



STG311

Case Study: How Zendesk and Videology Modernized Their Big Data Platforms on Amazon EBS

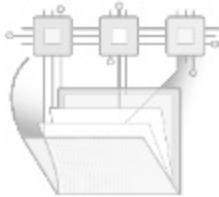
David Stein, Business Development EBS

November 30, 2016

What to Expect from the Session

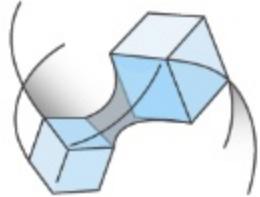
- How to architect big data processing platforms to scale to meet growing demand while improving performance, availability, and cost with Amazon EBS
- Learn how about new ST1 and SC1 Throughput Optimized EBS volumes designed for big data workloads
- Overview of how Zendesk runs a large ELK (Elasticsearch, Logstash, Kibana) on Amazon EC2 and EBS for their cloud-based customer support platform
- Overview of how Videology runs a Hadoop architecture on EC2 and EBS to ingest, process, and analyze logs for their converged advertising solution

AWS storage is a platform



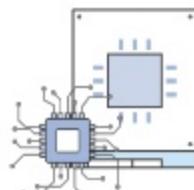
Amazon EFS

File



Amazon EBS

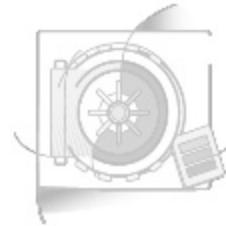
Block



Amazon EC2
Instance Store



Amazon S3



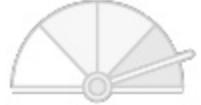
Amazon Glacier

Object

Data Transfer



Internet/VPN



Amazon S3
Transfer
Acceleration



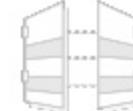
Amazon
CloudFront



AWS Direct
Connect



Amazon
Kinesis
Firehose



AWS Storage
Gateway

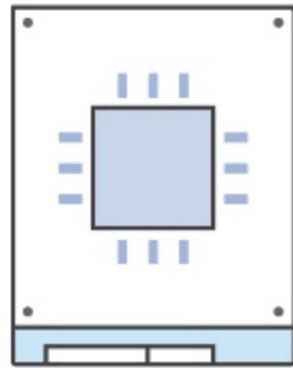


AWS
Snowball

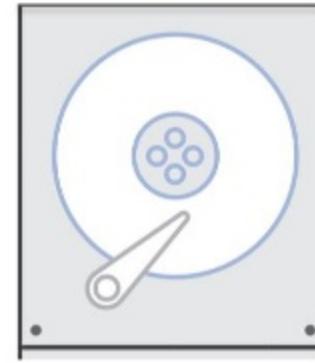


ISV
Connectors

EBS volume types

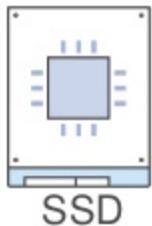


Solid state drive
(SSD)

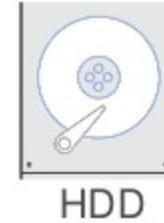


Hard disk drive
(HDD)

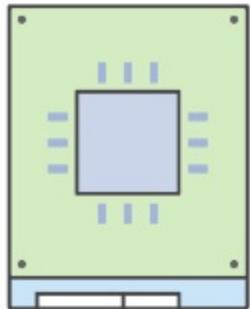
EBS volume types



SSD

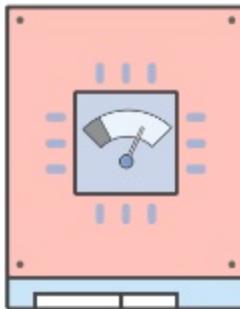


HDD



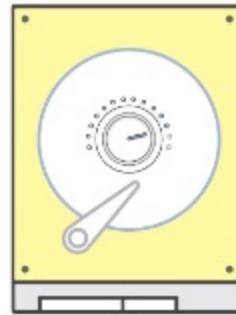
gp2

General Purpose
SSD



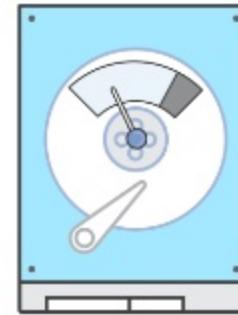
io1

Provisioned IOPS
SSD



st1

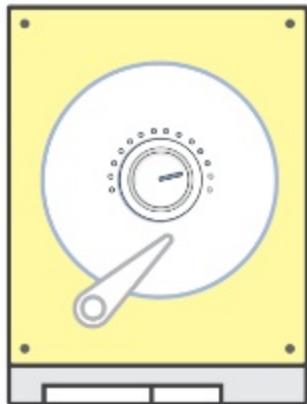
Throughput Optimized
HDD



sc1

Cold
HDD

EBS volume types: throughput



st1

Throughput
Optimized HDD

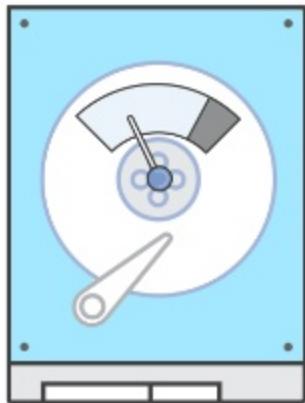
Baseline: 40 MB/s per TB up to 500 MB/s

Burst: 250 MB/s per TB up to 500 MB/s

Capacity: 500 GB to 16 TB

Ideal for large-block, high-throughput sequential workloads

EBS volume types: throughput



sc1

Cold HDD

Baseline: 12 MB/s per TB up to 192 MB/s

Burst: 80 MB/s per TB up to 250 MB/s

Capacity: 500 GB to 16 TB

Ideal for sequential throughput workloads such as logging and backup



Case Study: How Zendesk Modernized Their Big Data Platforms on Amazon EBS

Inside Our New ELK Deployment

Kyle House, David Bernstein, Zendesk

November 30, 2016



Zendesk builds software for better customer relationships. It empowers organizations to improve customer engagement and better understand their customers. More than 87,000 paid customer accounts in over 150 countries and territories use Zendesk products. Based in San Francisco.



