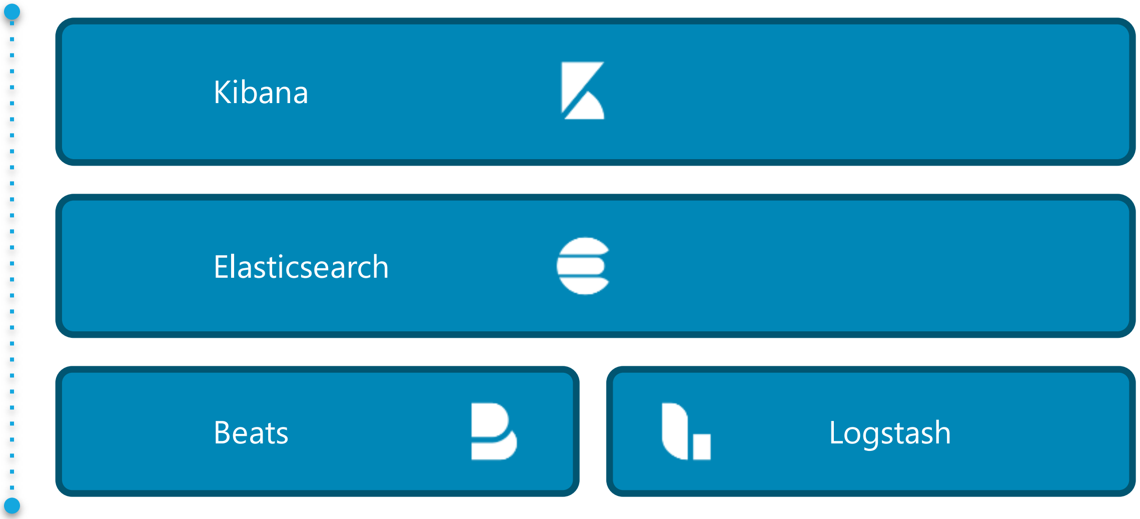
# Elastic Stack Reference Architecture

**Elastic**
**www.elastic.co**

# Elastic Stack

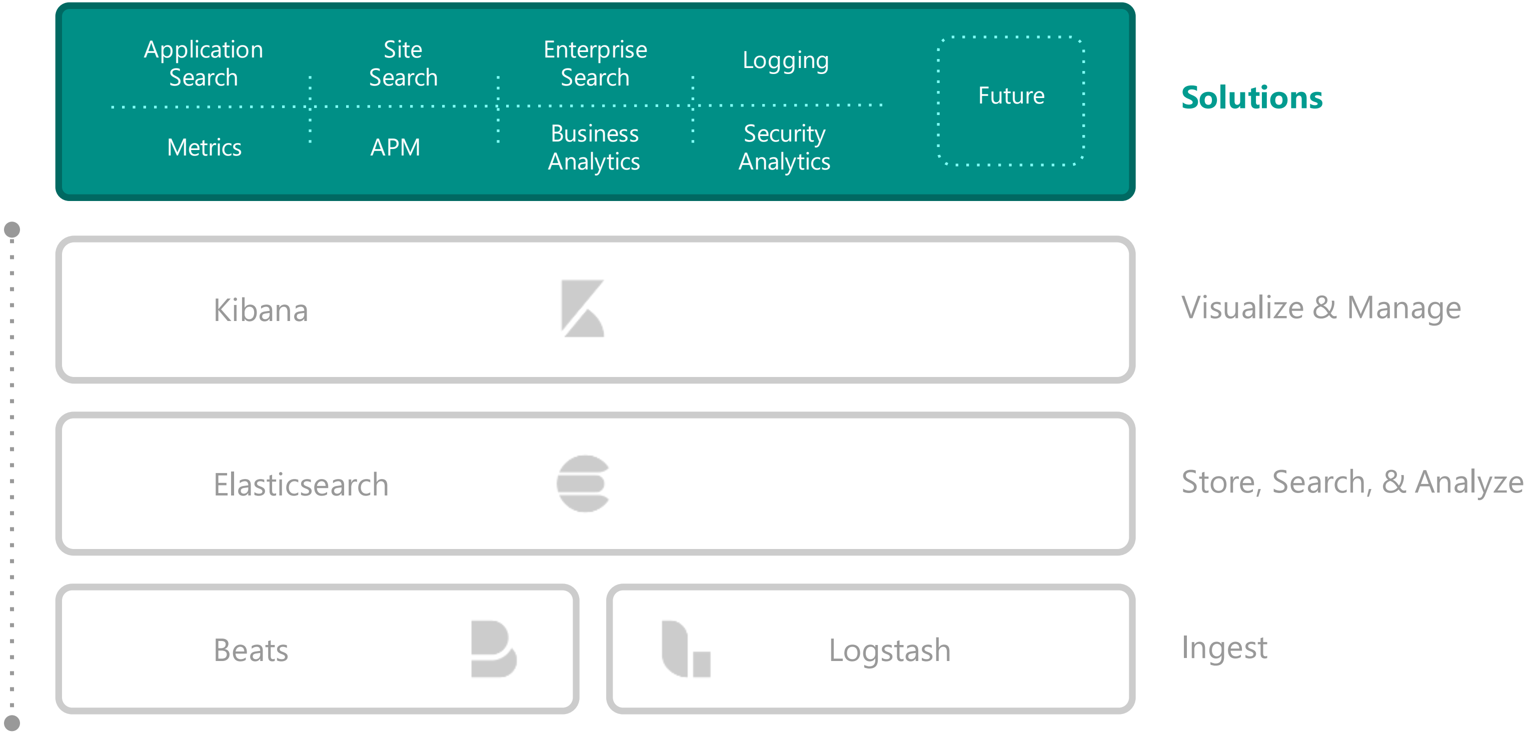


Kibana — Visualize & Manage

Elasticsearch — Store, Search, & Analyze

Beats, Logstash — Ingest

# Elastic Stack



Application Search

Site Search

Enterprise Search

Logging

Metrics

APM

Business Analytics

Security Analytics

Future

**Solutions**

Kibana

Visualize & Manage

Elasticsearch

Store, Search, & Analyze

Beats

Logstash

Ingest

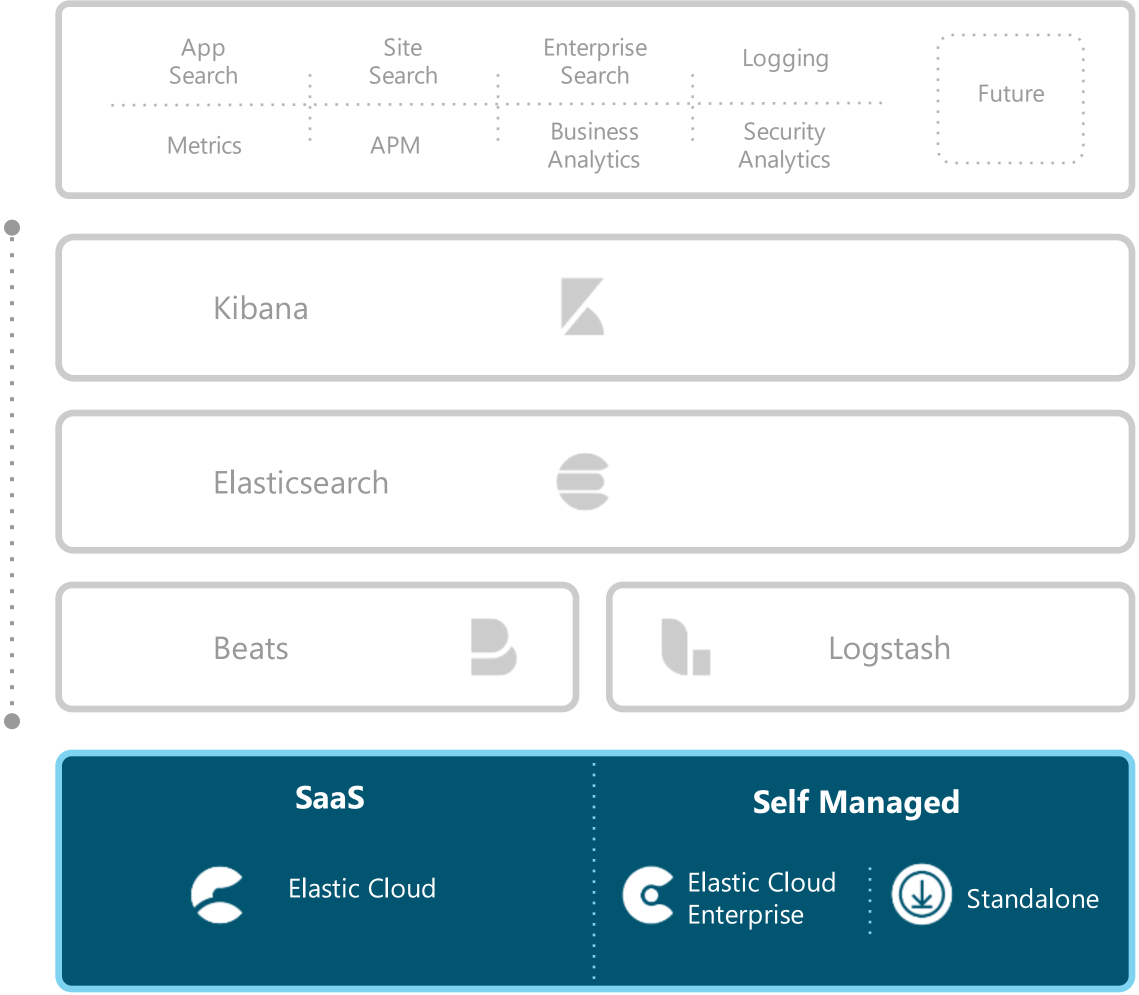
# Solutions

APM

