

Five Years of Multi-Cloud at PagerDuty

A ROMANTIC AND COMPLICATED LOVE STORY
SRECON AMERICAS 2018

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Disclaimers and Context

What is PagerDuty?

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I work with ~~smart~~ smart people

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You are not PagerDuty

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We get this wrong sometimes

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You will not get an easy answer

Not a vendor endorsement

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Slides will be posted online
afterward

Terminology

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Multi-Cloud

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*Having Active or Passive
Infrastructure in Multiple
Cloud Providers*

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*Having the same product or
service spread across
Multiple Cloud Provider*

*What every Procurement
Manager thinks they want*

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Active / Active

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*Running the same workload
across multiple datacenters*

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“Distributed Systems”

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Active / Passive

*Running a workload in one
datacenter with a standby
datacenter*

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History Lesson

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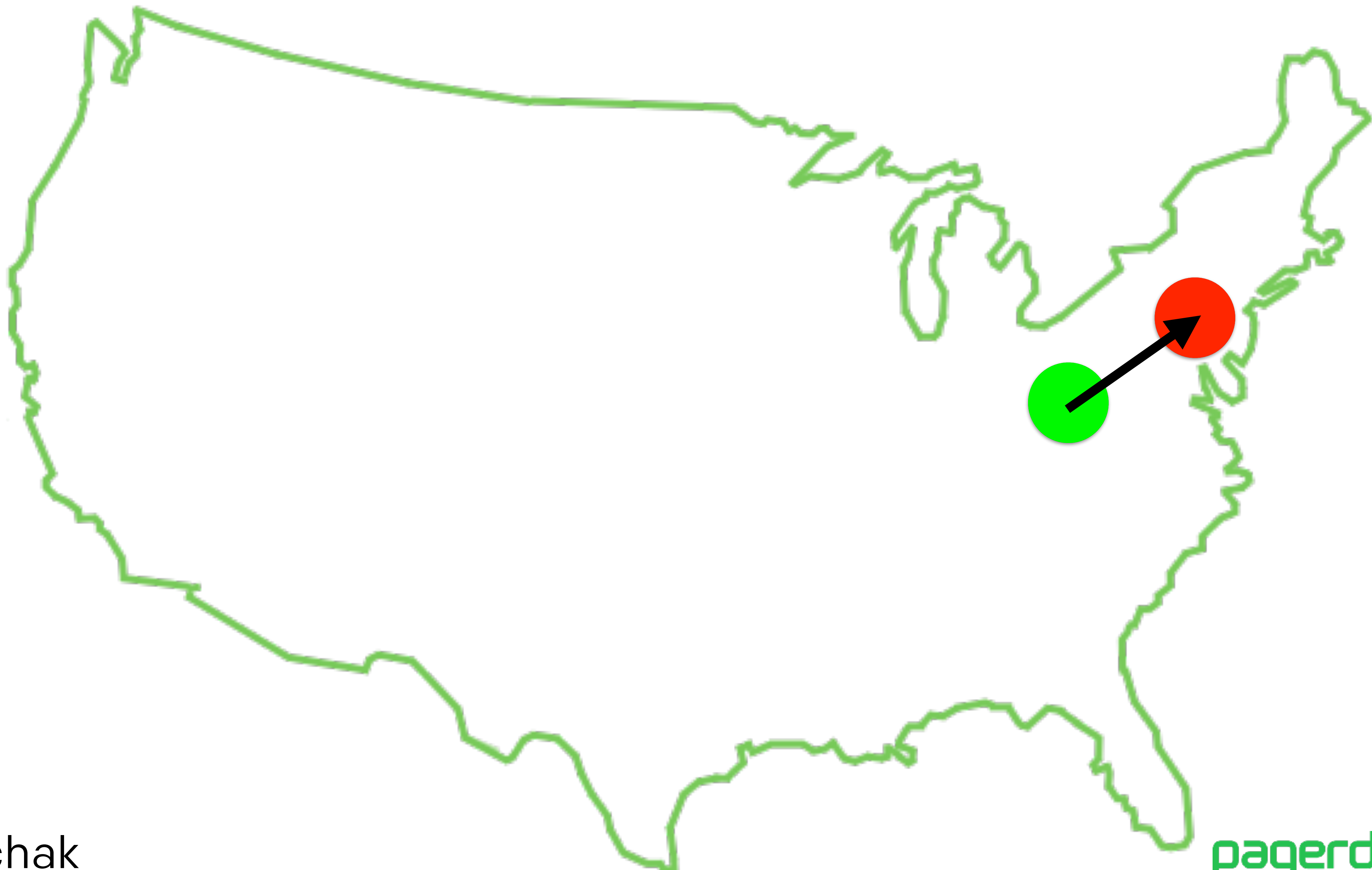
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PagerDuty Early 2012