KONAMI

easynvest ➤

AdRoll

shopify

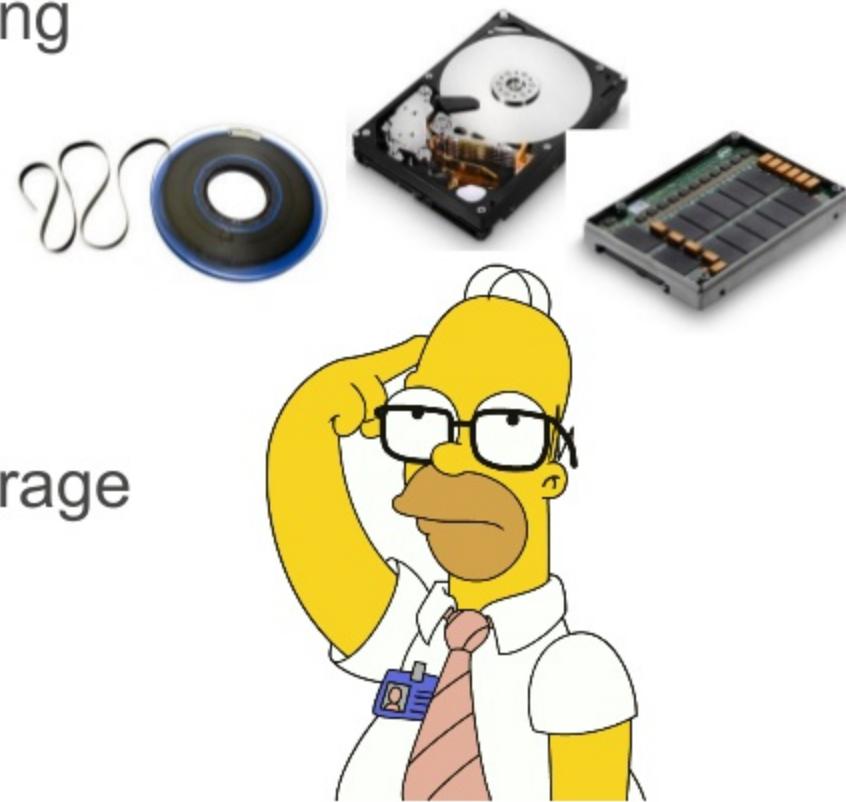
lonely planet

vend

neato
robotics®

What to Expect from the Session

- Discuss storage redesign, utilizing new Amazon EBS volumes
- Talk through design choices
- Explain benefits of new storage model
- Cost benefits of “rightsizing” storage



ELK at Zendesk



Distributed database



Log ingestion/parsing



Beautiful visualizations

Storage Optimized

I2 – High I/O Instances

This family includes the High Storage Instances that provide very fast SSD-backed instance storage optimized for very high random I/O performance, and provide high IOPS at a low cost.

Features:

- High Frequency Intel Xeon E5-2670 v2 (Ivy Bridge) Processors
- SSD Storage
- Support for TRIM
- Support for Enhanced Networking
- High Random I/O performance

Model	vCPU	Mem (GiB)	Storage (GB)
i2.xlarge	4	30.5	1 x 800 SSD
i2.2xlarge	8	61	2 x 800 SSD
i2.4xlarge	16	122	4 x 800 SSD
i2.8xlarge	32	244	8 x 800 SSD

Use Cases

NoSQL databases like Cassandra and MongoDB, scale out transactional databases, data warehousing, Hadoop, and cluster file systems.

Storage Optimized - Current Generation

i2.xlarge	4	14	30.5	1 x 800 SSD	\$0.853 per Hour
i2.2xlarge	8	27	61	2 x 800 SSD	\$1.705 per Hour
i2.4xlarge	16	53	122	4 x 800 SSD	\$3.41 per Hour
i2.8xlarge	32	104	244	8 x 800 SSD	\$6.82 per Hour
d2.xlarge	4	14	30.5	3 x 2000 HDD	\$0.69 per Hour
d2.2xlarge	8	28	61	6 x 2000 HDD	\$1.38 per Hour
d2.4xlarge	16	56	122	12 x 2000 HDD	\$2.76 per Hour
d2.8xlarge	36	116	244	24 x 2000 HDD	\$5.52 per Hour