Site Search

App Search

# Elastic Stack



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**SaaS**

Elastic Cloud

**Self Managed**

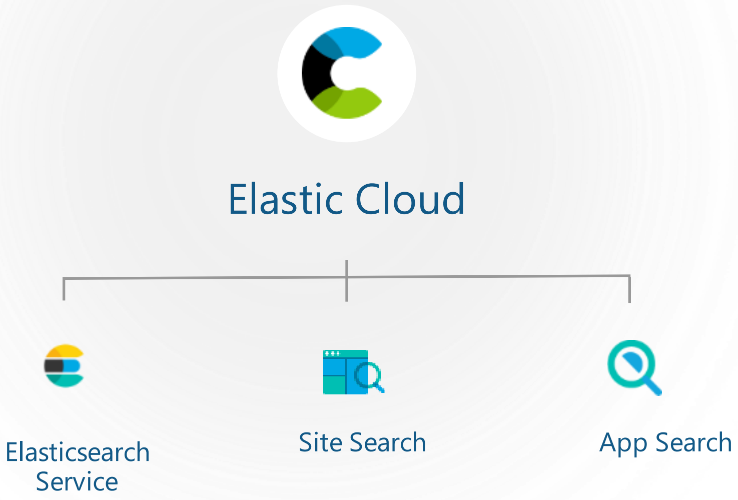
Elastic Cloud Enterprise

Standalone

**Deployment**

elastic

## SaaS



Elastic Cloud

Elasticsearch Service

Site Search

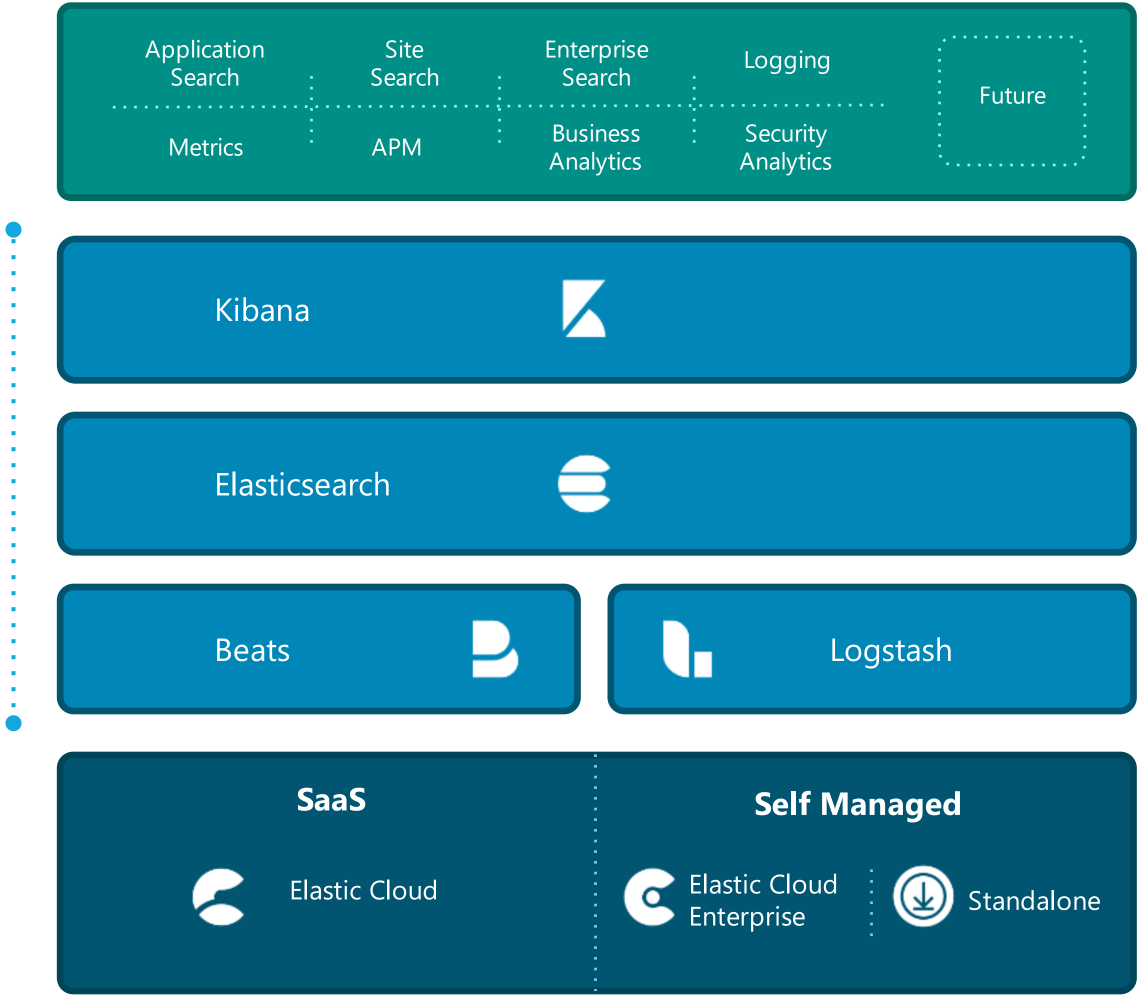
App Search

## Self Managed

Elastic Cloud Enterprise

Standalone

Elastic Stack



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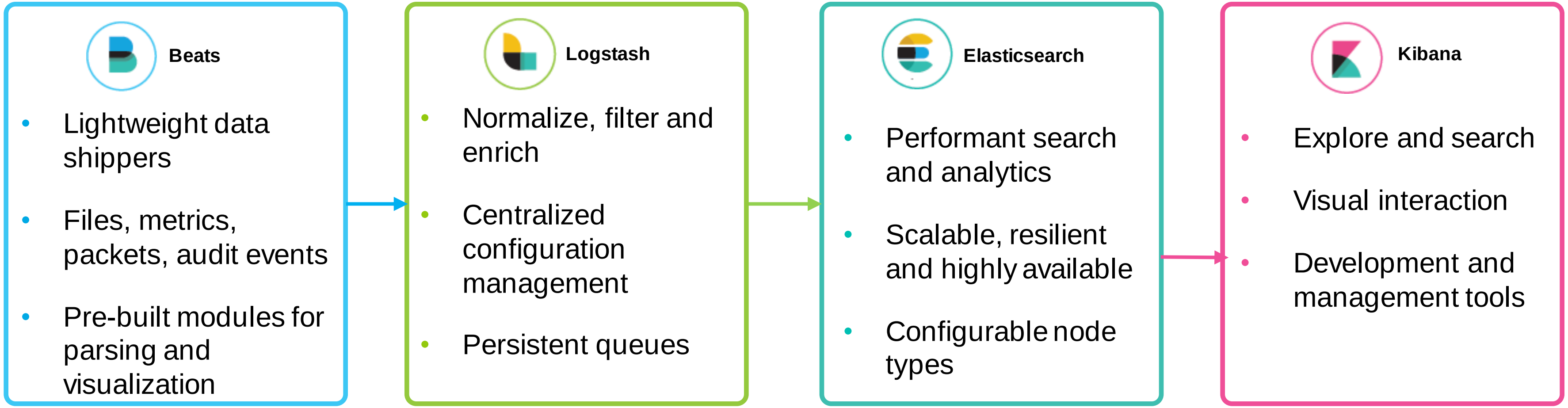
