Logging and Analytics Overview

How Much Data

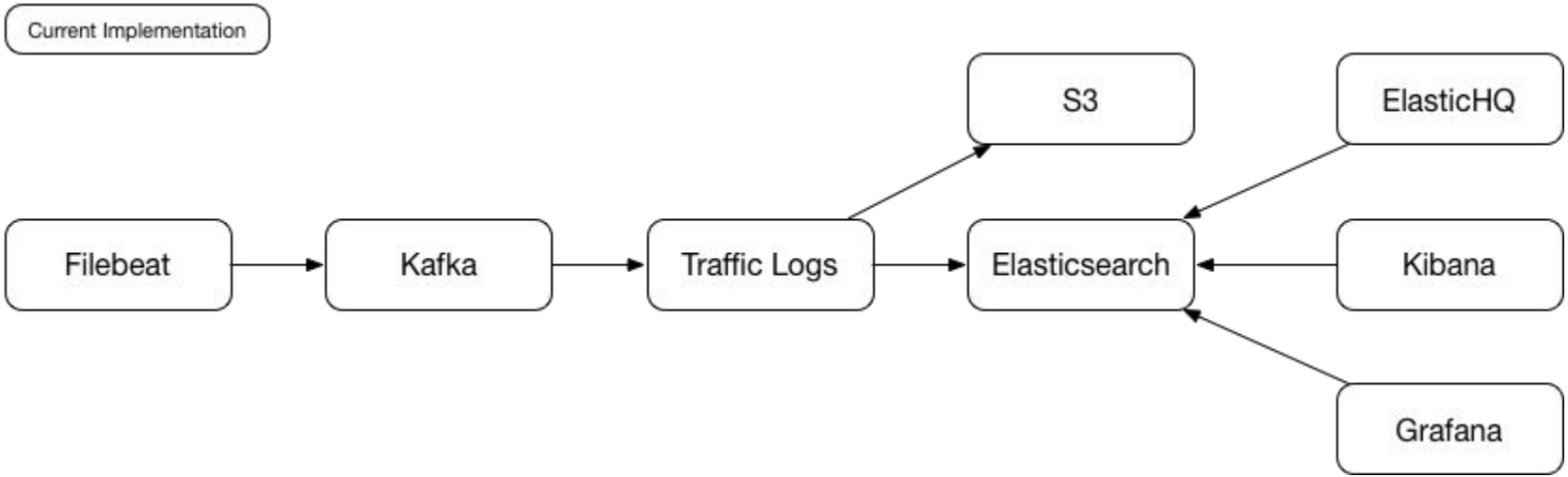
- Syndication Partners
  - 3.3 Billion Records/Day (June 2018)
  - Avg ~900 Bytes/Message for TC
  - Resulting in ~970GB/Day Raw
- Comcast - OTT
  - 11.7 Billion Records/Day (June 2018)
  - Avg ~700 Bytes/Message for NetStats
  - Resulting in ~3.5TB/Day Raw
- Comcast - Title VI
  - 60 Billion Records/Day (June 2018)
  - Avg ~700 Bytes/Message for NetStats
  - Resulting in ~17.9TB/Day Raw

What Has Been Built

The Tech

- Filebeat
  - Grabbing and forwarding of logs
- Kafka
  - Aggregating and Queing of logs
- Spark
  - Parsing, Transforming, Enhancement, and delivery of messages
- ElasticSearch
  - Log search and statistics gathering

Current Design



What is TrafficLogs

- Think Logstash but better
- Uses Spark for scalability
  - Attempted Beam, more about that later
- Yaml based configs
  - Pipeline config
  - Complex parse, transform, and enrichment tree designs
- Any source
  - Kafka only currently
- Any destination
  - ES, Kafka, S3 currently available

The Challenges So Far

Apache Beam

- Issues
  - No support for backpressure
  - No support for Kafka offset tracking outside of filesystem
  - Introduced innate slowness due to limitations of Spark integration and workflow optimizations
  - Adaption layer resulted in re-deserialization and instantiation for each batch
  - Beam wasn’t mature enough
- Solution
  - Replaced Beam with direct Spark SDKs

ElasticSearch using Ceph Block Storage

- Issues
  - Slow to read/write.
  - Lots of congestion from neighbors and ourselves
  - Added 2nd layer of replication (3x) outside of ElasticSearch's own
- Solution
    - Moved to lots VMs (120) using ephemeral storage

Spark to ElasticSearch

- Issues
  - Constant Flushing to Disk
  - Slow Spark batch times even when no data
- Solutions
  - Increased batch send limits
  - Disabled refresh after each batch submit (batch.write.refresh=false)
  - Node state improvements
    - Currently refreshed on every Task that writes to ES
    - More ES nodes means more nodes to get state about, increasing
    - Working with Elastic on improvements to allow caching and background fetching of node state
  - Failed events stay in same ES writer as successful ones

ElasticSearch Index Performance

- Issues
  - Constant Flushing to Disk
  - High CPU load
- Solutions
  - Field map all the things
    - Templates are your friend
    - Use primitives
    - Only use Keyword indexing where FullText isn't needed
      - Default string type indexing results in FullText and Keyword being applied
  - Increase Shards and Decrease replication
    - Use Curator to increase replication later
  - Moving to ephemeral helped greatly here as well

S3 Uploading

- Issues
  - Minimum File Size for Multipart Upload (5MB/part)
  - Max File Size for Single part Upload (5GB)
  - Built-In File System support via Hadoop creates tons of very small files
- Solutions
  - LZO Compression done on all executores
  - Aggregate LZO parts within each batch to 1 task for upload
  - Use S3 SDK directly

Future Plans

Central User Interface

- Combined Portal
  - Kibana
  - Turnilo
    - Formulary called Swiv
    - Opensource fork of Pivot from Imply
  - Grafana
  - Zeppelin
  - ElasticHQ
  - KafkaManager
  - Potentially Superset
- Spark Management
  - Job Management
  - Job Status
    - Active Date Ranges
    - Active Offset Ranges
    - Backlog
- Data Availability
- Elastic Curator Management
- Parser Config Generator

Report Generation

Growth Forecasting

- Infrastructure per mille requests
- Data Volume per mille requests
- Bandwidth forecasting
- Arbitrary Aggregation Grouping
  - Per Device
  - Per Customer

Tenant Usage & Billing

- Per CDN, Tenant, Service, and Delivery Service
- General Usage metrics
  - Bandwidth
  - Requests at each layer
- Billing
  - Multiple billing points

Filebeat Replacement

Filebeat

- Uses Sarama for Kafka Client
- Small broker outages would pause sending completely until all brokers where online
- No and/or limited control on throughput

LogForwarder

- Written in GO
- Uses LibRDKafka
  - Supported by Confluence
  - Better handling of broker outages
- Support for pipe and file based logs

Apache Druid

- Rolled up stats as opposed to individual search records
  - Faster queries
  - Retain longer windows of time
  - Query much larger windows of time
  - Power many dashboards and monitoring systems
- Allows you to pivot data in multiple dimensions. Allowing you to see more and do more with your data.
- Opens up more possibilities within reporting, managing, and day to day operations

The Current and the Future