Cluster health, 2 == green, 1 == yellow, 0 == red

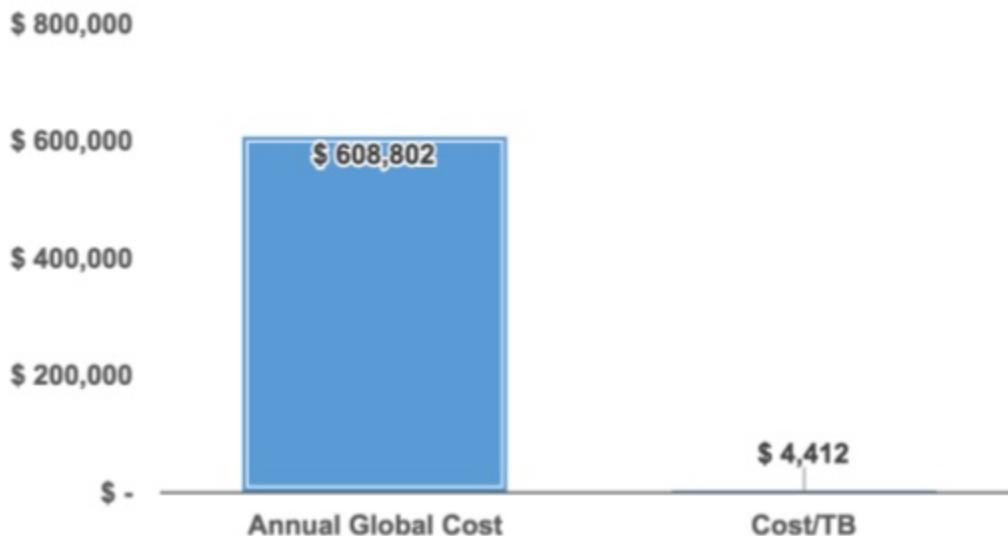
Show 1h The Past Hour

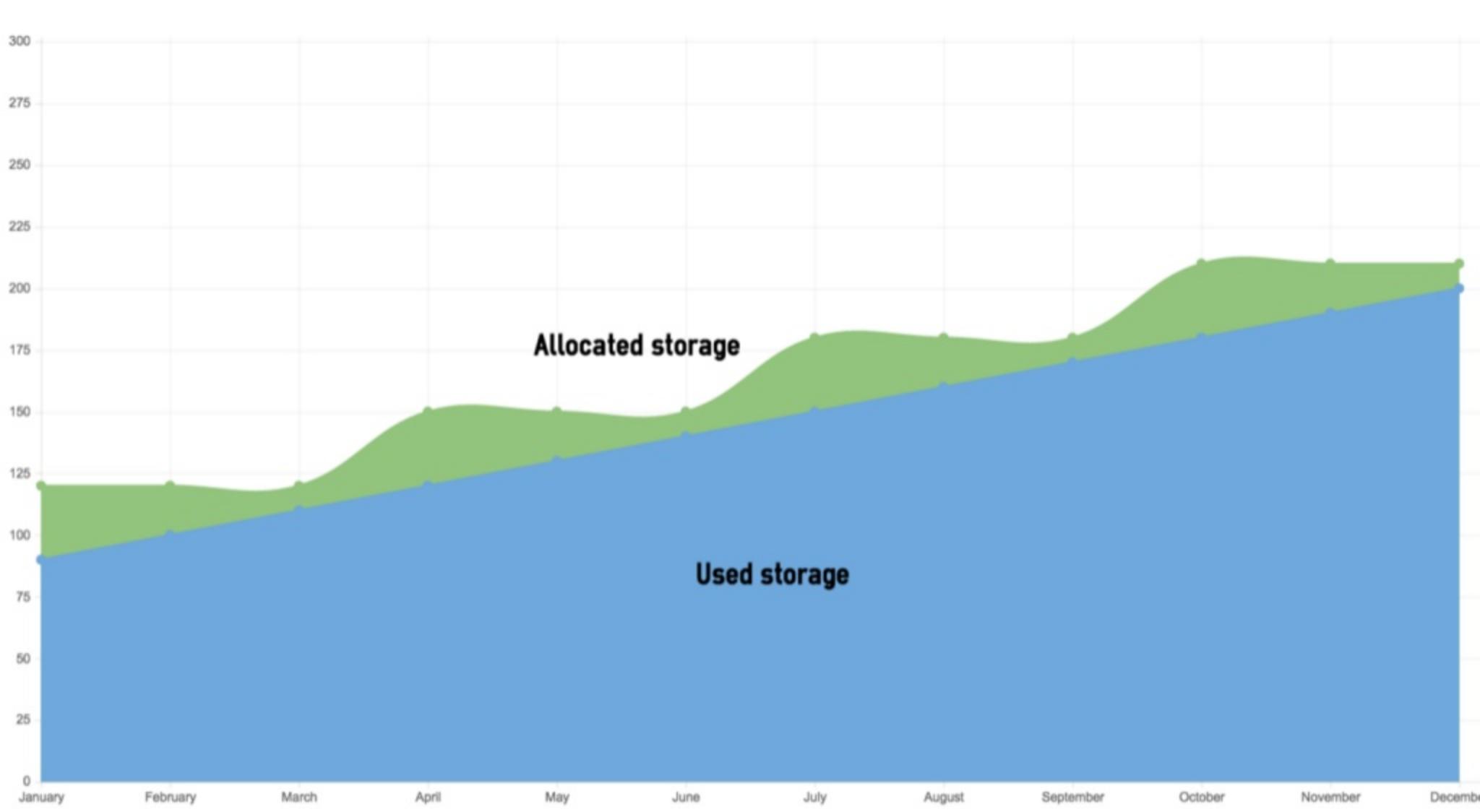




The Problem

- Operational headaches
- Encryption
- Data retention
- Cost too high







The Investigation

- User access patterns
- Performance requirements
- New EBS volume types

Amazon EBS Update – New Cold Storage and Throughput Options

by Jeff Barr | on 19 APR 2016 | in [Amazon Elastic Block Store](#) | [Permalink](#) | [Comments](#)

The AWS team spends a lot of time looking in to ways to deliver innovation based around improvements in price/performance. Quite often, this means wrestling with interesting economic and technical dilemmas.

For example, it turns out that there are some really interesting trade-offs between HDD and SSD storage. On the one hand, today's SSD devices provide more IOPS per dollar, more throughput per gigabyte, and lower latency than today's HDD devices. On the other hand, continued density improvements in HDD technology drive the cost per gigabyte down, but also reduce the effective throughput per gigabyte. We took this as a challenge and asked ourselves—could we use cost-effective HDD devices to build a high-throughput storage option for EBS that would deliver consistent performance for common workloads like big data and log processing?

Of course we could!

Today we are launching a new pair of low-cost EBS volume types that take advantage of the scale of the cloud to deliver high throughput on a consistent basis, for use with EC2 instances and [Amazon EMR](#) clusters (prices are for the US East (Northern Virginia) Region; please see the [EBS Pricing](#) page for other regions):

- **Throughput Optimized HDD (st1)** – Designed for high-throughput MapReduce, Kafka, ETL, log processing, and data warehouse workloads; \$0.045 / gigabyte / month.
- **Cold HDD (sc1)** – Designed for workloads similar to those for Throughput Optimized HDD that are accessed less frequently; \$0.025 / gigabyte / month.



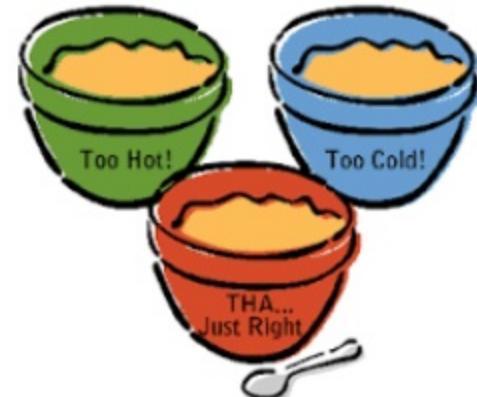


The Proposal

- Full usage of EBS with new volume types
- Create a tiered storage model
- Optimize instance types; decouple instances from storage

Tiered storage

Hot (0-7 days)	General Purpose SSD (gp2)
Warm (8-30 days)	Throughput Optimized HDD (st1)
Cold (31-60 days)	Cold HDD (sc1)





