AWS re:Invent

STP203

The modern startup: A look at today's most successful architectures

Mackenzie Kosut
Global Startup Evangelist
Amazon Web Services

Roy Penn
VP of Engineering
Amenity Analytics

AWS re:Invent

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aws



Mackenzie Kosut

Global Startup Evangelist

Betterment

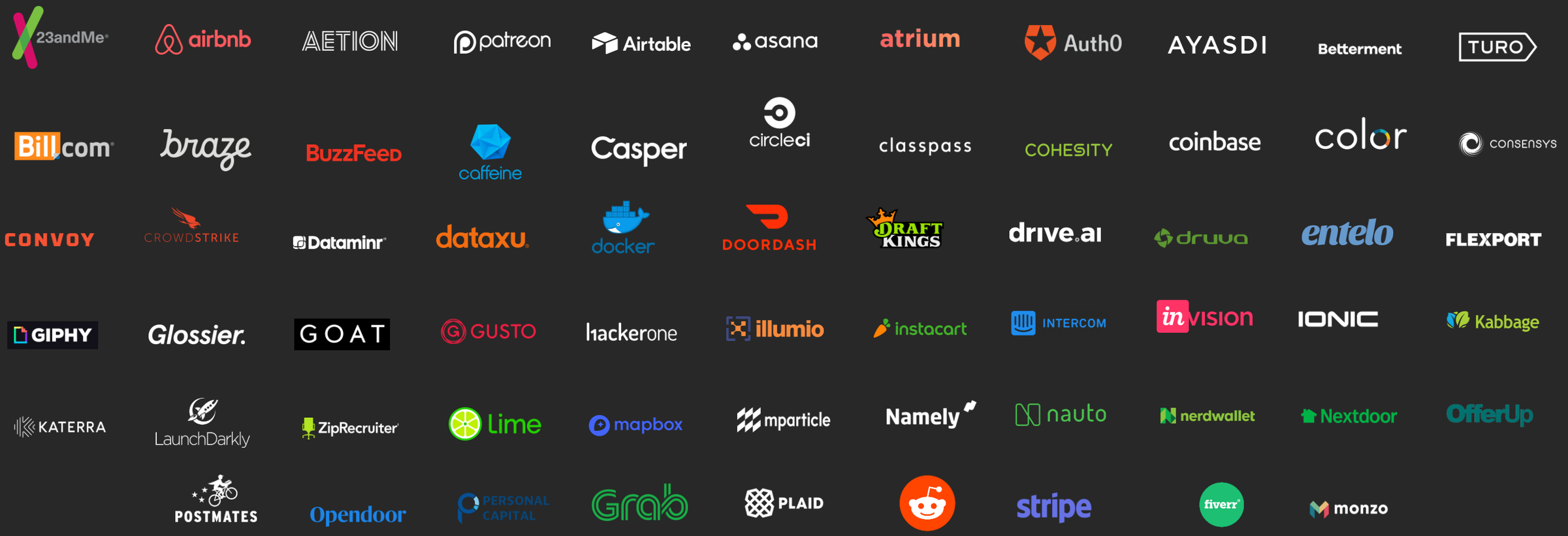
tumblr.

oscar

viacom

DHL WORLDWIDE EXPRESS

Largest Number of Startups



The Modern Startup

How architecture helps build the culture of your startup

AWS re:Invent

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Best Practices

Philosophical Beliefs

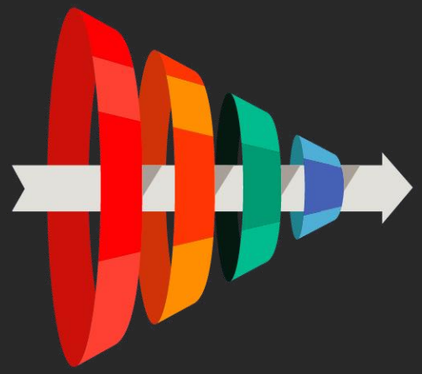
Tested Patterns

Experience

Simplicity

New Technologies

Ingenuity



Great Engineering

1. Find and eliminate blockers or wait states
2. Everything continuous, all the time
3. Keep your systems simple
4. Enable your developers


Zocdoc


Segment




Intercom


Nextdoor


oscar

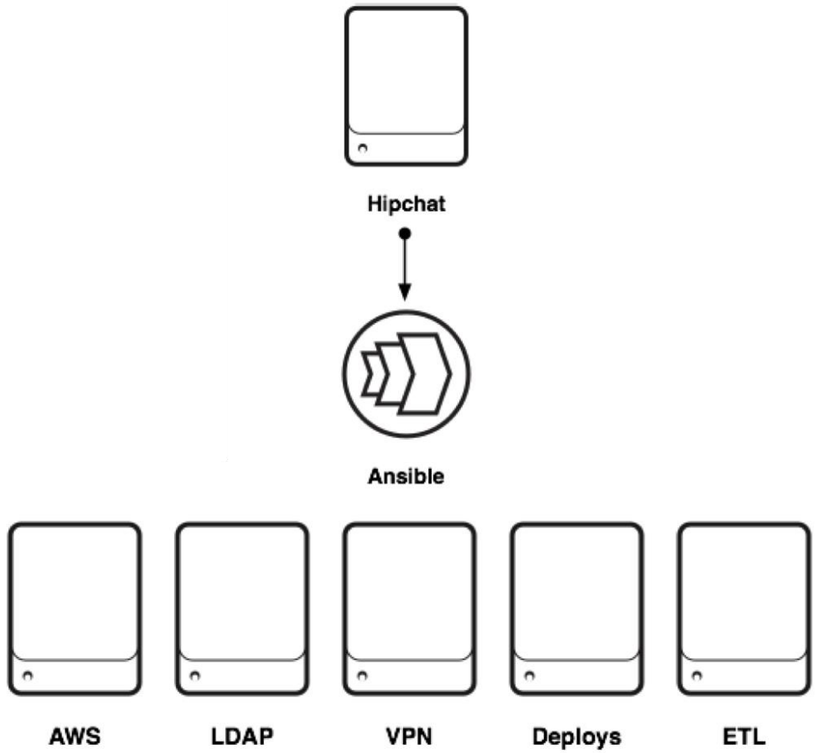
Find and eliminate blockers or wait states

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oscar

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Provisioning a Server

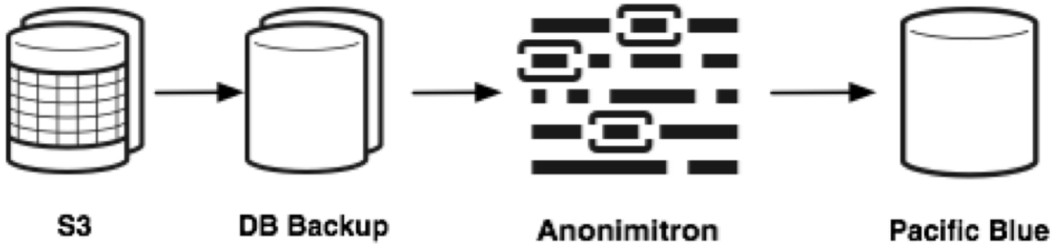
@grouchy build [role]

Mackenzie Kosut	@Grouchy build web branch=testforawstalk_safetodelete	6:39 PM
Mr. Grouchy	Provisioning a web for @mackenzie	6:39 PM
Mr. Grouchy	waiting for ssh to be available on d-web-b-shockingpink-1b	6:40 PM
Mr. Grouchy	Hey @mackenzie, d-web-b-shockingpink-1b at ip 10.10.6.17 is provisioning as a web in the beta pool. Watch for a boot notice in 'Autobots'	6:41 PM

Anonymizing development databases

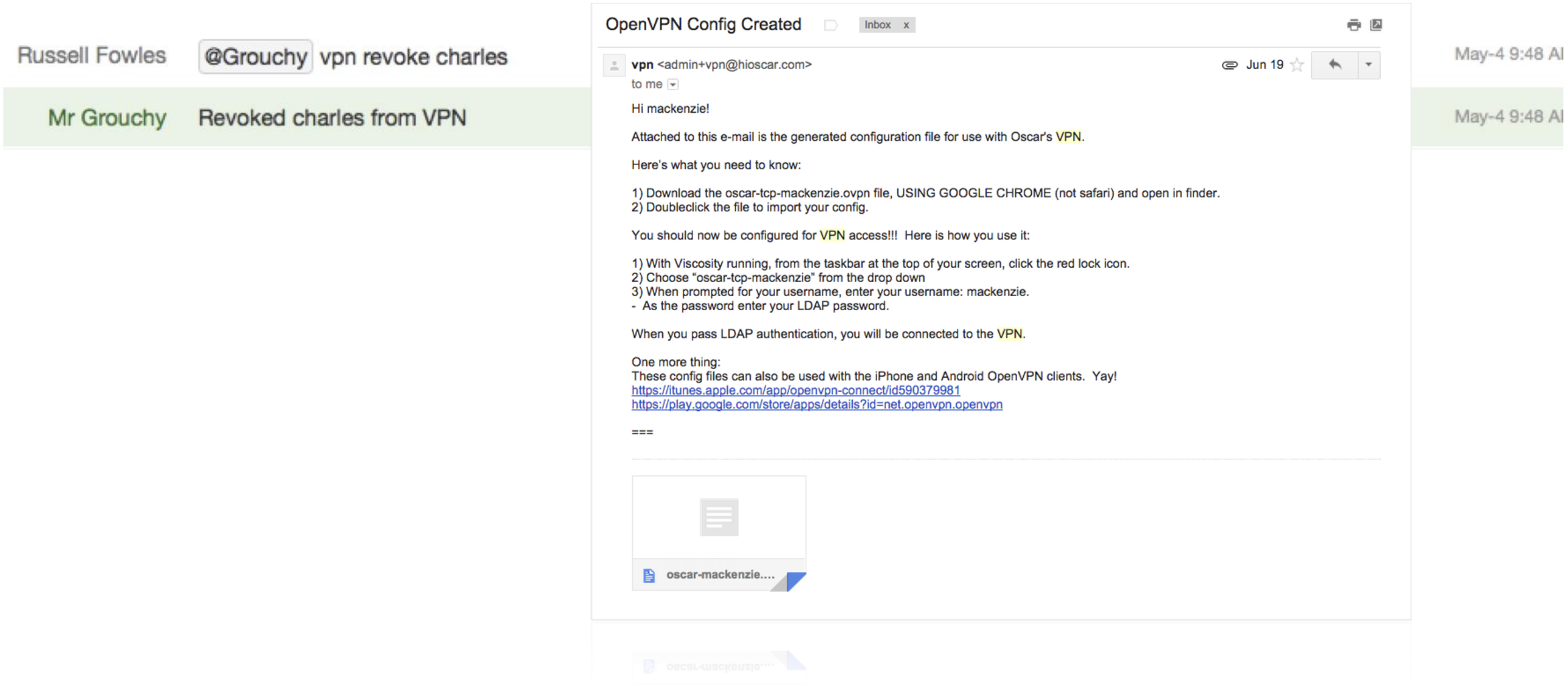
@grouchy anonymize [server]