- Cloud Native
- Used Failover for High Availability
 - MySQL Master/Slave Topology based on DRBD
 - Stateless Rails app behind Load Balancers
- AWS us-east-1 and failover site in New Jersey

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Opinions

The Cloud: Risky, Unreliable, and Dumb

I'm not saying the cloud isn't viable. I just think it's risky, unreliable, and dumb for many uses.



By [John C. Dvorak](#) May 16, 2011 5:10PM EST

51% Of People Think Stormy Weather Affects 'Cloud Computing'



Jay Yarow [✉](#) [📡](#) [🐦](#) [G+](#)

🕒 Aug. 30, 2012, 12:14 PM 🔥 28,882

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Summary of the AWS Service Event in the US East Region

July 2, 2012

We'd like to share more about the service disruption which occurred last Friday night, June 29th, in one of our Availability Zones in the US East-1 Region. The event was triggered during a large scale electrical storm which swept through the Northern Virginia area. We regret the problems experienced by customers affected by the disruption and, in addition to giving more detail, also wanted to provide information on actions we'll be taking to mitigate these issues in the future.

Our US East-1 Region consists of more than 10 datacenters structured into multiple Availability Zones. These Availability Zones are in distinct physical locations and are engineered to isolate failure from each other. Last Friday, due to weather warnings of the approaching storm, all change activity in the US East-1 Region had been cancelled and extra personnel had been called into the datacenters for the evening.

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RELIABILITY

OUTAGE POST-MORTEM - JUNE 14

*by Alex Solomon
on June 18, 2012*

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2012: Cloud is Unreliable

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Minutes of downtime is
unacceptable

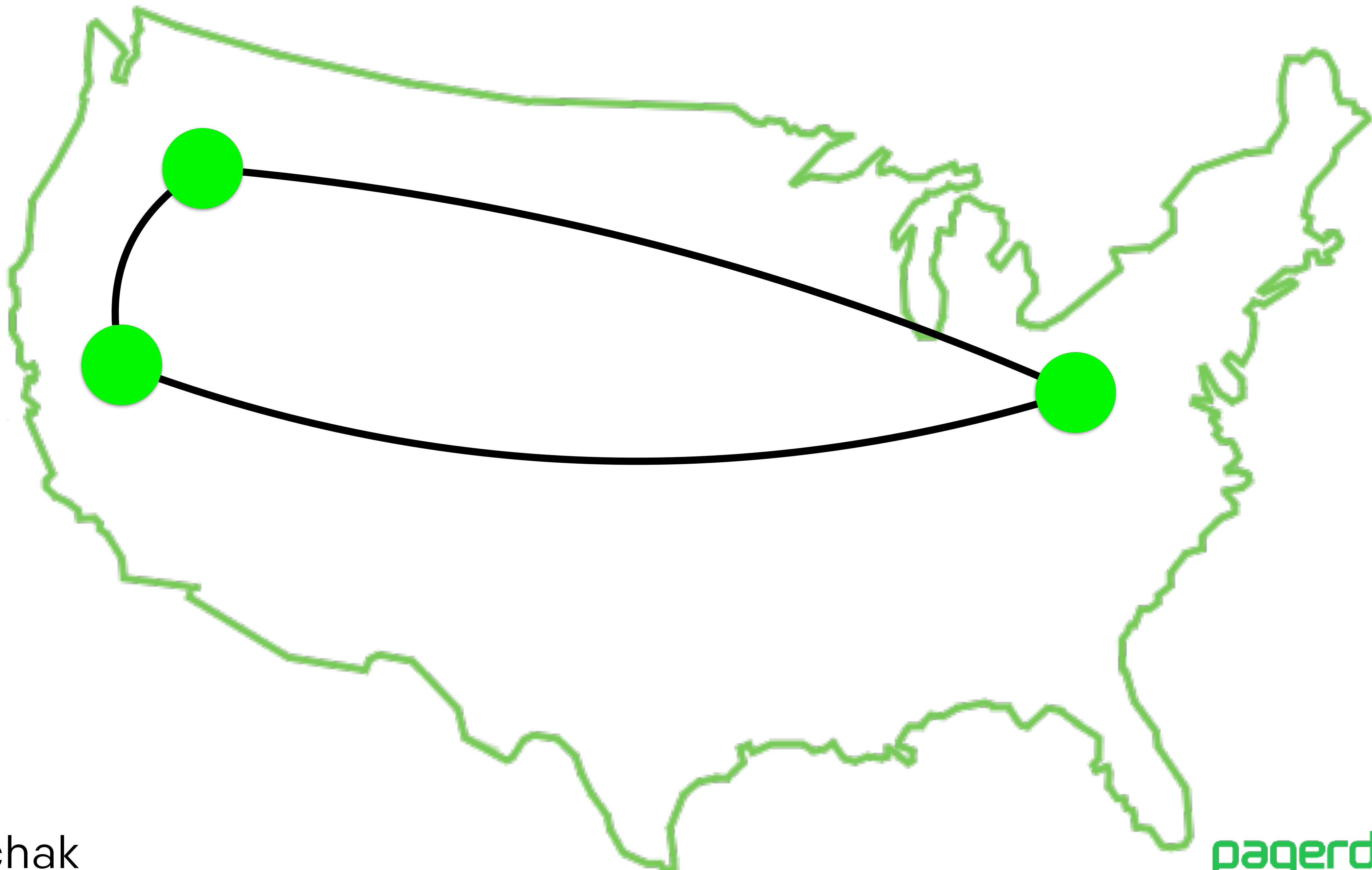
Only way to achieve
Reliability is through distinct
Regions