**Deployment**

# Logical Processing Pipeline



**Beats**

- Lightweight data shippers
- Files, metrics, packets, audit events
- Pre-built modules for parsing and visualization

**Logstash**

- Normalize, filter and enrich
- Centralized configuration management
- Persistent queues

**Elasticsearch**

- Performant search and analytics
- Scalable, resilient and highly available
- Configurable node types

**Kibana**

- Explore and search
- Visual interaction
- Development and management tools

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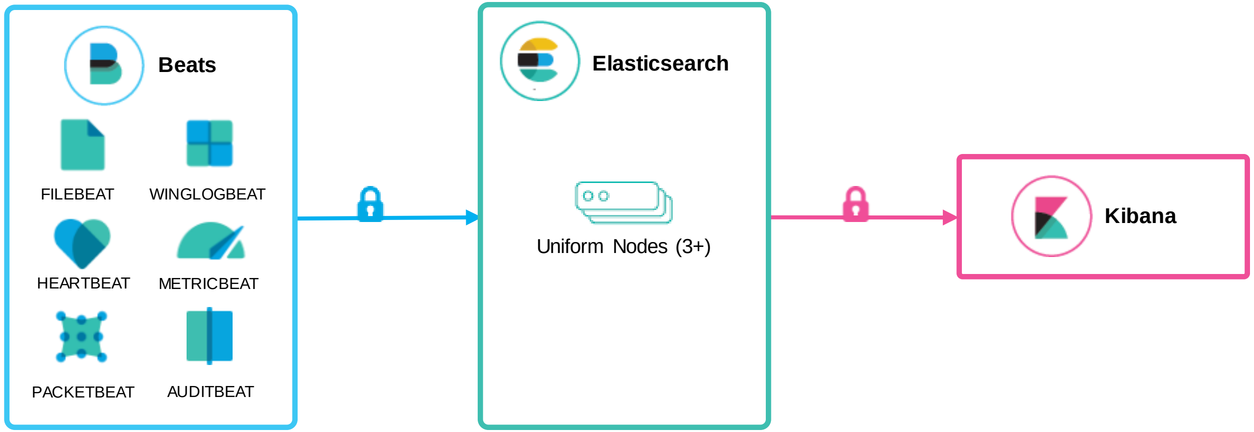
# Logging Architecture