Andrew Jones	@Grouchy anonymize pacificblue	9:45 AM
Mr. Grouchy	@andrew Beginning to anonymize 'pacificblue', this will take a few.	9:46 AM
	Charles Kong joined the room	9:47 AM
	Brent Langston joined the room	9:49 AM
	Charles Kong changed the topic to: queue: web(kong) | parked migrations: 490, 492, 495, 496, 500, 501,502, 503, 504 | https://confluence.hioscar.com/display/ENG/Grouchy+Cheat+Sheet | Deployment Dashboard: http://bit.ly/1yQj1XG	9:55 AM
Mr Grouchy	[production] deploy confirmed nginx is running on p-web-e-periwinkle-1c	9:46 AM
Mr Grouchy	[production] deploy confirmed nginx is running on p-web-e-sunset-1b	9:46 AM



Managing LDAP

@grouchy vpn add [user], @grouchy vpn revoke [user]



Takeaways

Remove human-to-human interaction where possible

Build self-service tools to guide users to proper behavior

Abstraction layers allow for modular evolution

Build Modularly: Write simple parts connected by clean interfaces

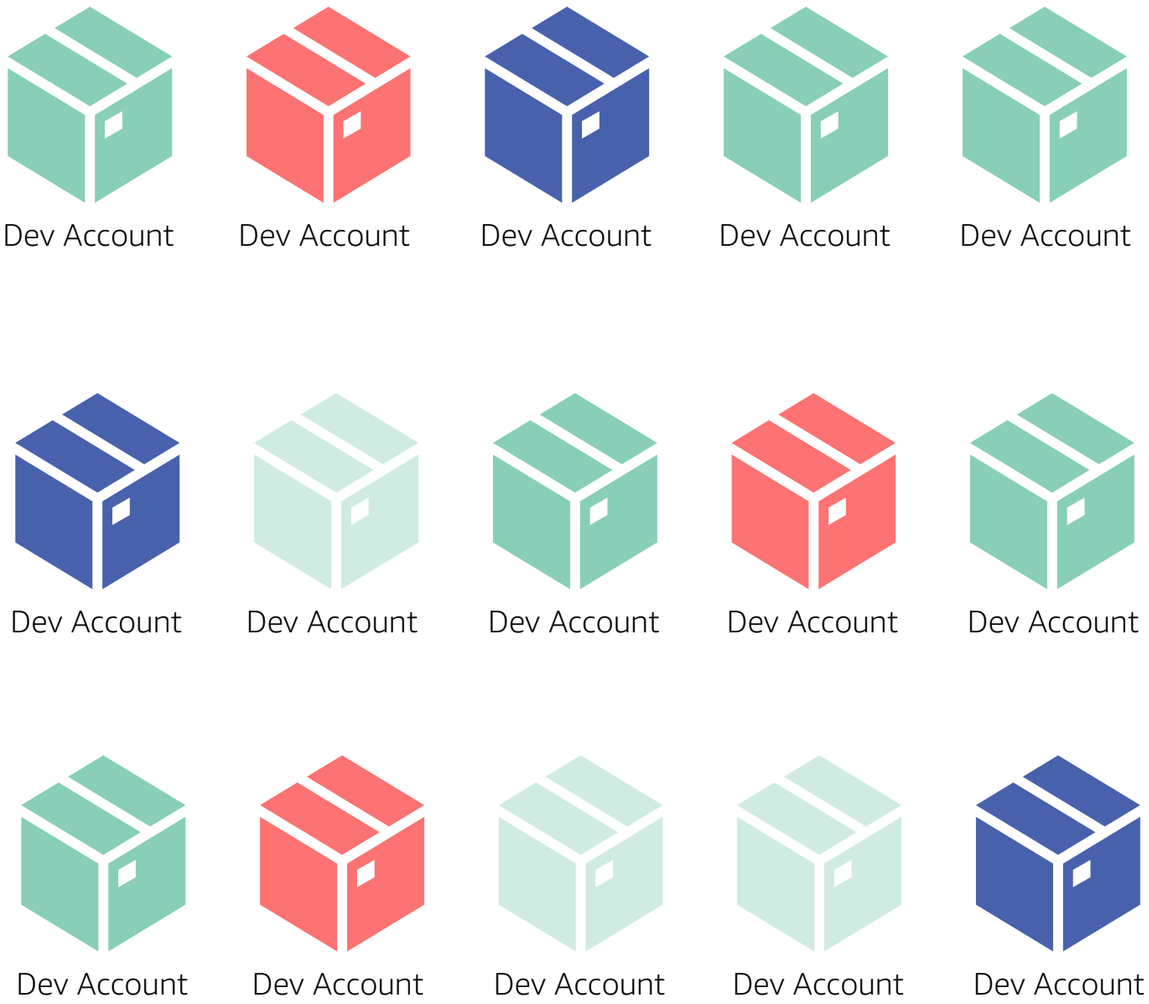
Enable your developers.

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Zocdoc

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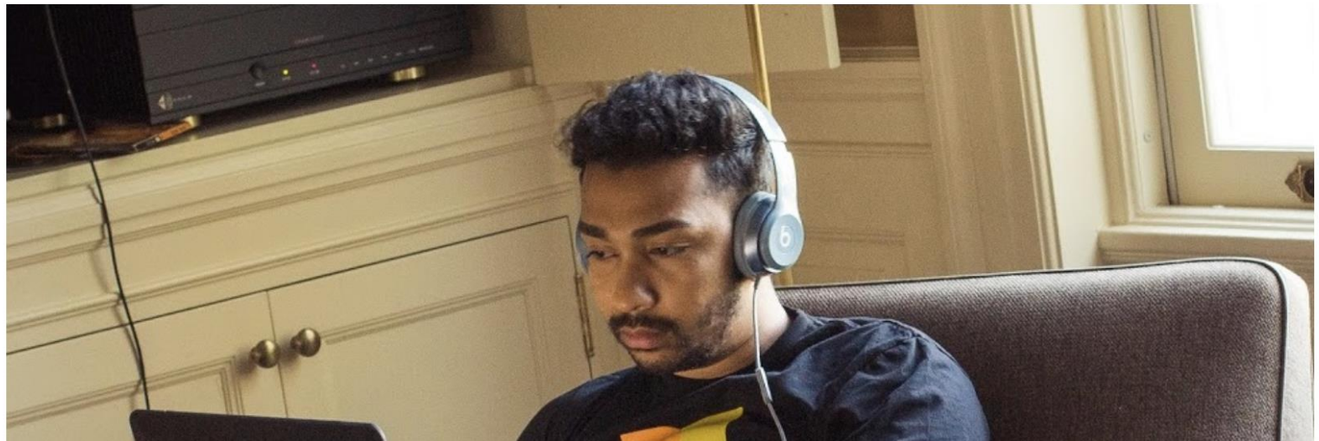
Preparing for a Hackathon

ZocTank

We run an internal event called ZocTank, based off the popular competition show Shark Tank. Everyone from the company, not just tech, is given an opportunity to pitch potential projects for us to work on. This a fantastic place for our developers to get a handle on the great ideas (or irritating workflows) that teams from other areas of our company have. A lot of times these are quality of life changes for operations and support teams such as better internal tooling or workflow improvements that save time. This enables the whole company to be involved, and provides a way for the technology team to give back.

Hackathon Planning Committee

You can't run a successful Hackathon without planners. Our team consists of five fun-gineers, who are in charge of every planning aspect from finding the right house to coordinating the trip there. Often the members rotate, but it's a good idea to solicit veterans who have at least gone to one previous hackathon, as they'll have a better idea of fun activities, or what needs improving.



Takeaways

Provide developers the tools to experiment

Encourage the testing of new ideas

Be open to ideas and suggestions from across your company

Everything continuous, all the time.