PagerDuty Late 2012

- Started teasing apart PagerDuty into separate Services
- Starting using Quorum based systems
 - Cassandra and Zookeeper
 - Favored Durability over Performance
 - Still needed Regions or Datacenters within 50ms
 - Tried AWS us-east-1, us-west-1, us-west-2

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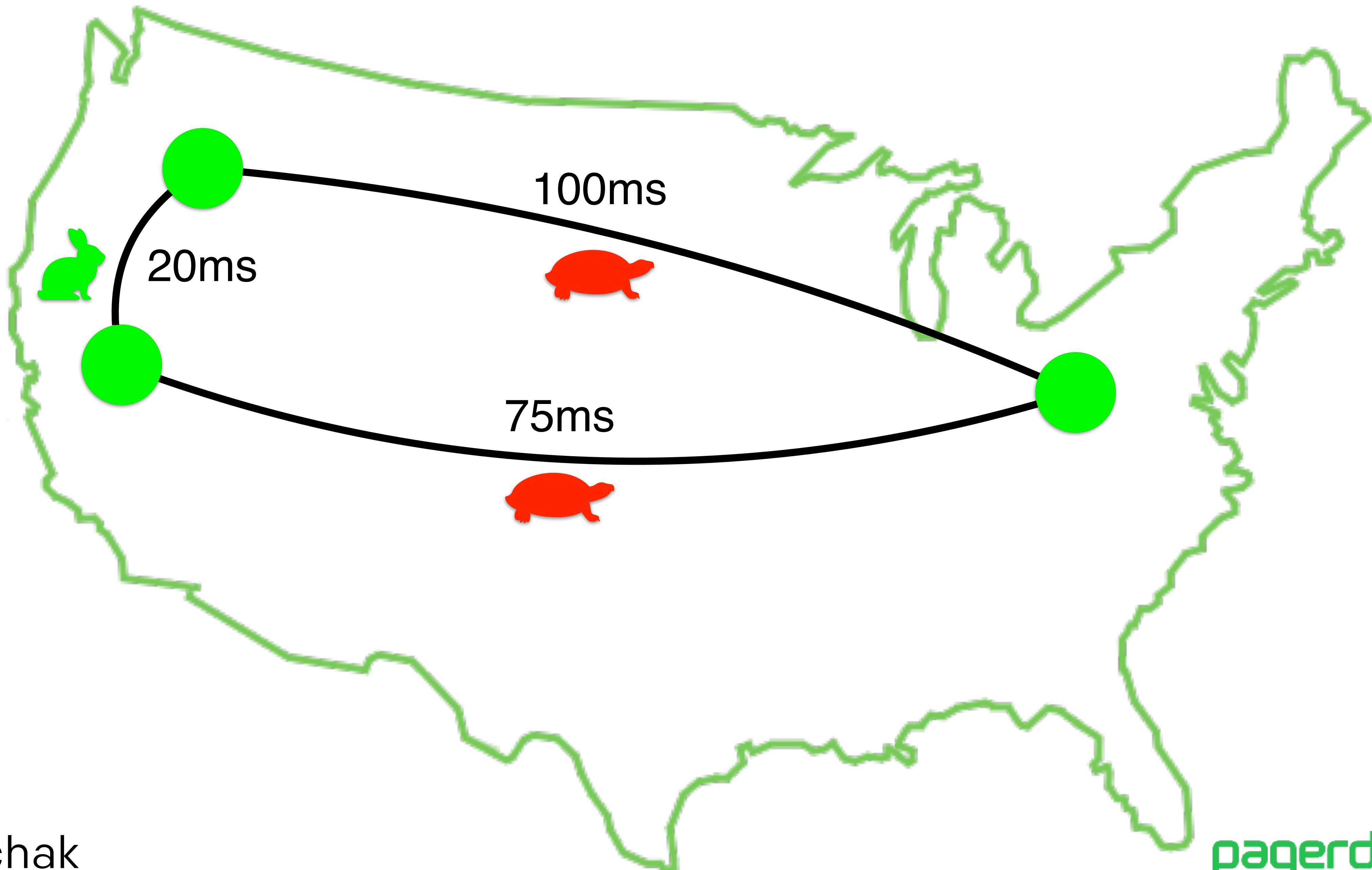
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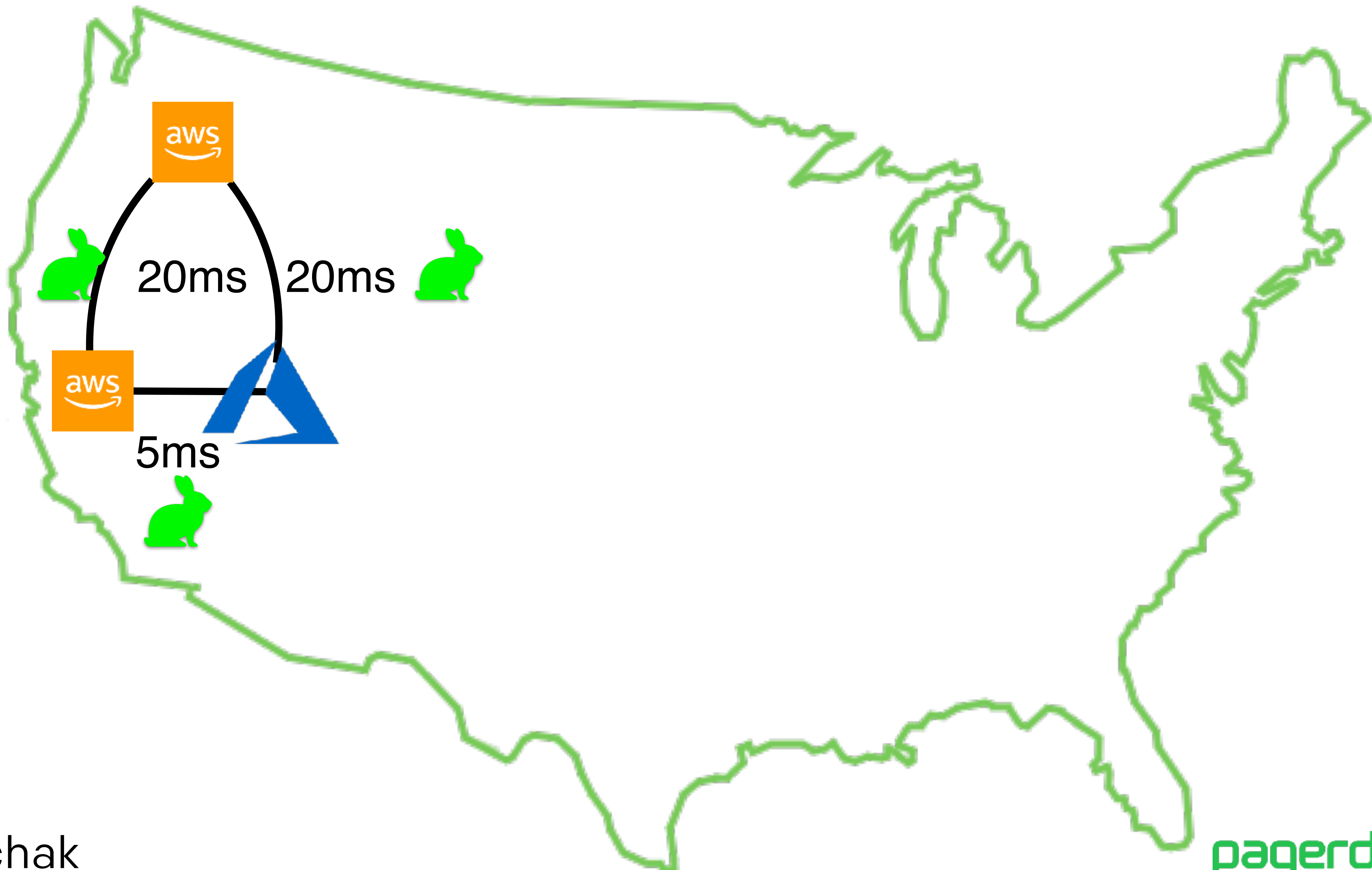
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Remember that 50ms
requirement?