2016.01.01



GP2 EBS
Hot storage



ST1 EBS
Warm storage

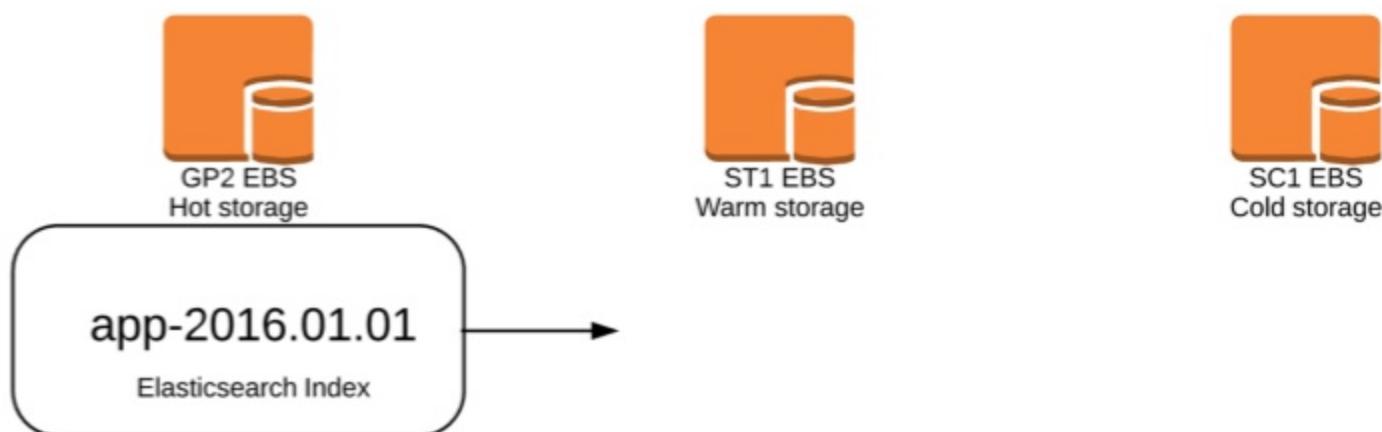


SC1 EBS
Cold storage

app-2016.01.01

Elasticsearch Index

2016.01.08



2016.01.08



GP2 EBS
Hot storage



ST1 EBS
Warm storage



SC1 EBS
Cold storage

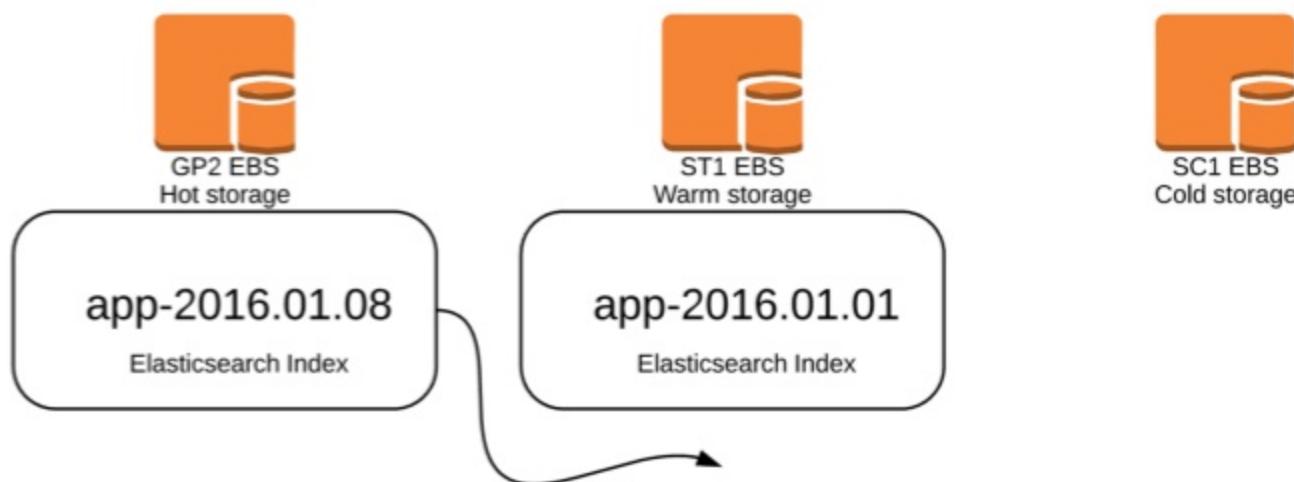
app-2016.01.08

Elasticsearch Index

app-2016.01.01

Elasticsearch Index

2016.01.15



2016.01.15



GP2 EBS
Hot storage

app-2016.01.15

Elasticsearch Index



ST1 EBS
Warm storage

app-2016.01.01

Elasticsearch Index

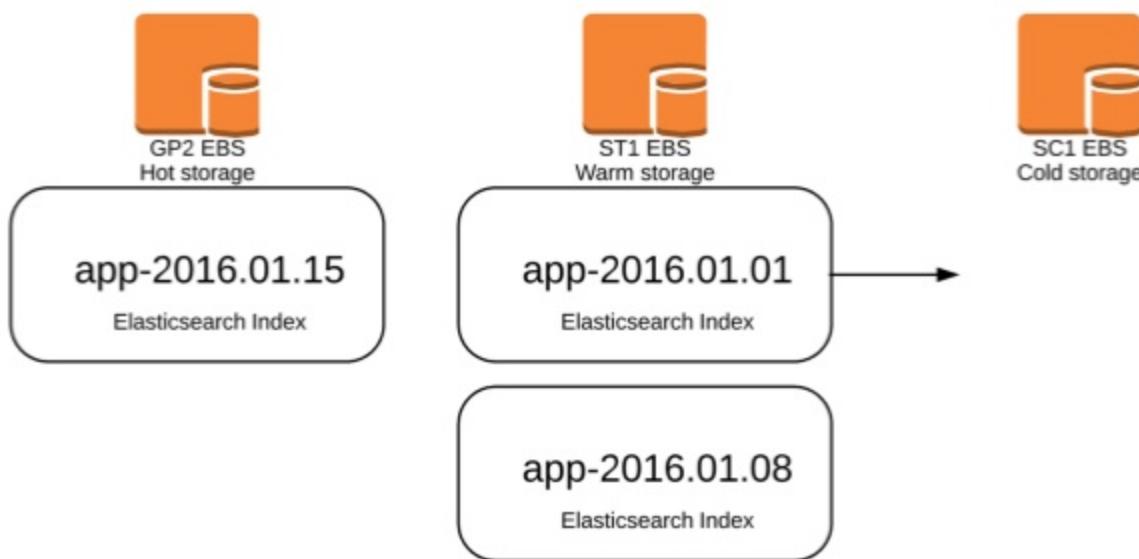


SC1 EBS
Cold storage

app-2016.01.08

Elasticsearch Index

2016.01.31



2016.01.31



GP2 EBS
Hot storage

app-2016.01.31

Elasticsearch Index



ST1 EBS
Warm storage

app-2016.01.08

Elasticsearch Index



SC1 EBS
Cold storage

app-2016.01.01

Elasticsearch Index

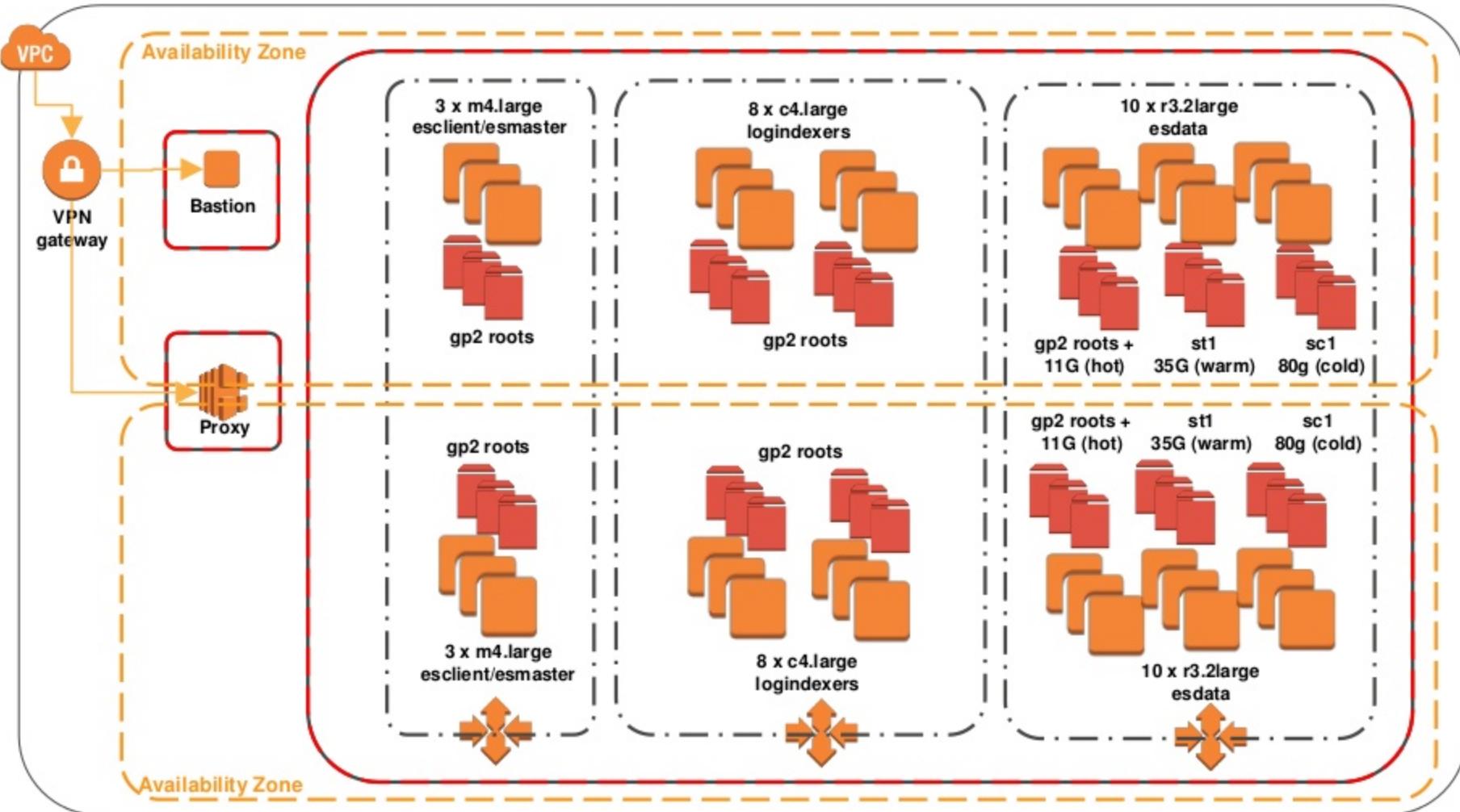
app-2016.01.15

Elasticsearch Index

```
1 PUT /index1/settings
2 {
3     "index" : {
4         "routing" : {
5             "allocation" : {
6                 "require" : {
7                     "type" : "hot"
8                 }
9             }
10            }
11        }
12    }
```

```
curator allocation --rule type=warm indices --older-than 7
```

Topology



COST-CUTTING PLAN



CARTOONSTOCK
.com

MORRIS

Search ID: jmo0476

"It's going to require a great
deal of money."