# Basic Processing Pipeline

*Beats, Elasticsearch w/ Ingest Node Pipelines and Kibana*



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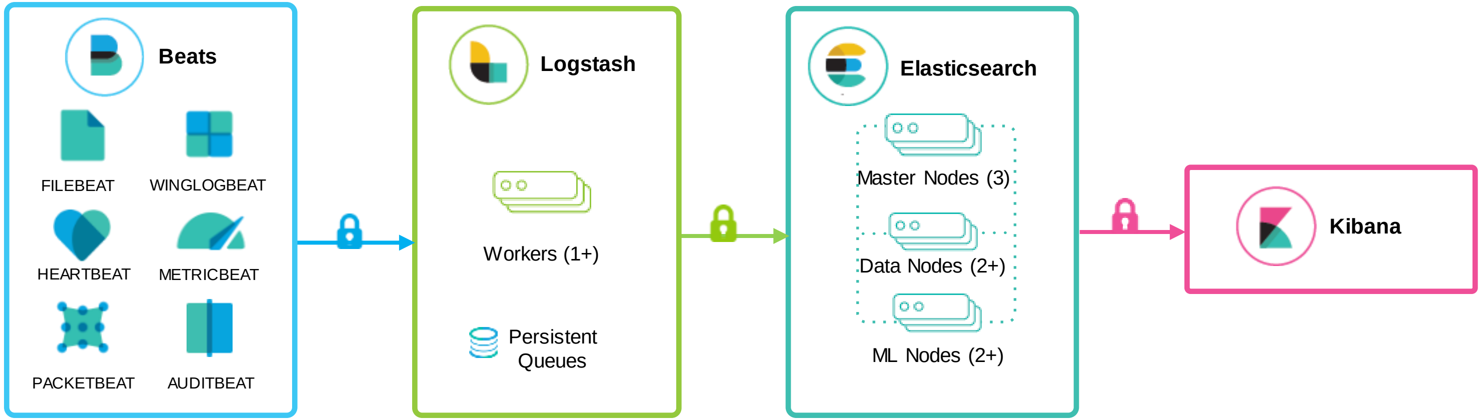
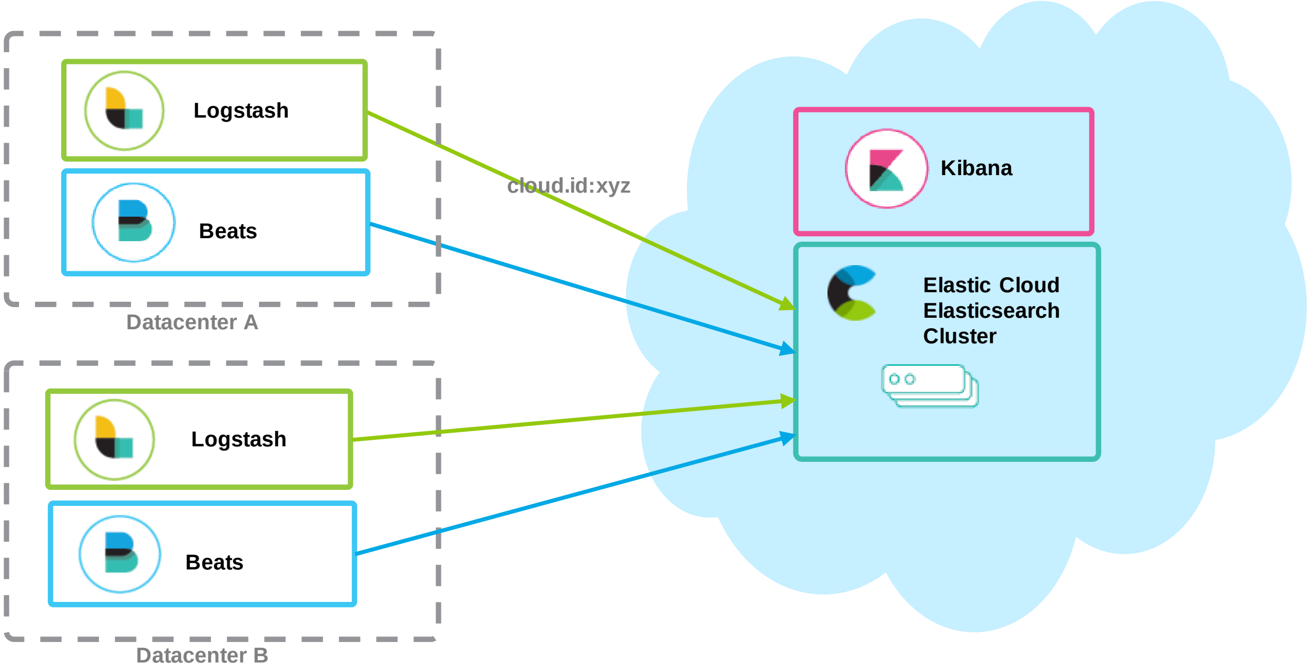
# Advanced Processing and Resiliency

*Adding Logstash