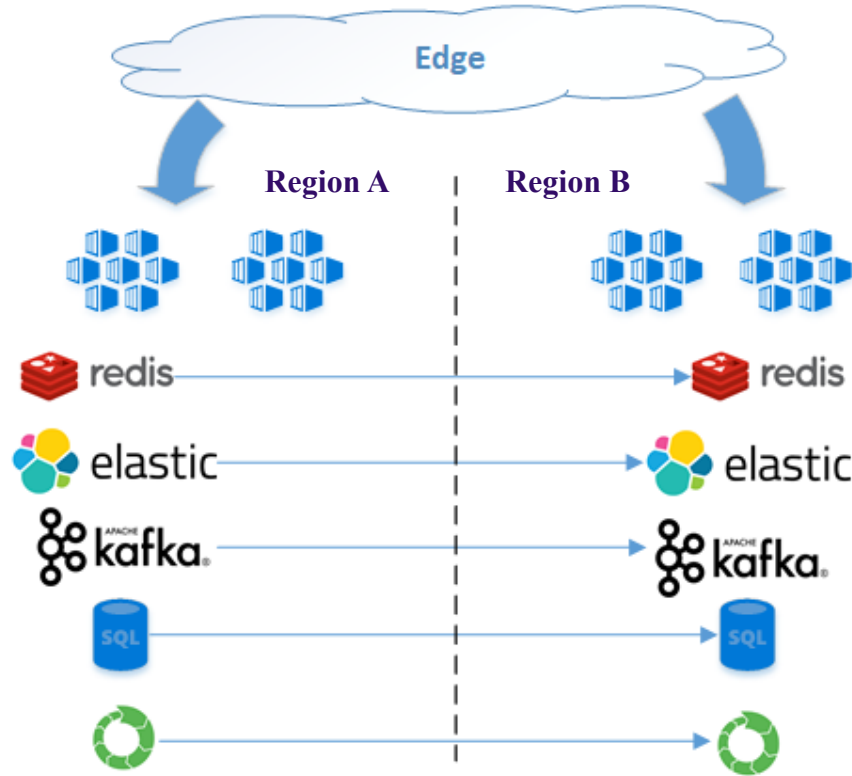
Fast MTTR



Planned  
Events

So we asked each engineering team to come up with a multi-datacenter architecture plan...

And we got back diagrams that looked like this...



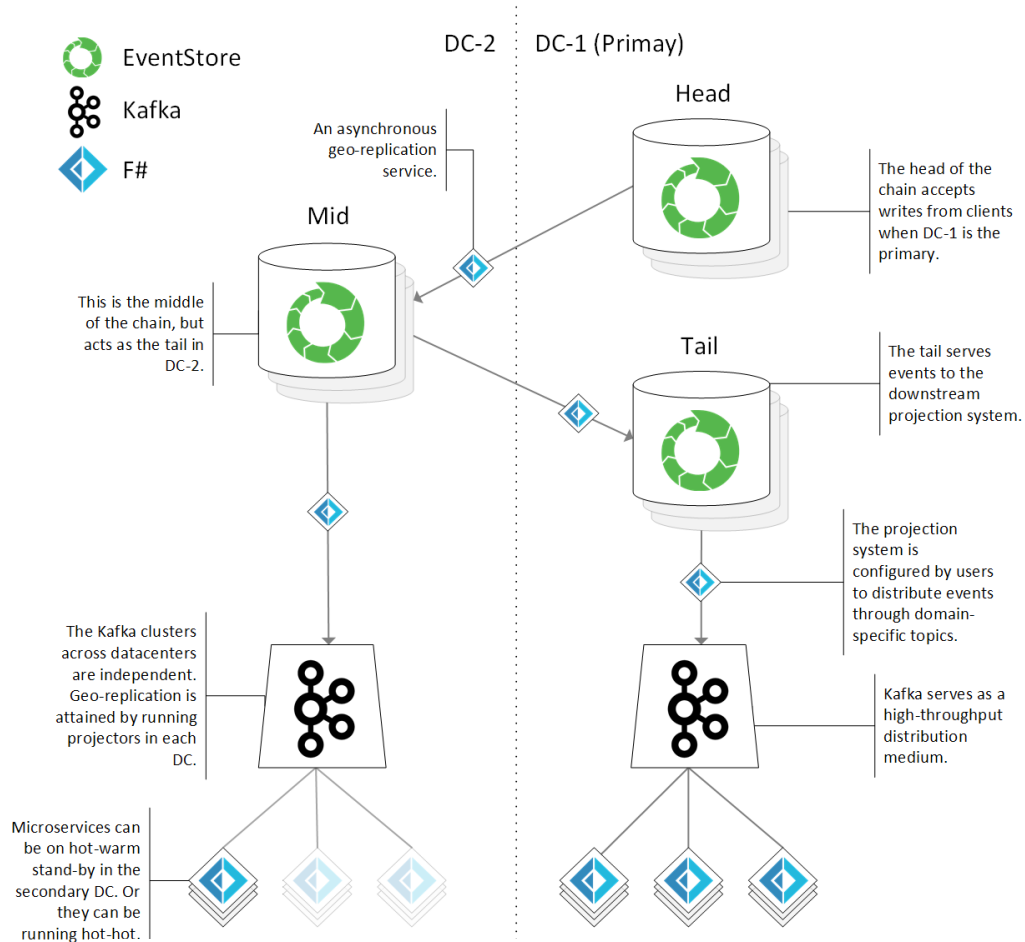
*“It will be a lot easier if I can just replicate all my data systems!”*