Sparkleformation

```
$ sfn update my-stack --file my_template
[Sfn]: SparkleFormation: update
[Sfn]:   -> Name: my-stack Path: /home/spox/workspace/demo/sparkleformation/my_template.rb
[Sfn]: Pre-update resource planning report:

Update plan for: my-stack
Resources to be removed:
[AWS::EC2::Instance] MyEc2Instance

Resources to be added:
[AWS::EC2::Instance] YourEc2Instance

[Sfn]: Apply this stack update? (Y/N): y
[Sfn]: Events for Stack: my-stack
Time          Resource Logical Id  Resource Status  Resource Status Reason
2015-11-06 19:51:12 UTC  my-stack    CREATE_IN_PROGRESS  User Initiated
2015-11-06 19:51:28 UTC  HyEc2Instance  CREATE_IN_PROGRESS  User Initiated
2015-11-06 19:51:29 UTC  HyEc2Instance  CREATE_IN_PROGRESS  Resource creation Initiated
2015-11-06 19:52:40 UTC  HyEc2Instance  CREATE_COMPLETE
2015-11-06 19:52:41 UTC  my-stack    CREATE_COMPLETE
2015-11-06 21:11:31 UTC  my-stack    UPDATE_IN_PROGRESS  User Initiated
2015-11-06 21:11:38 UTC  YourEc2Instance  CREATE_IN_PROGRESS  User Initiated
2015-11-06 21:11:39 UTC  YourEc2Instance  CREATE_IN_PROGRESS  Resource creation Initiated
2015-11-06 21:12:39 UTC  YourEc2Instance  CREATE_COMPLETE
2015-11-06 21:12:42 UTC  my-stack    UPDATE_COMPLETE_CLEANUP_IN_PROGRESS

2015-11-06 21:12:44 UTC  HyEc2Instance  DELETE_IN_PROGRESS
2015-11-06 21:13:36 UTC  HyEc2Instance  DELETE_COMPLETE
2015-11-06 21:13:37 UTC  my-stack    UPDATE_COMPLETE

[Sfn]: Stack update complete: SUCCESS
[Sfn]: Stack description of my-stack:
[Sfn]: Outputs for stack: my-stack
[Sfn]:   My Instance Address: 54.176.86.101
```