processing, differentiated Elasticsearch node types*



# Elastic Cloud Based Logging

*Capturing events securely to Elastic Cloud with easy configuration*



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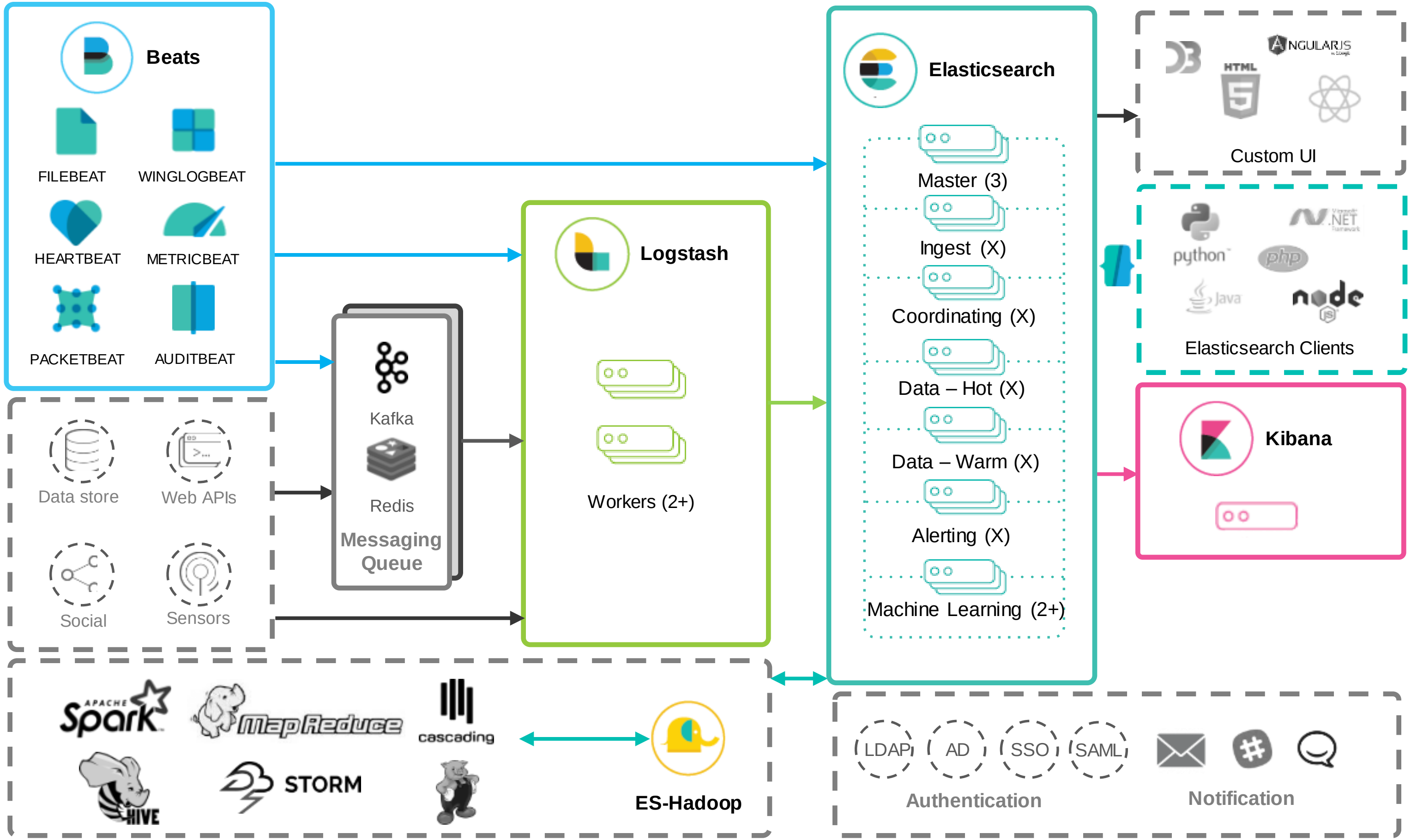
# Deployment in the Enterprise