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Nextdoor

Founded 2010

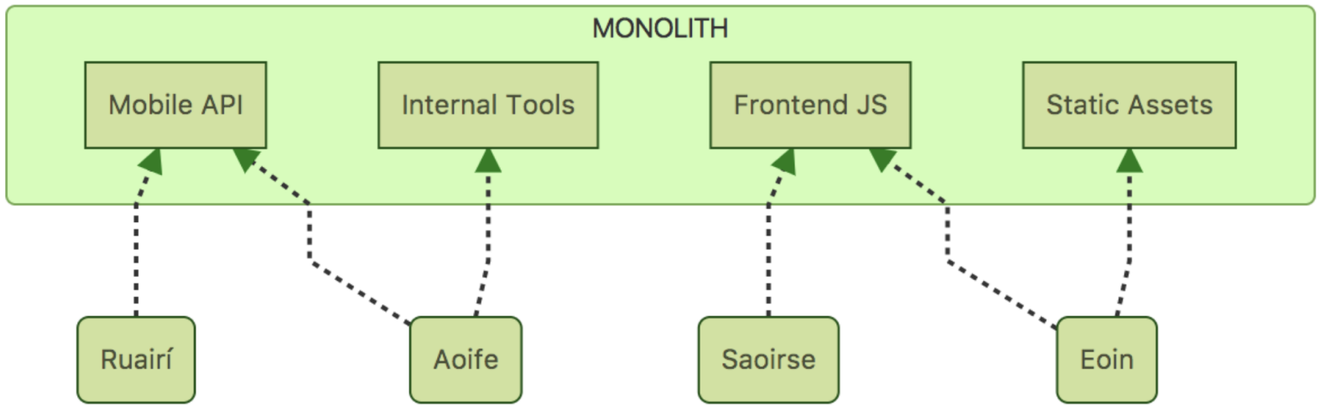
101-250 Employees

3 Hard Lessons from Scaling Continuous Deployment to a Monolith with 70+ Engineers



Niall O'Higgins Follow
Dec 8, 2017 · 9 min read

Like many successful tech startups (Instagram, Slack, New Relic, and many more) a large portion of Nextdoor is a monolithic application. While we've also created a significant number of microservices—especially in places where high throughput is needed—a large amount of our product and feature work still takes place in our Django monolith.



Our developers work on unrelated components of the monolith at the same time

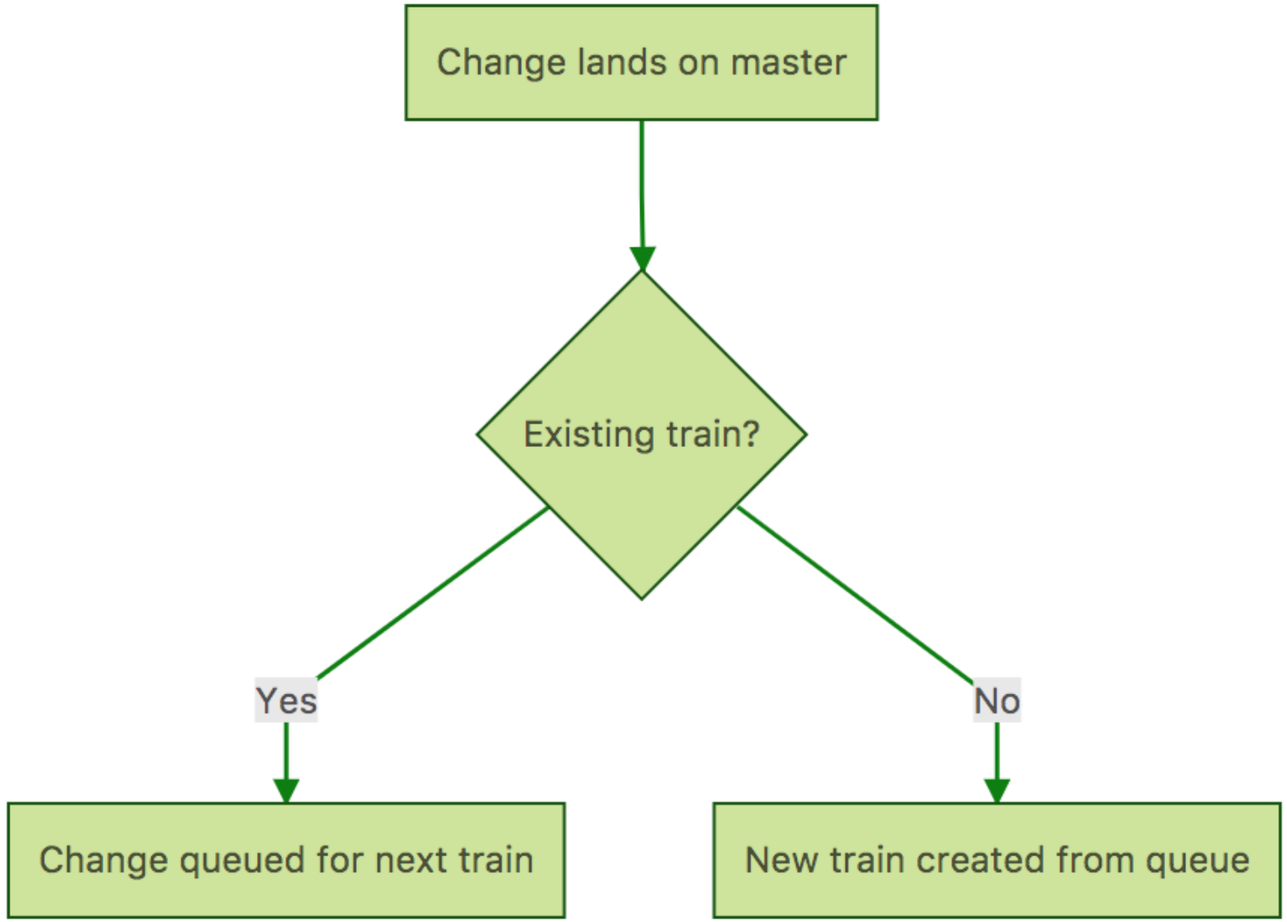
This means that the majority of our 70-member (and growing) engineering team is regularly working on a large monolithic Python codebase. We recently completed a very significant project to move from ~4 releases of the monolith per week to Continuous Deployment. See our related post How Nextdoor

Nextdoor

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Monolithic Release Train

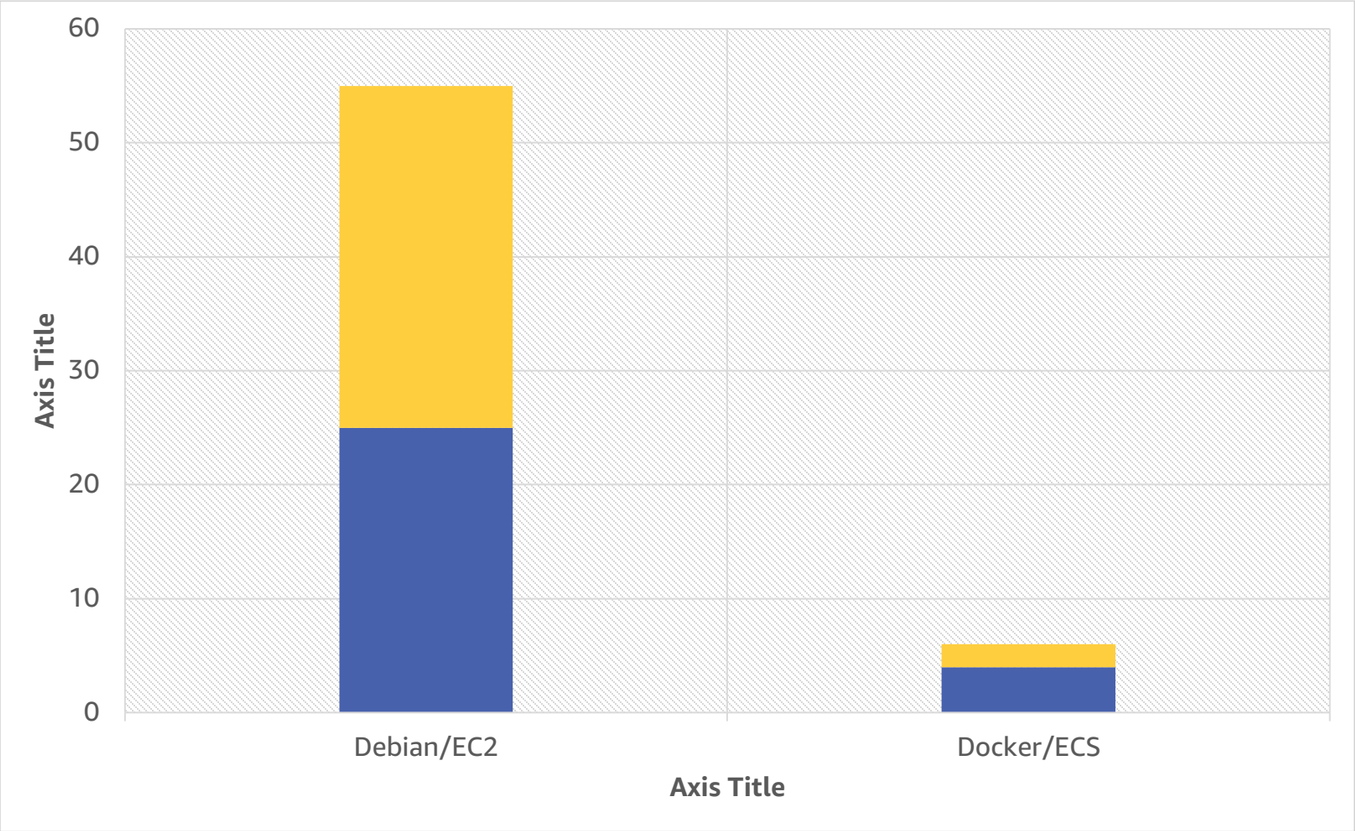


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"That's madness," you say. "Why on earth did things take so long?"



Our philosophy is that our engineers are customers, and our job is to make their experience developing, testing, and deploying their work pleasant and efficient.