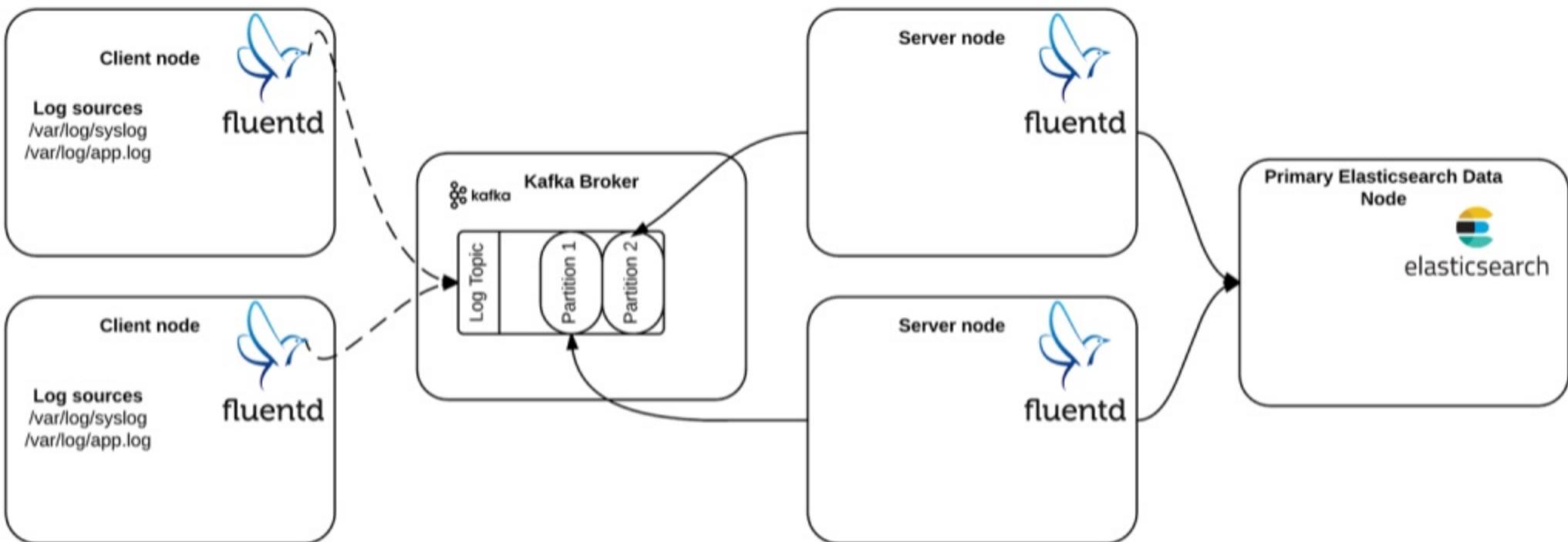




fluentd



kafka

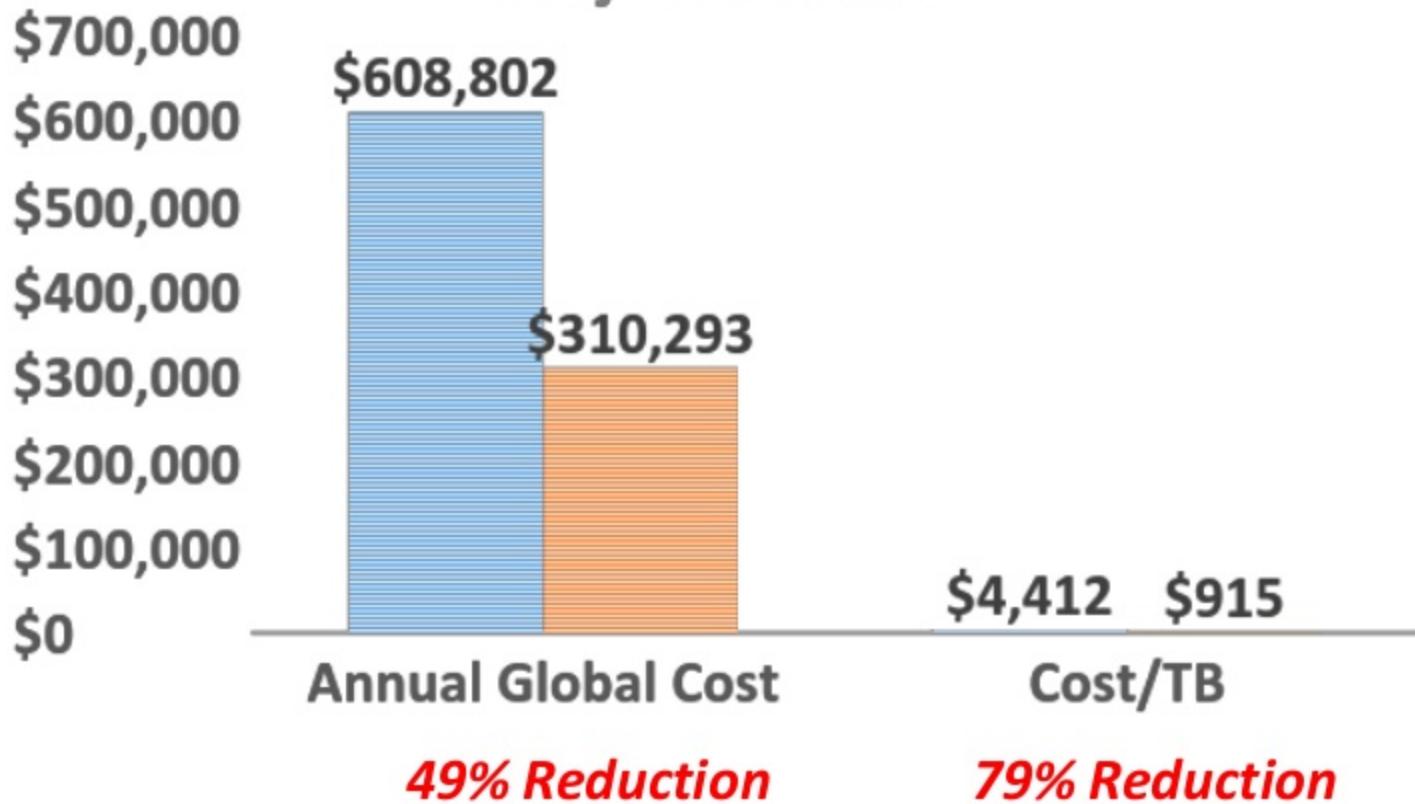




The Result

- Reduced operating costs by 50%
- Increased data retention 3x
- Predictable scaling model
 - Storage allocation detached from instance count
- Increased data transport reliability
- Reduced operational overhead
- Increased cluster stability

Project Results



Recommendations

- Identify data usage model before you build
- Find places where performance matters, and where cost can be optimized
- Reduce over-provisioned storage/IOPS
- Utilize AWS managed services whenever possible



Thank you!

Up next in this session:
Videology



Videology

Paul Frederiksen – Principal DevOps Engineer
David Ortiz – Senior Software Engineer
Videology Big Data Team

November 30, 2016

On the Rocky Road to EBS Videology's Journey to EBS-backed Big Data

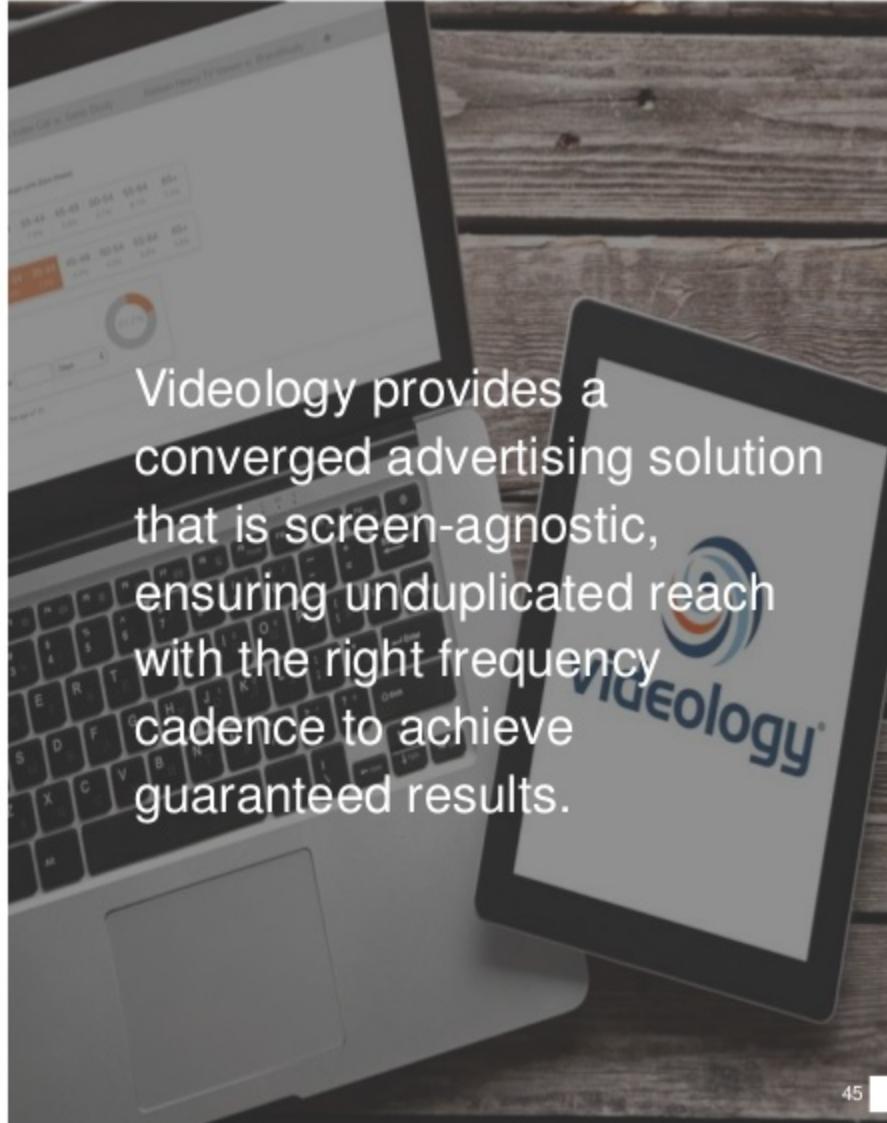


What to Expect from the Session

- Intro to Videology
- Challenges
- Road to EBS-backed cluster
- Happy engineers

Videology overview

Founded:	2007 by Scott Ferber, co-founder of Advertising.com, which sold to AOL Time Warner in 2004 for \$497 Million
Corporate Headquarters:	New York, NY
Operations:	<ul style="list-style-type: none">Operating in 28 Global MarketsKey Offices – New York, Baltimore, Toronto, London, Singapore & Sydney
Employees:	Approximately 380
Investors	NEA, Comcast Ventures, Harbourvest, Catalyst Investors, Pinnacle Ventures, Valhalla Venture
Customers:	4,500 Active Users including Brand marketers, agencies, trading desks, media companies, MVPD's
Ecosystem Integrations:	Open platform with 2200+ ecosystem integrations, including 1000+ media companies, 40 data providers, all major 3rd party verification providers, and dozens of technology partners across the media ecosystem
Recent Client Wins:	    



Videology provides a converged advertising solution that is screen-agnostic, ensuring unduplicated reach with the right frequency cadence to achieve guaranteed results.

Industry accolades...

CYNOPSIS

“ Videology was named **Best Digital Video Ad Platform** by Cynopsis Media at their 2015 Model D Awards.”