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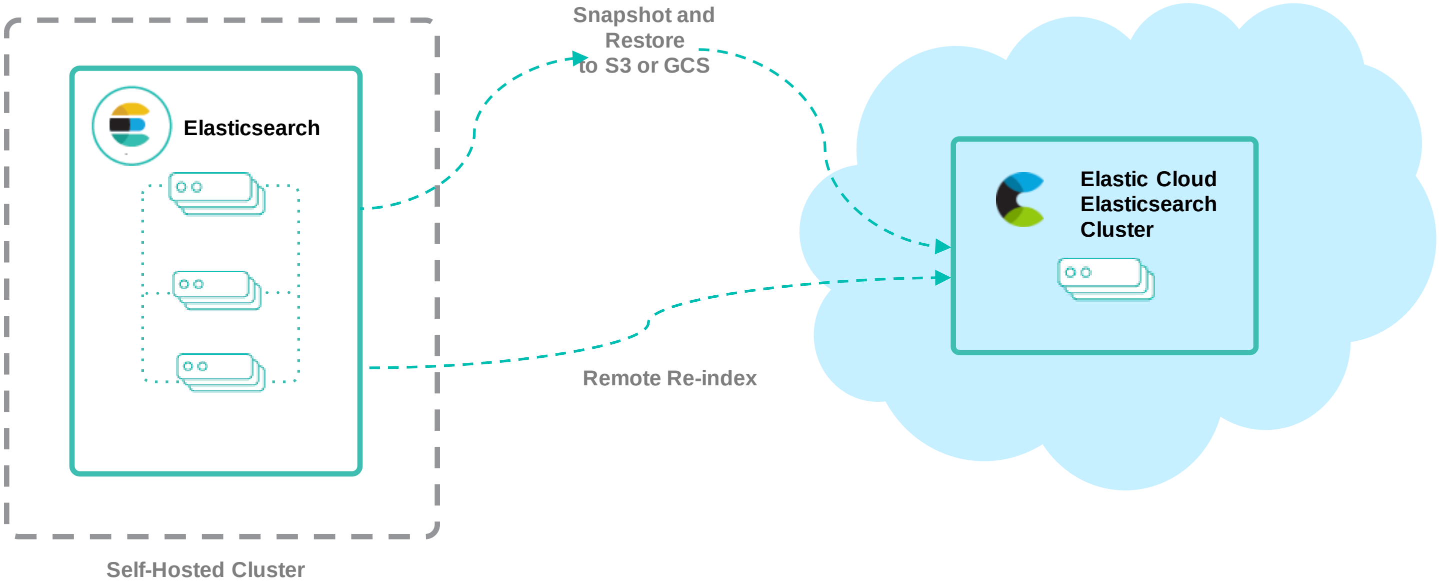
# Options for Migrating from Self-Managed to Elastic Cloud

*Multiple options for easily migrating to Elastic Cloud from self-managed*


Elasticsearch
Snapshot and Restore to S3 or GCS
Elastic Cloud Elasticsearch Cluster
Remote Re-index
Self-Hosted Cluster