Takeaways

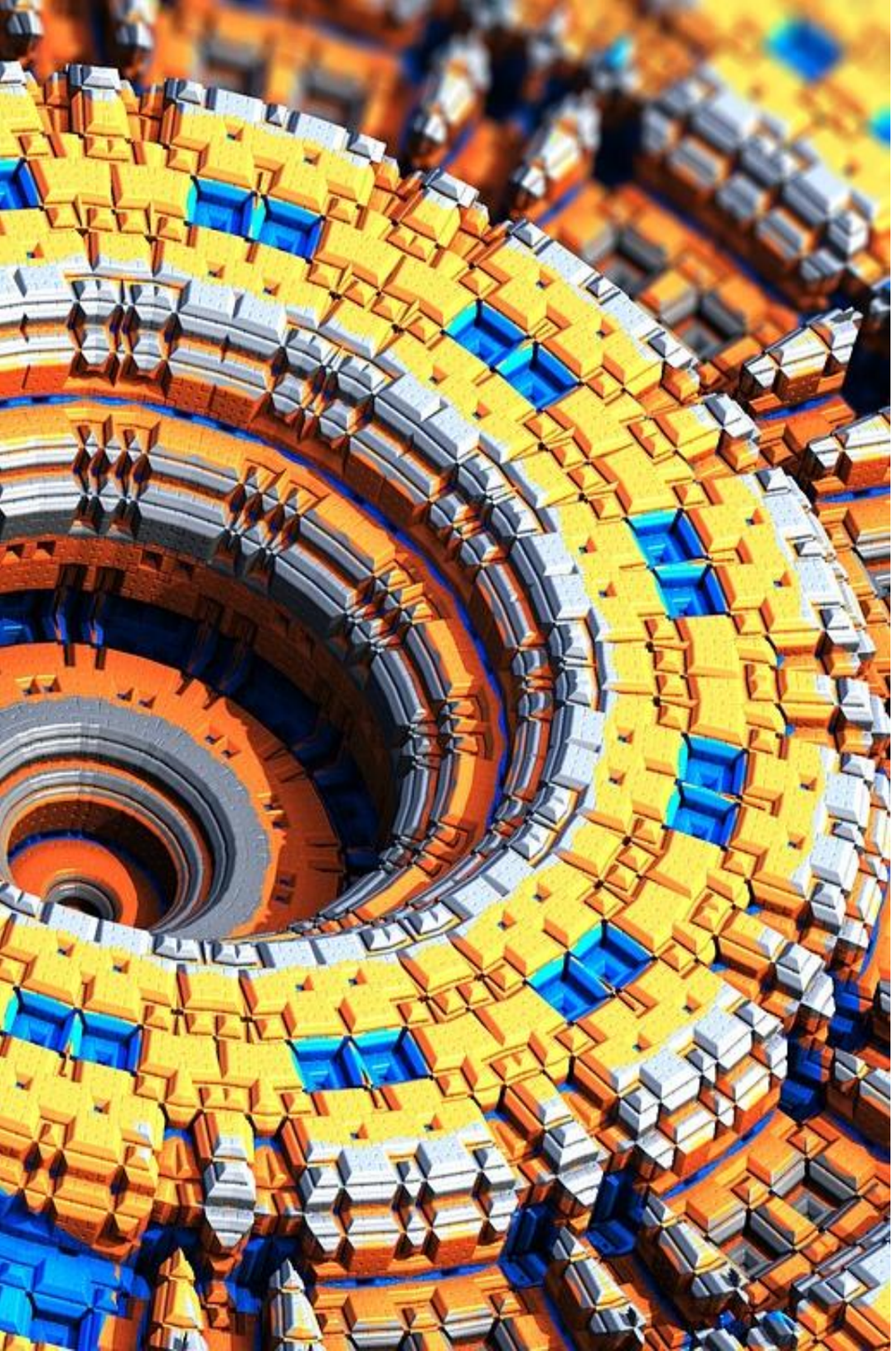
Encourage curiosity and questions from the team

Ask “How long does [x] take?” and dive deep to solve it

If you can’t show it’s a bottleneck, don’t spend time on it.

Keep your systems simple.

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GALL'S LAW

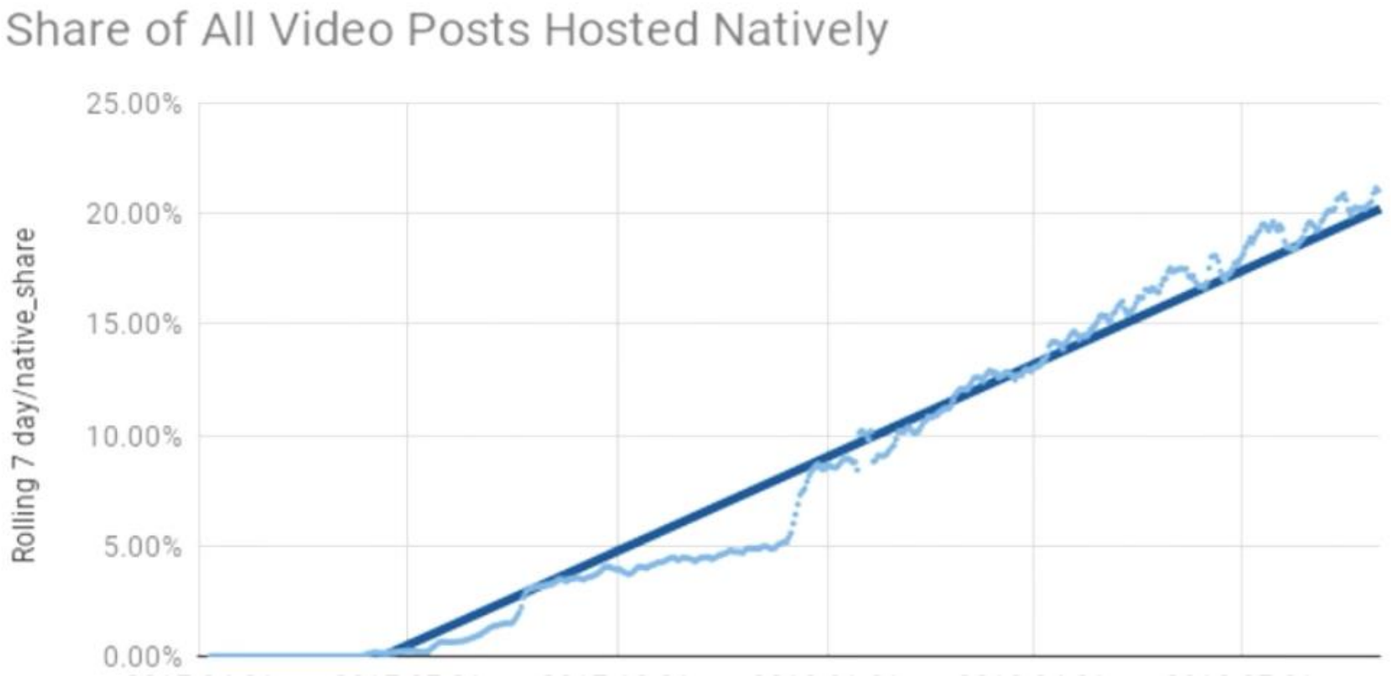
All complex systems that work evolved from simpler systems that worked. If you want to build a complex system that works, build a simpler system first, and then improve it over time.



Founded 2013

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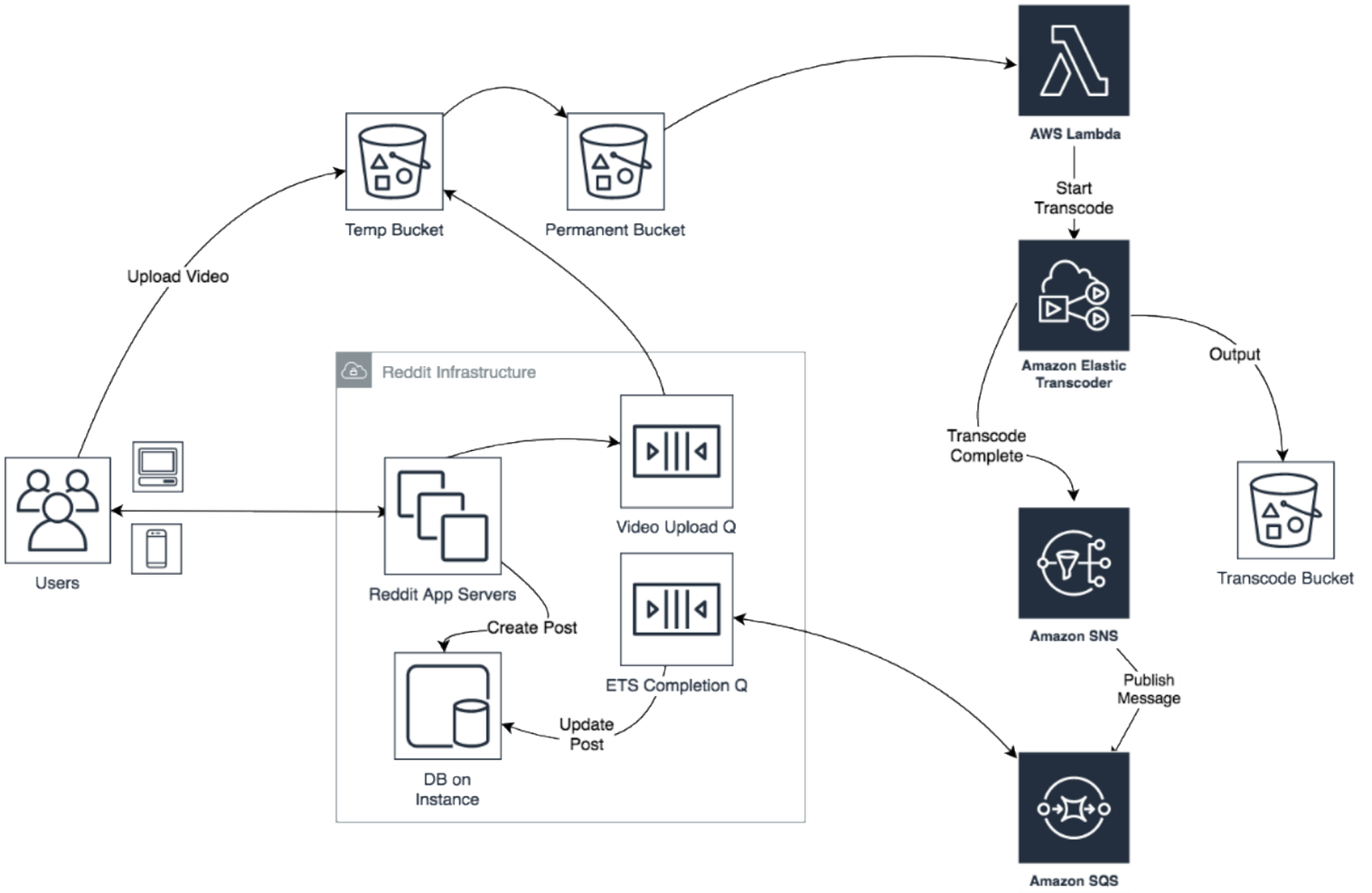
Serving over 1B videos a month





Founded 2013

101-250 Employees



tumblr.