# **Lesson #1: Don't replicate every data store**

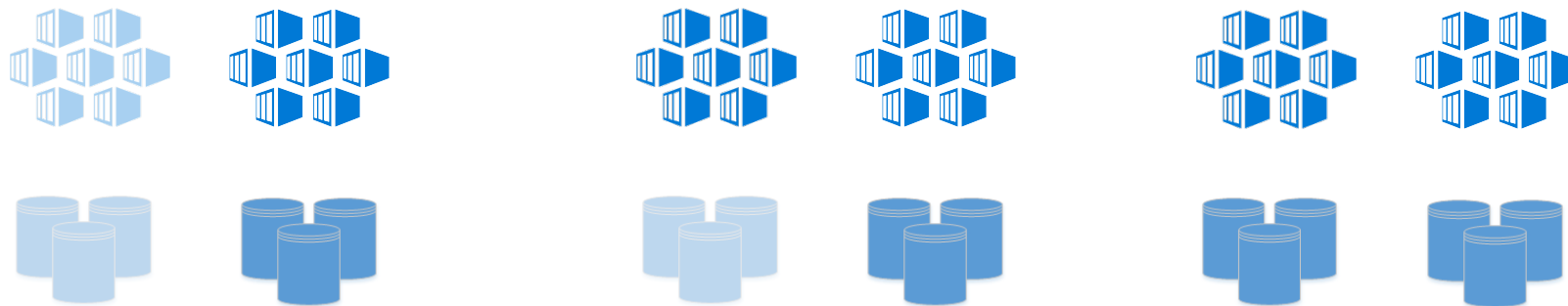
## Lesson #1: Don't replicate every data store

- Learning how to design for and operate geo-replication of data stores is **hard**
- Only replicate **source-of-truth** data stores across regions
- All other data stores should be **projections** of that data that are **hydrated locally**
- Let's see an example...



# **Lesson #2:** Not every system needs to be Active/Active

# How can I architect my systems?



Active/Passive

Active/Active Stateless

Active/Active



## Lesson #2: Not every system needs to be Active/Active

**Time** - Achieving Active/Active architecture for apps that were not designed to do so often involve significant refactoring

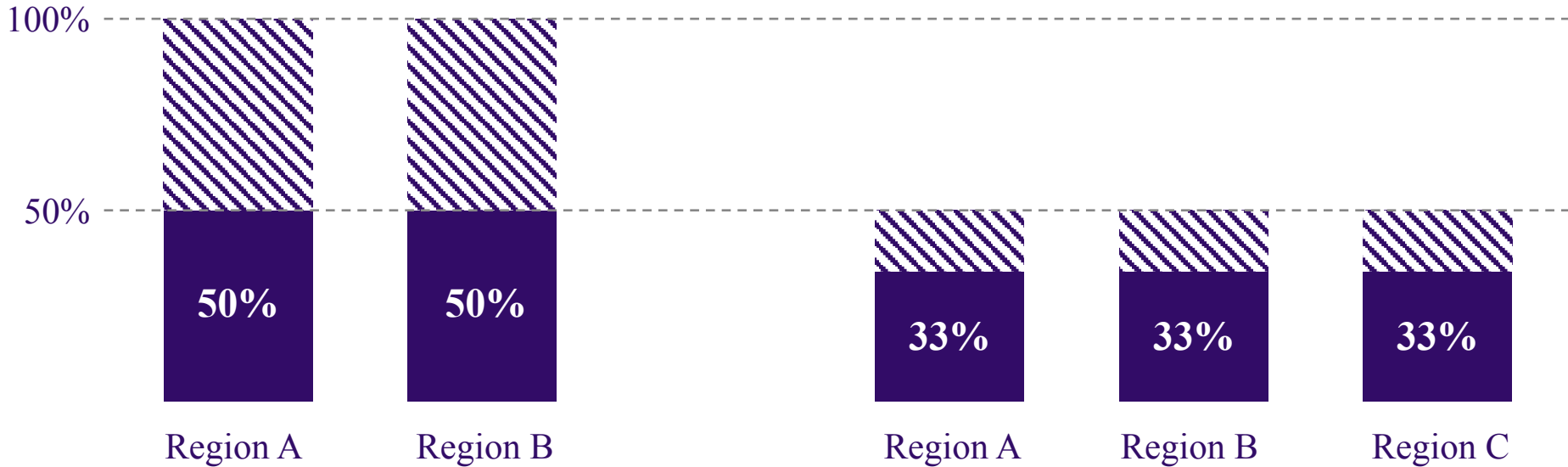
**Complexity** - Teams need to make their own CAP trade-offs. Conflict resolution is requires thought

**Cost** - Having hot data access in every region can become expensive and may not be required for non-Tier 1 services

*Let the SLO be an input into architecture decisions...*

**Lesson #3: Three is cheaper than two**

# Lesson #3: Three is cheaper than two



**Two Region Model**  
 Excess compute capacity when  
 not in failure mode: 100%

**Three Region Model**  
 Excess compute capacity when  
 not in failure mode: 50%

*Both are N+1...*



# **Lesson #4: Practice, Practice, Practice**

## Lesson #4: Practice, Practice, Practice

- We run traffic failovers on a weekly basis
- We run storage layer DR exercises monthly
- It's not enough to run a failover exercise, **break your regional links** in order to expose hidden or forgotten dependencies

# **Lesson #5: Failover Automation Needs to Scale**

## Lesson #5: Failover Automation Needs to Scale

- First-generation failover was a compilation of scripts that would move us through **well defined states**... required a lot of operator expertise
- Second-generation was a fully automated failover tool with centrally managed plans.
- Ultimate goal would be failover handled within the platform layers of the system... No external coordination tooling

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Q/A

*This work was contributed by numerous people across many teams at Jet.*