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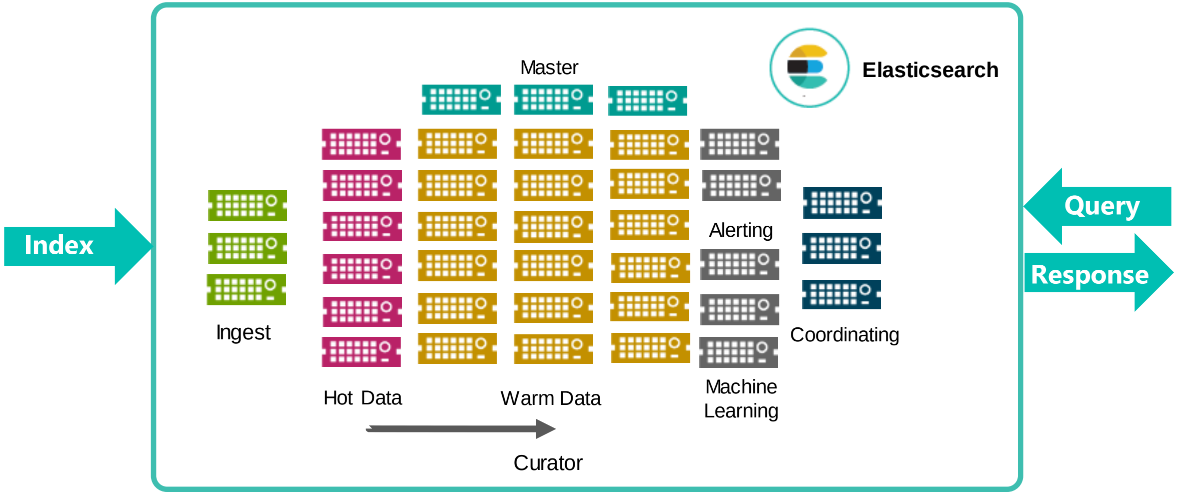
# Inside a Large Elasticsearch Logging Cluster

*Reduce infrastructure costs, isolate workloads, and manage data lifecycle*



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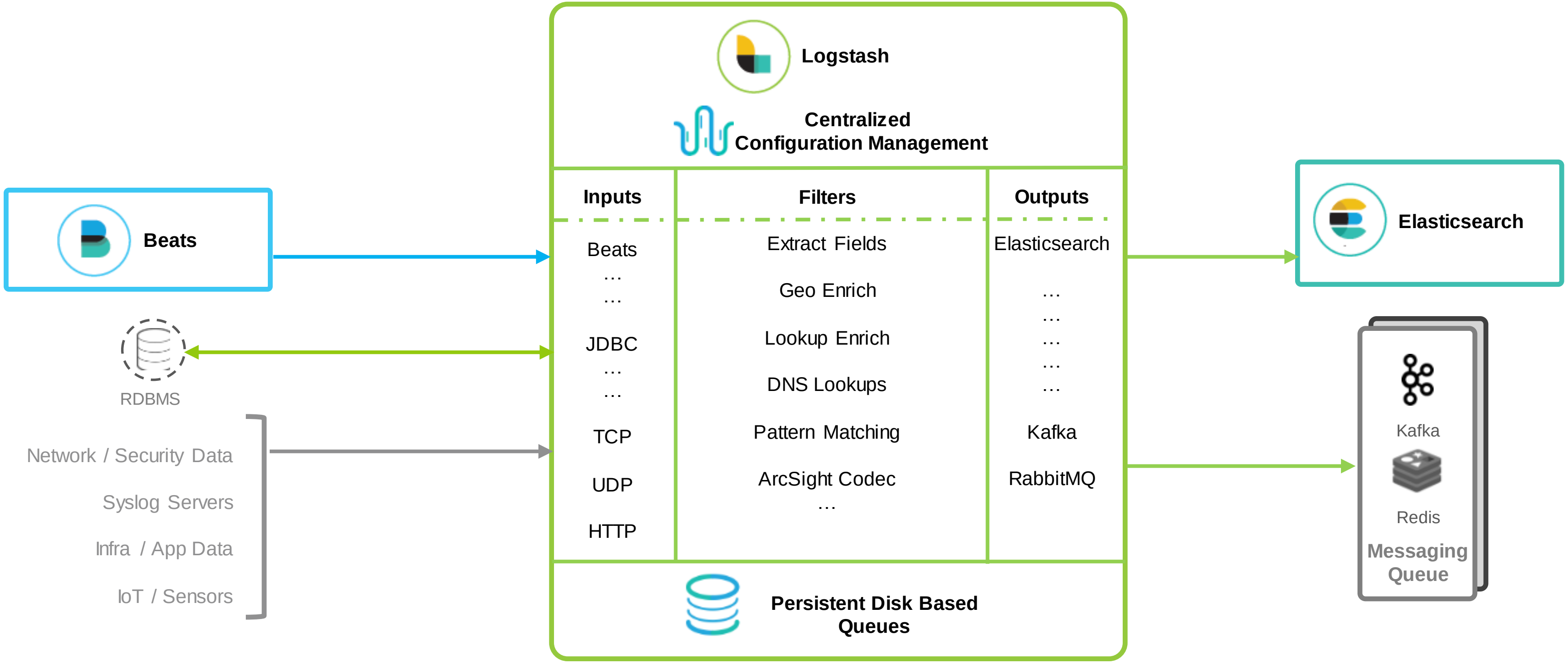
# Variants of Logging Architectures