Founded 2007

251-500 Employees

A quick tale of how a simple change took out 3,500 servers in a spectacular display of catastrophic failure.

tumblr.

Founded 2007

251-500 Employees

“Perrow's argument, based on systemic features and human error, is that big accidents tend to escalate, and technology is not the problem, the organizations are.

Each of these principles is still relevant today.”

Takeaways

Use off the shelf products when you can

Don’t reinvent the wheel

Elegance is in simplicity, not complexity

Every safety is another way a system can fail.

Democratize your data

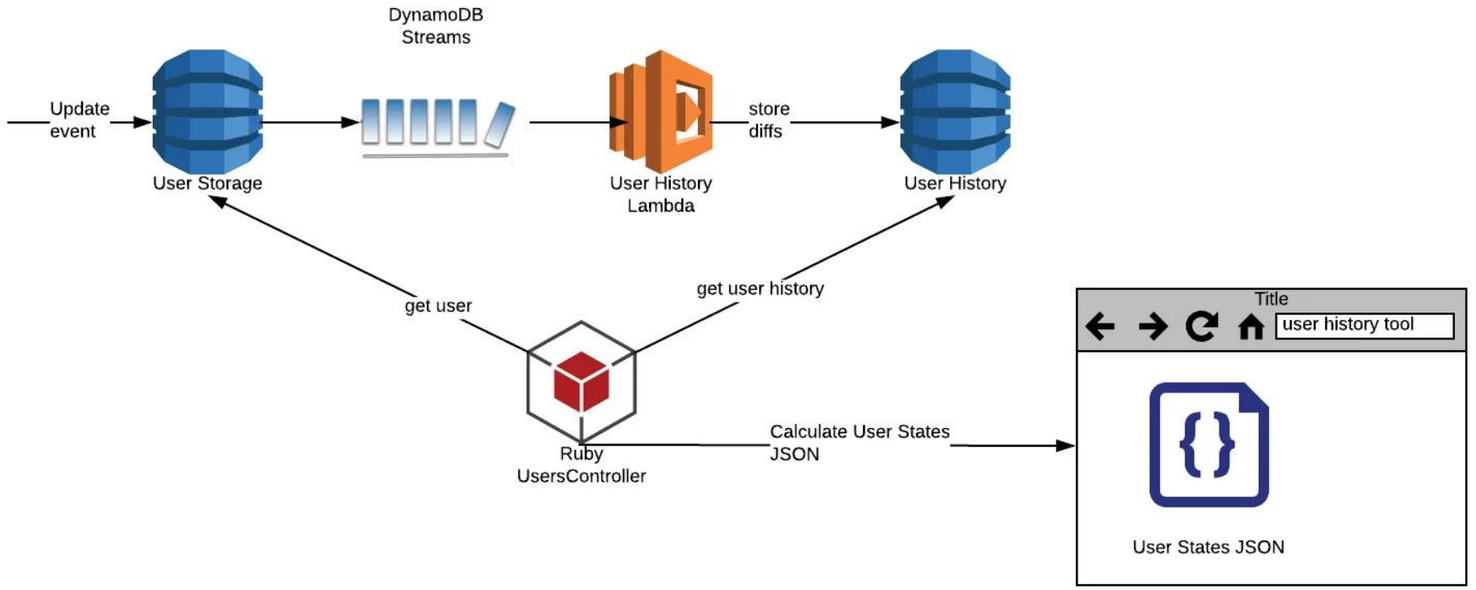
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Intercom

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501-1000 Employees

“Thinking simple and leveraging common technologies is part of our engineering philosophy”





MAJA GRUBIC
Product Engineer, Intercom
@princessmaja



SOFIA TZIMA
Product Engineer, Intercom
@sophiesiw

Develop a culture of openness.

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Segment

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251-500 Employees

Readme.md

Segment Stack circleci failing

The Segment Stack is a set of Terraform modules for configuring production infrastructure with AWS, Docker, and ECS. It's a more 'curated' set of defaults for configuring your AWS environment, while still allowing you to fully customize it.

To get more background on the Segment Stack you can read this blog post about its history.

The Stack comes with:

- an auto-scaling group of instances to run your services
- a multi-az VPC with different subnets for availability
- self-managed services run via docker and ECS
- an ELB and ECS definition for each service
- docker logs that populate in CloudWatch
- a bastion node for manual SSH access
- automatic ELB logging to S3

Start from scratch or selectively add it to your existing infrastructure, the Stack is yours to customize and tweak.

Quickstart

To run the stack, you'll need AWS access and Terraform installed, check out the requirements section.

The easiest way to get the Stack up and running is by creating a Terraform definition for it, copy this snippet in a file named `terraform.tf`:

```
module "stack" {
  source      = "github.com/segmentio/stack"
  environment = "prod"
  key_name    = "my-key-name"
  name        = "my-app"
}
```

This is the *base* configuration, that will provision everything you need to run your services.

From there, you'll want to plan, which will stage the changeset



Segment

Founded 2011

251-500 Employees

segmentio / stack

Watch 109 | Star 2k | Fork 403

Code | Issues 34 | Pull requests 14 | Projects 0 | Security | Insights

is:pr is:open | Labels 7 | Milestones 0 | New pull request

14 Open | 77 Closed | Author | Labels | Projects | Milestones | Reviews | Assignee | Sort

- **Fixed bug in ECS ASG based on hashicorp issue: 16632**
  #158 opened on Feb 21 by mgale
- **added consistent tagging for rds**
  #156 opened on Jan 23 by savn
- **Enhance retrieving of elb_account in s3_logs module**
  #145 opened on Oct 17, 2017 by egarbi
- **bunch of updates** 19
  #139 opened on Jul 24, 2017 by Brzhk
- **create alb-service** 18
  #134 opened on Jun 16, 2017 by slajax 2 of 2
- **Add ssh security group attributes**
  #133 opened on Jun 13, 2017 by danscan
- **added log driver for modules using task**
  #130 opened on May 23, 2017 by sherzberg
- **[WIP] Create new amis with dynatrace**
  #124 opened on May 9, 2017 by mikearagao
- **Move ingress/egress to aws_security_group_rule in rds** 1
  #119 opened on Apr 19, 2017 by thattommyhall
- **Add product_area to rds-cluster** ✓ 1
  #110 opened on Mar 30, 2017 by kevinburke • Changes requested
- **Replace classic ELB with ALB** 7
  #101 opened on Mar 7, 2017 by micahlmartin
- **Added ASG template, explicit types in module arguments** 5
  #81 opened on Jan 25, 2017 by kchugalinskiy
- **Add and force unit tests in packer build process (with simple examples)** ✓ 1
  #68 opened on Nov 21, 2016 by flochaz
- **Stack join security groups** 2
  #55 opened on Oct 11, 2016 by backnight

ProTip! Filter pull requests by the default branch with base:master



Segment

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ENGINEERING

The $10m engineering problem



Calvin French-Owen on Oct 17th 2019

When evaluating the value of any business, one of the most important factors is the **cost of goods sold** (or COGS). For every dollar that a business makes, how many dollars does it cost to deliver?

For a traditional business, there are many ways to minimize COGS. You could optimize your supply chain, find cheaper raw materials, or negotiate better rates with your suppliers. But all of these take time.

In the age of the cloud, we've entered a new reality. Your costs might grow by 10x overnight as a result of a sudden increase in volume or a one-line config change.

In September 2018, we found ourselves hitting fever pitch. We were contemplating a new funding round. All of our business metrics looked great—revenue growth, customer churn, new product attachments were all positive. All of them, that is, except our gross margin.

As one board member put it: *"Your gross margin is a bit of a black eye on the whole economics of the business."*

To remedy this, in the six months between July and January**, we managed to reduce our infrastructure cost by 30%,** while simultaneously increasing traffic volume by 25% over the same period.

Takeaways

Bounce ideas off other engineering teams

It’s cheaper to discuss ideas than to build and test each one

An open culture encourages a healthier team

Conclusion

You can build complex systems.. but each component should aim to be simple, modular, leveraging available APIs and services, and easy for teams to understand.

Once you build one of those systems, get out there and talk about it!