Had to go Multi-Cloud due
to latency requirement



PagerDuty Early 2018

- Software deployed to AWS us-west-1, us-west-2 and Azure Fresno
- ~50 Services across ~10 Engineering teams
- Each team owns the entire vertical stack

What went well

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Reliability Benefits

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Summary of the Amazon S3 Service Disruption in the Northern Virginia (US-EAST-1) Region

We'd like to give you some additional information about the Amazon S3 Service Disruption in the Northern Virginia (US-EAST-1) Region on the morning of February 28th, 2017. The issue was caused by a small number of servers for one of the S3 subsystems that were not properly configured. A small number of authorized S3 team members were debugging an issue causing the S3 billing system to process billing for a small number of servers for one of the S3 subsystems that were not properly configured. A small number of authorized S3 team members were debugging an issue causing the S3 billing system to process billing for a small number of servers for one of the S3 subsystems that were not properly configured. A small number of authorized S3 team members were debugging an issue causing the S3 billing system to process billing for a small number of servers for one of the S3 subsystems that were not properly configured.

Microsoft confirms Azure storage issues around the world (updated)

JORDAN NOVET @JORDANNOVET MARCH 15, 2017 5:18 PM

AWS suffers a five-hour outage in the US

21 September 2015 | By Max Smolaks



in Share

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Like 26

Ten services hosted in the Northern Virginia data center experience disruption

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Reliability: Hard to measure

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Portability Benefits

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Portability Benefits

- Everything is treated as Compute
- If there is a base Ubuntu image, we can secure and use it
- Actually helped in pricing

Engineering Culture Benefits

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Engineering Culture Benefits

- Teams built for Reliability early in the SDLC
- Teams had deep expertise in their technical stacks (double-edged sword)
- Failure Injection / Chaos Engineering

What did not go well

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Right sizing is hard

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Pinned to limiting
system resource

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AWS m3.large =
Azure Standard F4

8GB / 2 Cores ≠

8GB / 4 Cores

\$112 ≠
\$182

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Deep Technical Expertise Required

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Deep Technical Expertise Required

- Forced to only use common Compute across providers
- Every engineer needs to know how to run their own:
 - Load Balancers
 - Databases
 - Applications
 - HA systems

Complexity Overhead

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Abstract away providers via Chef

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Code 54

54 code results in PagerDuty/chef

Code 181

181 code results in PagerDuty/chef

Even Less Control Over Network

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String of West Coast attacks on Internet fiber optic cables leads to FBI investigation

By Will Greenberg July 2, 2015

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The farther apart your
datacenters, the less control
you have

Cannot use hosted
services

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The Big Question

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Should you go Multi-Cloud?

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“It Depends”

-Arup on almost everything

What to consider

- Business requirements first, technical requirements second
- Company buy-in
- Engineering staff capabilities
- What do your customers care about?

*“Understand your customer’s problems
better than they do”*

-Andrew Miklas, PagerDuty Co-Founder

Thank You

WE ARE HIRING! [PAGERDUTY.COM/CAREERS](https://www.pagerduty.com/careers)

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