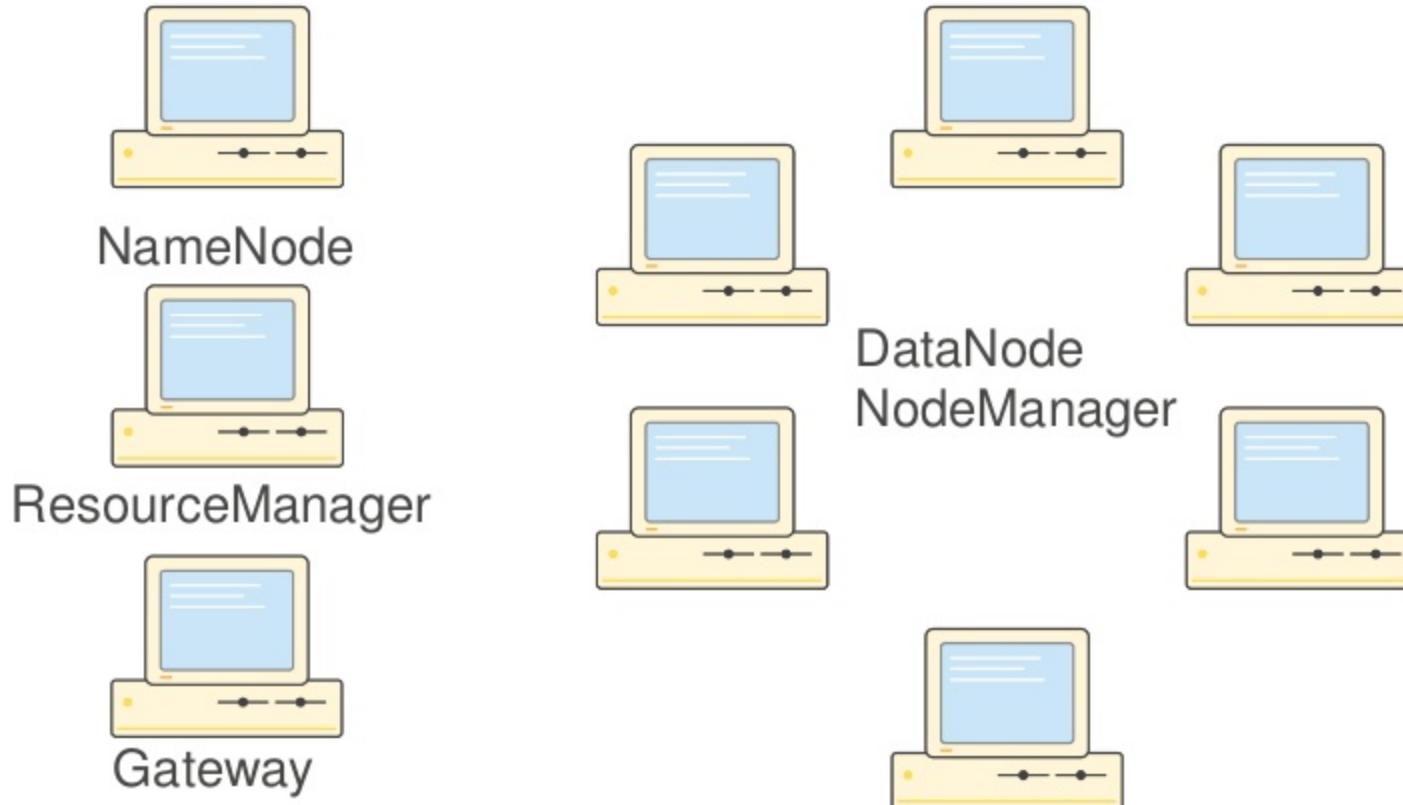
FORRESTER®

“ Videology has the **most sophisticated media optimizer** to analyze the right allocation of TV and online video to optimize reach and campaign cost.”

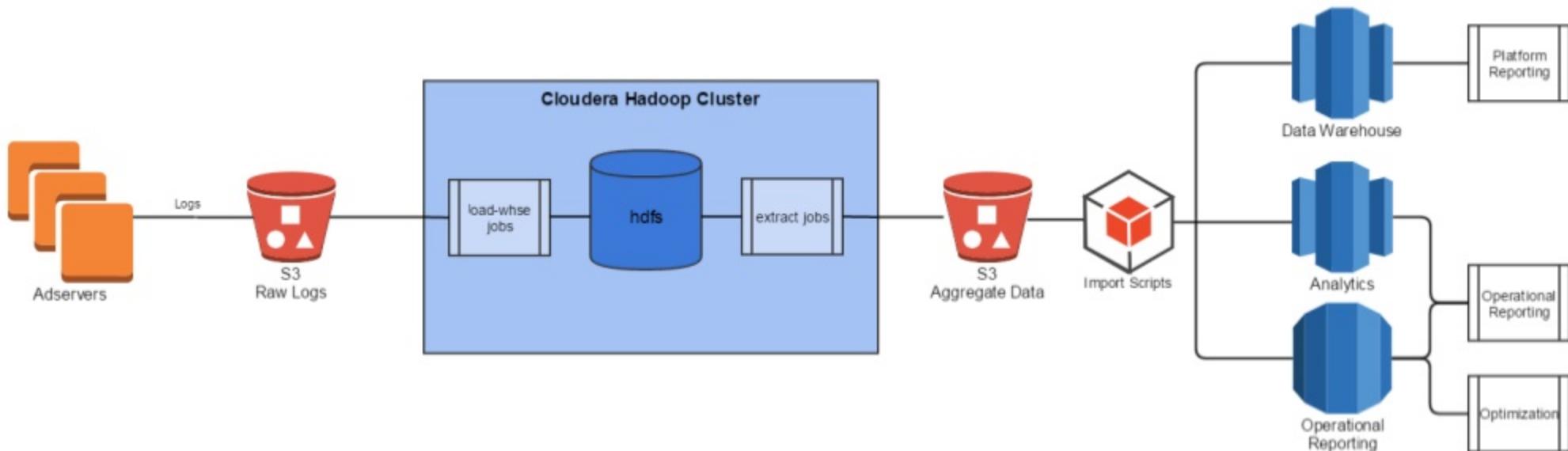
nielsen

“ Videology was able to show that their platform drove brand lift that was on average **6X higher than Nielsen's norms.**”

Hadoop overview



Where does big data processing fit in?



Original production

Instance Type	Qty	Role	vCPU	RAM (GB)	Storage (GB)
m3.xlarge	1	Jumpbox	4	15	80
m3.xlarge	1	Cloudera Manager	4	15	80
m3.2xlarge	2	NN/RM	8	30	160
cc2.8xlarge	1	Service Master	32	60	3,200
cc2.8xlarge	30	Worker	32	60	3,200

I've got 99 problems and Hadoop is a few of them

Reliability

David [REDACTED] @PFred Any of your metrics show any issues with node usvacdhprd64?

Paul [REDACTED] let me look

Paul [REDACTED] hmmm, looks like an aws status check failed on it

Paul [REDACTED] that's usually bad

Paul [REDACTED] underlying hardware might be upset

David [REDACTED] had a couple failures on a job because it was failing to fetch data from that node

Distcp

Jeremy [REDACTED] distcp issues keep hitting us... (

CPU to Memory Ratio



Scalability

Ron [REDACTED] @Jeff [REDACTED] @jp CDH jobs are running way behind. is there a cause other than just a spike in data?

Ron [REDACTED] @all anyone who can help pull CDH out of it's funk, please log in

Ron [REDACTED] we've got hourly jobs that have been running for hours

Engaged Cloudera
for EBS support

2015

Q2
2016

New EBS to
the rescue!

Q3
2016

Q4 and
beyond

Gave up on EBS
and tested D2s

Take advantage of
new hardware

CC2.8XL



Old
Not enough disk
Expensive

D2.8XL



Lots of disk!
Not enough memory
Expensive

M4.10XL



Nirvana

D2.8xl prototype

Instance Type	Qty	Role	vCPU	RAM (GB)	Storage (GB)
r3.large	1	Jumpbox	2	15.25	32
r3.large	1	Cloudera Manager	2	15.25	32
r3.xlarge	2	NN/RM	8	30	160
r3.2xlarge	2	Service Master	8	61	160
d2.8xl	10	Worker	36	244	48,000

M4.10xlarge w/ sc1 prototype

Instance Type	Qty	Role	vCPU	RAM (GB)	Storage (GB)
r3.large	1	Jumpbox	2	15.25	32
r3.large	1	Cloudera Manager	2	15.25	32
r3.xlarge	2	NN/RM	8	30	160
r3.2xlarge	2	Service Master	8	61	160
m4.10xlarge	18	Worker	40	160	4,000

M4.10xlarge w/ st1 prototype

Instance Type	Qty	Role	vCPU	RAM (GB)	Storage (GB)
r3.large	1	Jumpbox	2	15.25	32
r3.large	1	Cloudera Manager	2	15.25	32
r3.xlarge	2	NN/RM	8	30	160
r3.2xlarge	2	Service Master	8	61	160
m4.10xlarge	18	Worker	40	160	8,000

Problems no more!