Impacts on philosophy and culture when shifting to serverless

Roy Penn

VP Engineering

Amenity Analytics

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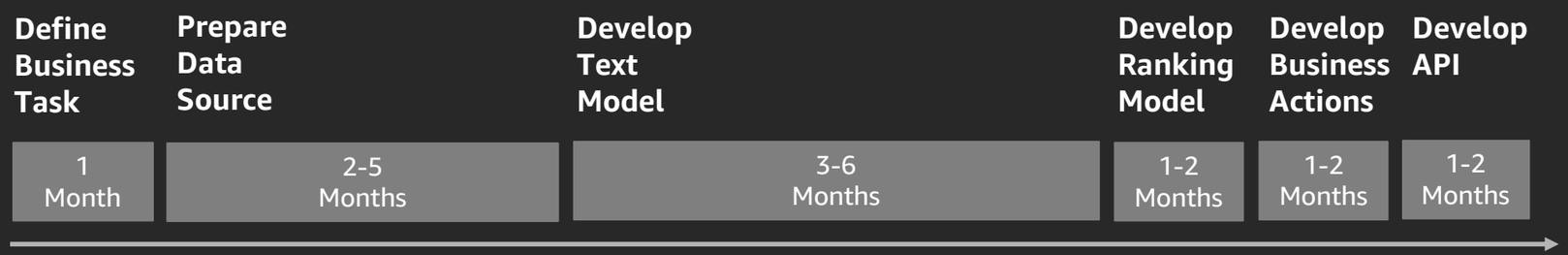
Tech doesn’t disrupt or change anything by itself. It’s the perception and expectations of people that lead to the disruption.

Leverage text like an NLP expert

Or, why companies don’t really care when we tell them how great our NLP stack is, but care when we manage expectations about what they can do with it

Making success with NLP accessible, actionable, and affordable

Non-Amenity Custom NLP Project (NLP 1.0)

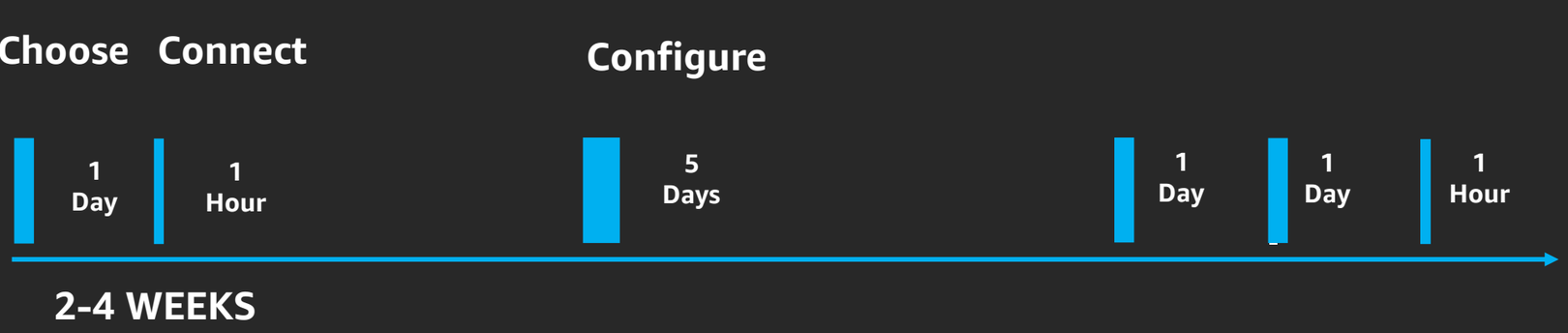


8-16 months
TTM

$1-$2M
Cost

10% - 30%
Success Rate

Amenity Analytics (NLP 2.0)



1-8 weeks
TTM

$0.2-$0.4M
Cost

95%+
Success Rate

Amenity Analytics Overview



- Founded in 2015, currently 60+ employees
- Headquarters in New York; R&D offices in Tel Aviv
- $25.8M of capital raised to date

Backed By

SOMV

intel Capital

STARR INSURANCE COMPANIES

Allstate

Amenity Analytics Customer Spotlight

















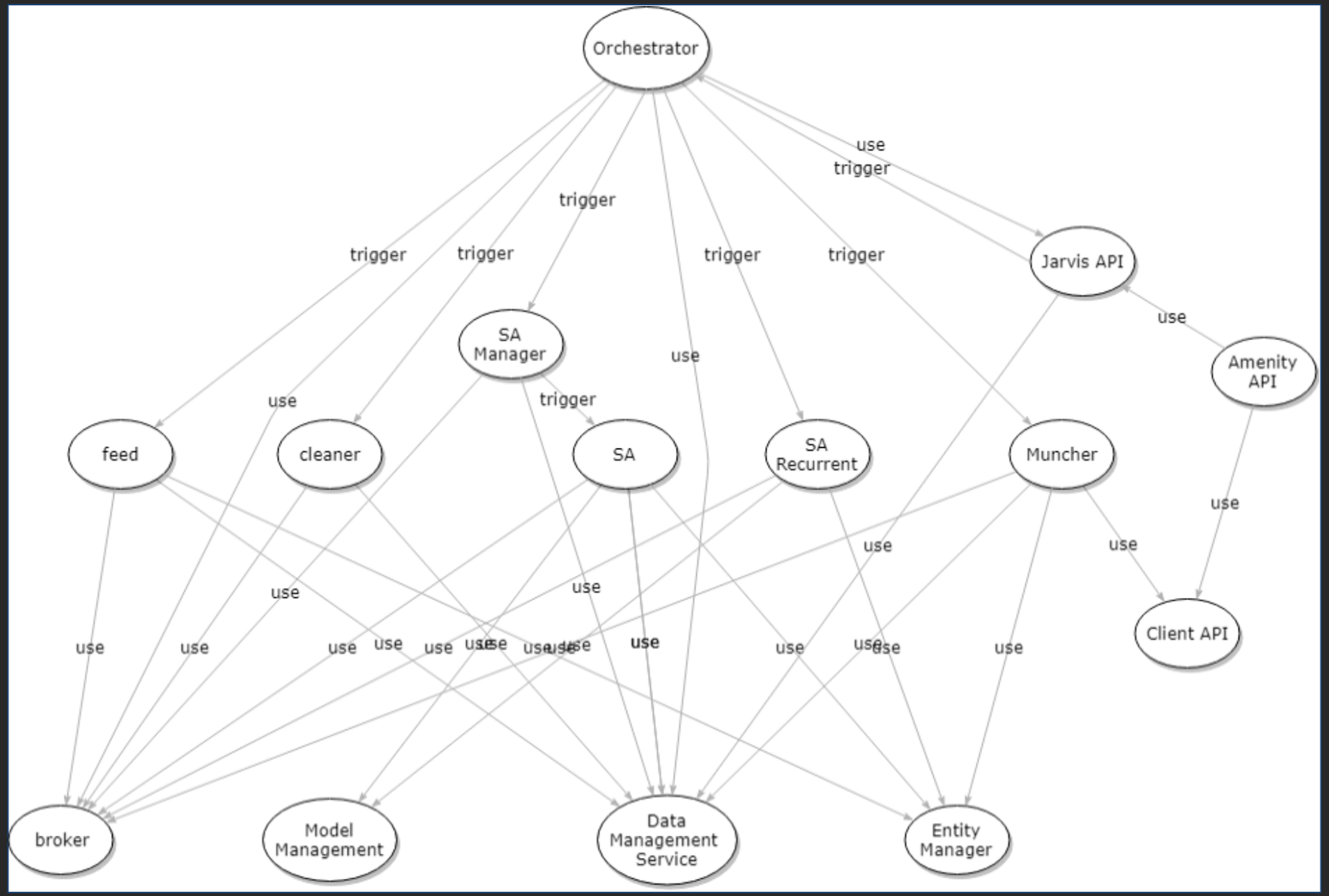








Legacy architecture



Goals



100x
Clients



100x
Faster



100x
More data

Goals



100x
Clients



100x
Faster



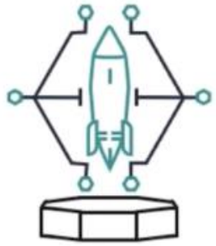
100x
More data

Oh and btw – make it cheaper

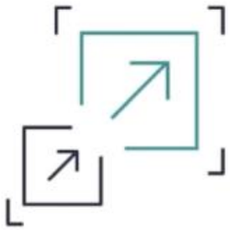
Principles



Agility



Simple deployment



Flexible scaling



Lower costs

A shift in Amenity

- Docker → serverless
- TDD
- Lower level understanding of our infra
- DevOps, Devs, and QA are all one – different facets of one entity

New architecture toolkit



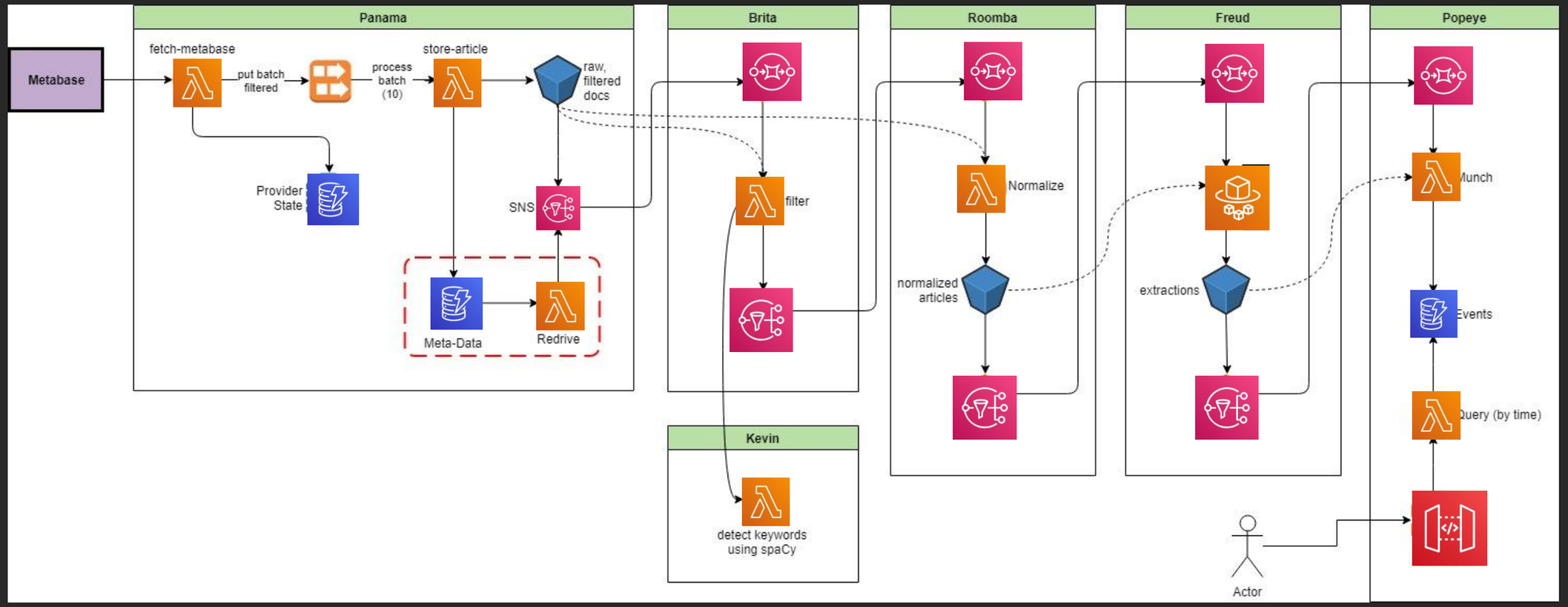




Understanding lower level layers make developers better

- Examples – data structure implementation in different languages, OS scheduling, CPU caching
- Serverless allows confined understanding to impact quickly

New architecture toolkit



Serverless empowers independence

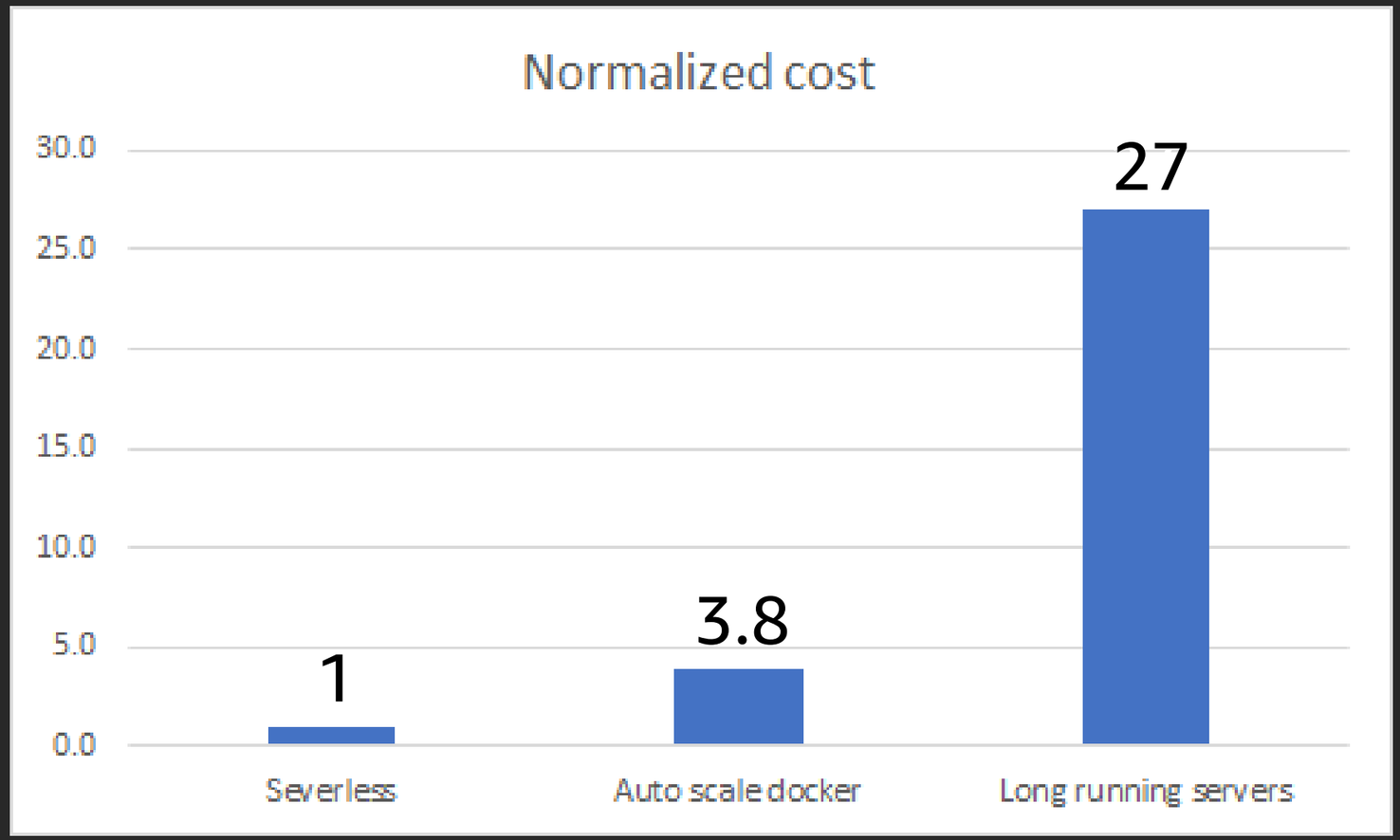
- Smaller services
- Increased local simplicity
- Micro optimizations easily measured and deployed

Serverless empowers independence

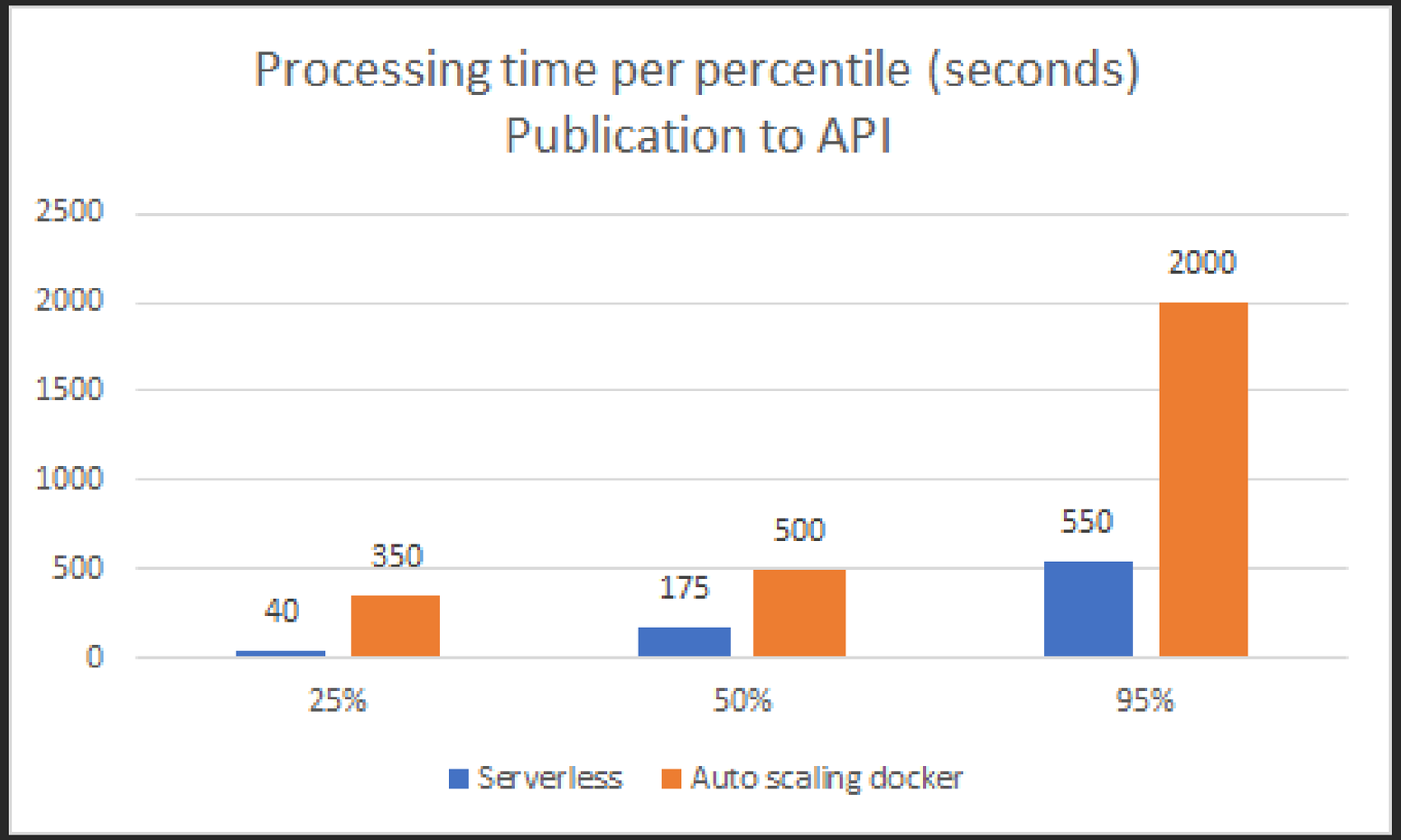
- Smaller services
- Increased local simplicity
- Micro optimizations easily measured and deployed

It allows me to increase my expectations on a local and global basis with every developer