- No more rebuilding Nodes
- 1 critical incident since switch vs. 5 in the year prior to release
- Get to play with kids instead of babysitting cluster

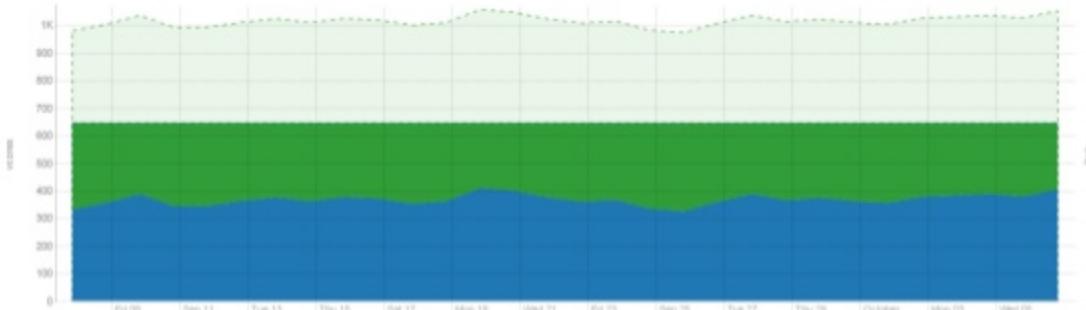
Engineering benefits - capacity

Vcores (Allocated & Free)

Query: SELECT allocated_vcores_cumulative, available_vcores where category=YARN_POOL and serviceName=yarn and queueName=root

Data Granularity:

Auto

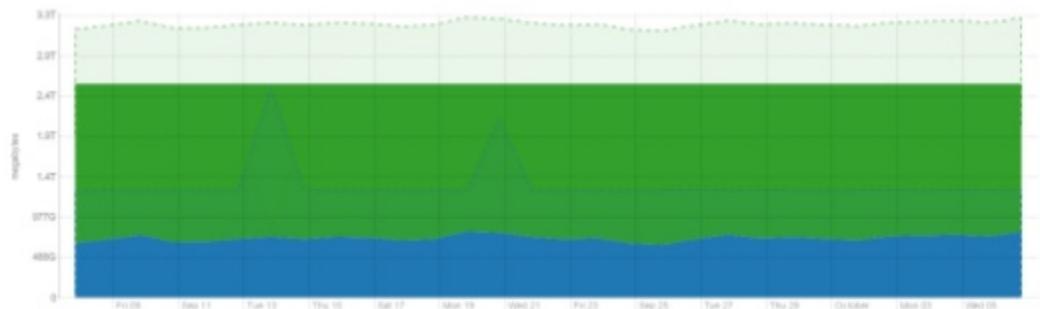


Memory (Allocated & Free)

Query: SELECT allocated_memory_mb_cumulative, available_memory_mb where category=YARN_POOL and serviceName=yarn and queueName=root

Data Granularity:

Auto



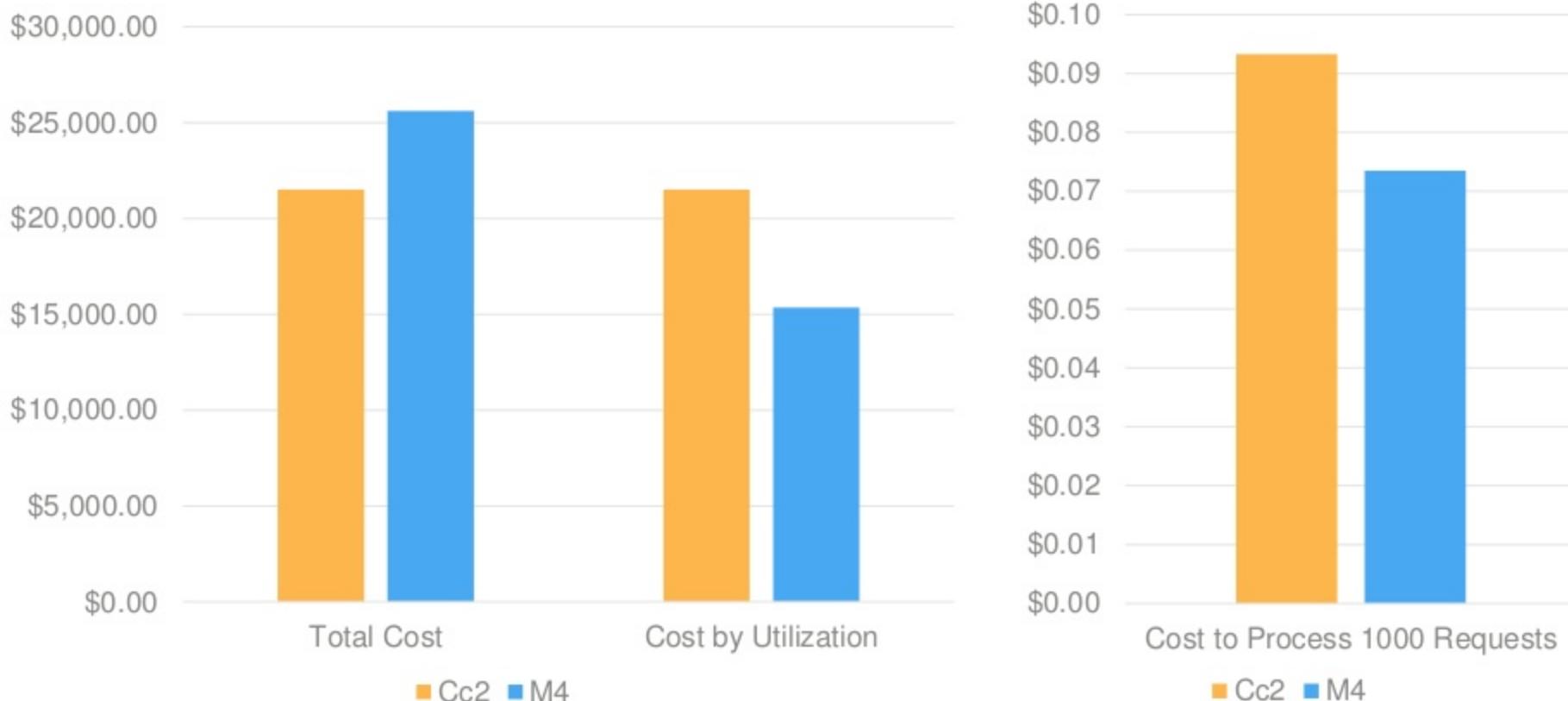
No longer restricted by memory, we now have resources to pursue other tools to improve our reliability and speed:

- Spark
- HBase
- Flafka
- Offloading processing from Amazon Redshift to CDH

More resilient to log volume increases

Can expand storage as requirements changes

Financial benefits





**AWS
re:Invent**

Thank you!

Questions?



**Remember to complete
your evaluations!**