Processing cost



Processing times



The drag

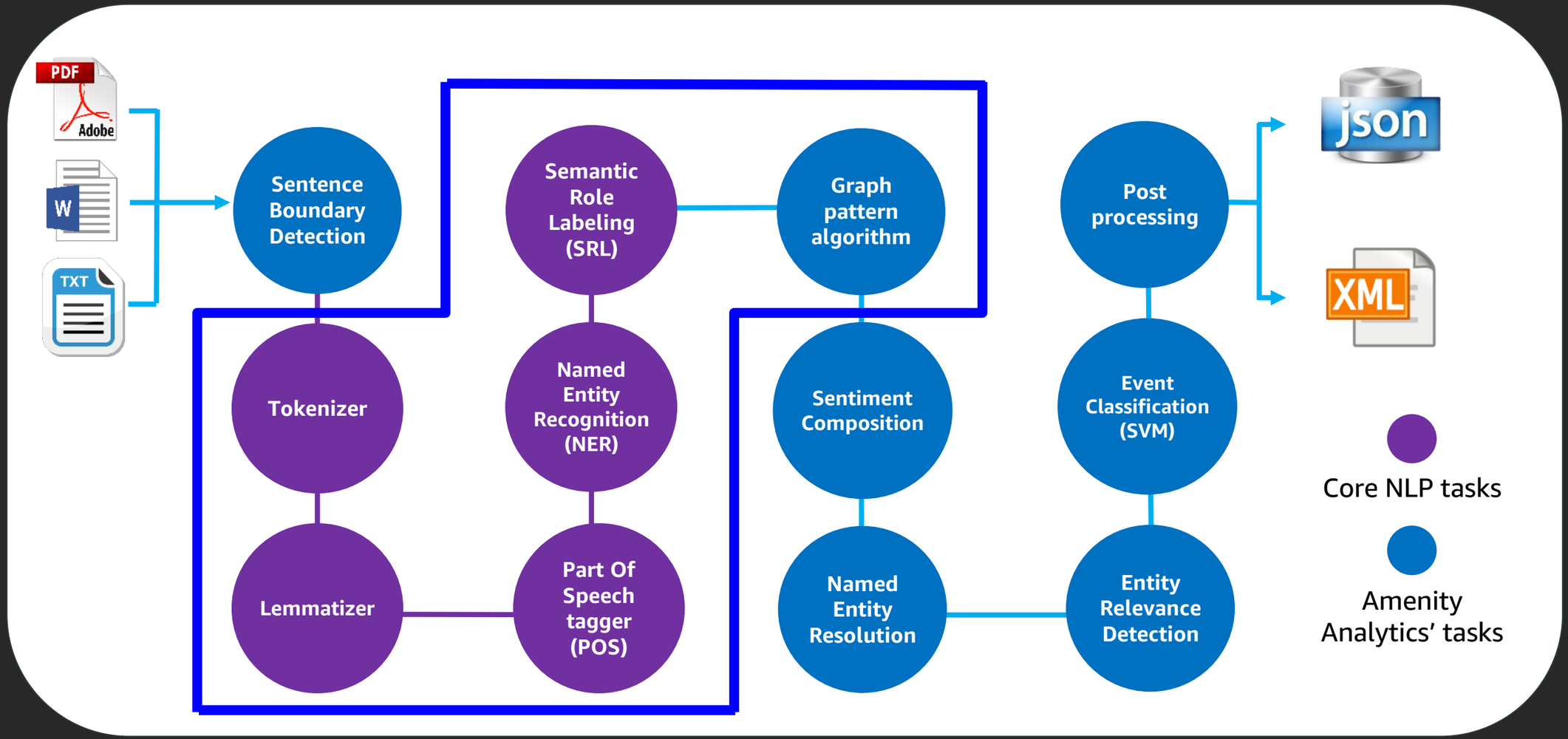
- “When to split” becomes a “when to join”
- Strong architecture is heavily required

Doing things that are almost impossible

- Why “almost”?
- How do you know it’s “almost impossible”?

- Serverless NLP
- Oh boy is it hard to recruit for that!

NLP engine flow



Serverless and incremental delivery

- The “12” layers of NLP and how serverless matches our philosophy of breaking problems down

- Help free our developers from past perceptions about order and process rigidity in NLP/ML

Next-gen NLP - The Insight Engine



Shorten the creativity cycle

- Simpler components, shorter deploys, and faster scale mean MORE ideas tried

- Go as deep or as wide as you want – algos or architecture

Takeaways - NLP x100 faster

	Loading Model Time	Loading Model RAM	Running Model Time (worst case)	Running Model RAM
Legacy	30-60s	1GB	1 minute per document	8GB
New Architecture	**50-200ms**	**50MB**	**10s per document**	**250MB**

Next goal - 10^9 documents in less than an hour

Decision making gone serverless

- Decision by exhaustion
- Takes too long to gather all the data
- Which skyscraper is taller?
- Just try!

Serverless isn’t for everything – don’t be emotional about it



ESG Dashboard

Select date range

Main Company | Sector | ESG Category | ESG Topic | U.N SDG Category | Polarity

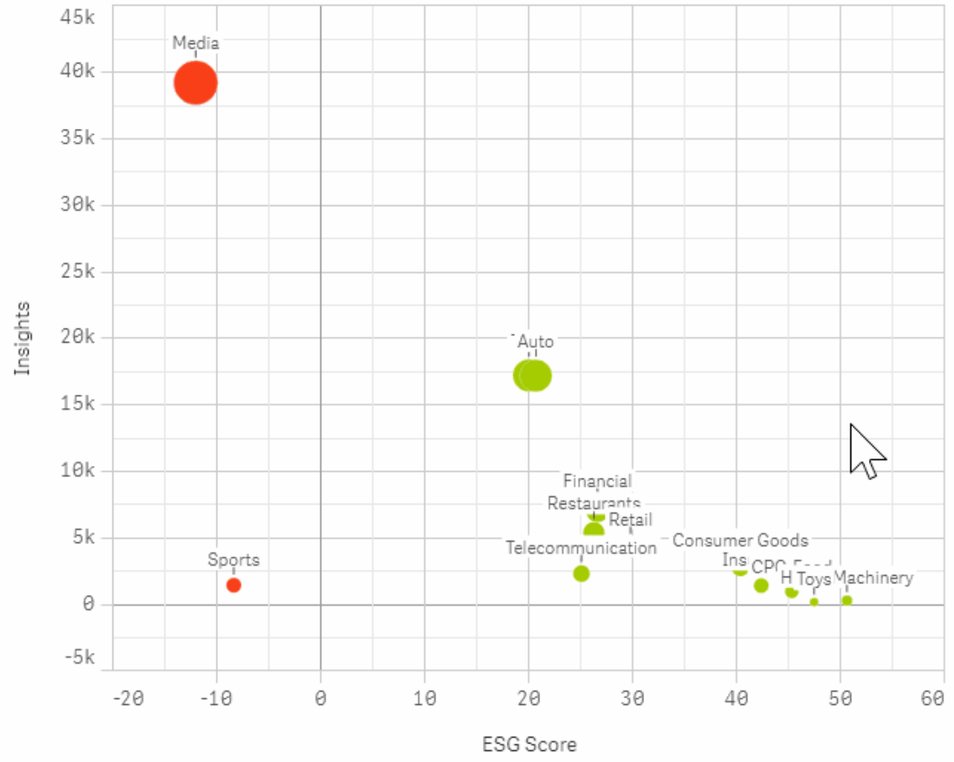
Select a company to see ranks...

Positive Events (All)	Negative Events (All)	Environmental Score (All)	Social Score (All)	Governance Score (All)	ESG Score (All)
56,958	45,632	47.28	32.9	2.03	25.26

Positive Events (30 Days)	Negative Events (30 Days)	Environmental Score (30 Days)	Social Score (30 Days)	Governance Score (30 Days)	ESG Score (30 Days)
4,556	2,313	43	37	0	26

Company	ESG Change vs AVG
Under Armour	123%
Ford	62%
Samsung	61%
Sony	59%
Wells Fargo	55%
Audi	54%
Panera	53%
Visa	43%
T-Mobile	42%
NBCU	41%
A&E	39%
Best Buy	34%
Kia	33%

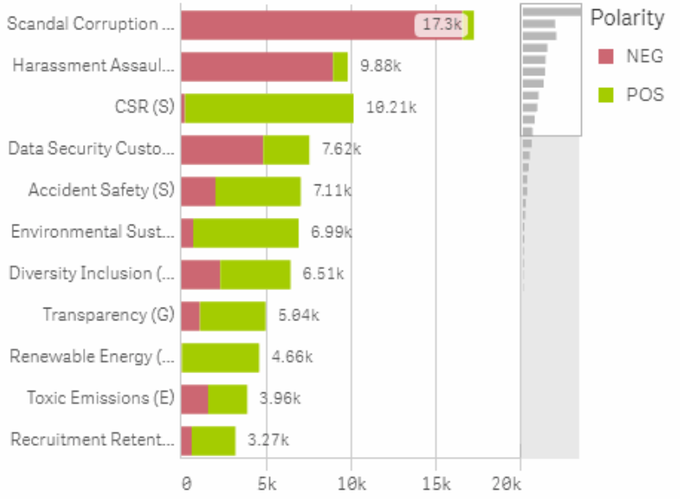
AVG ESG Scores by Sector



Top ESG Score Trends by Sector (Month)



ESG Topics by Polarity



Get a demo

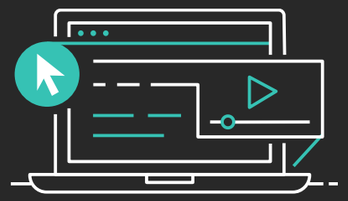
Announcing the launch of Amenity Analytics in AWS Marketplace

To get a demo, contact:
aws-marketplace@amenityanalytics.com



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- Amazon S3 Glacier
- Amazon Elastic File System (Amazon EFS)
- Amazon Elastic Block Store (Amazon EBS)



Classroom offerings, like Architecting on AWS, feature AWS expert instructors and hands-on activities

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aws training and certification

Thank you!

Roy Penn

roy@amenityanalytics.com

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