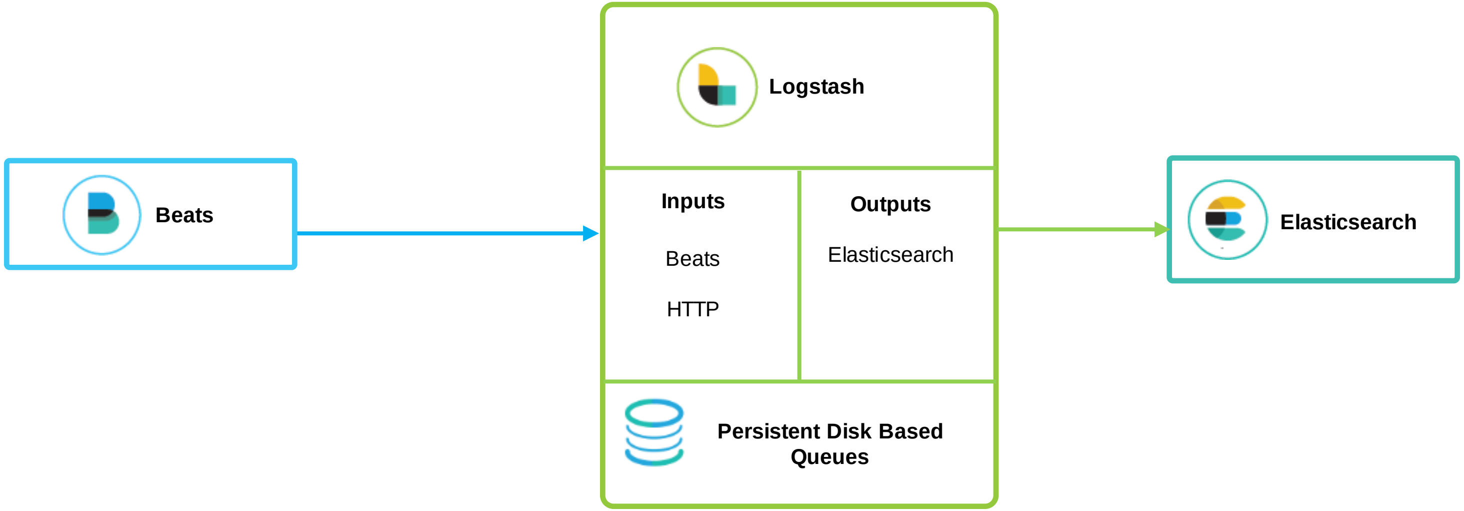
# Inside Logstash

*Example Inputs, Filters and Outputs*



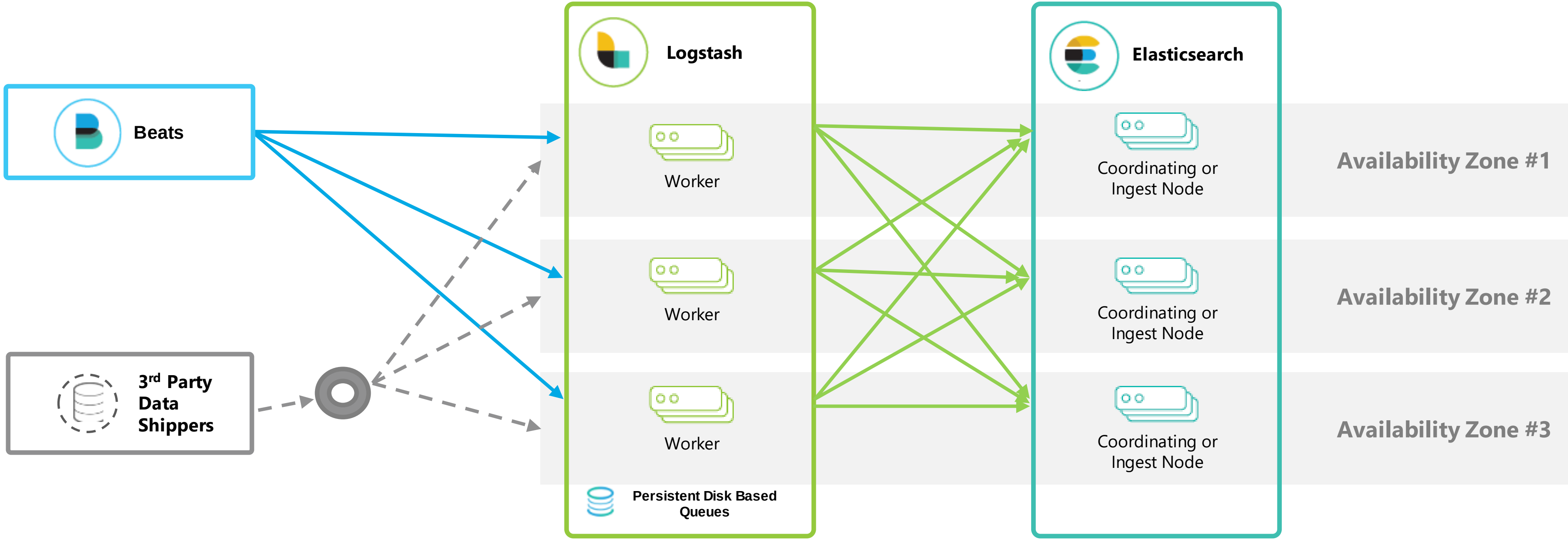
# At-least-once Delivery with Logstash

*Using inputs and outputs with acknowledgement capability*



# Highly Available, Persistent Logstash without an MQ

*Round-robin with persistent Logstash queues responds to backpressure and continues operation with AZ interruption.*



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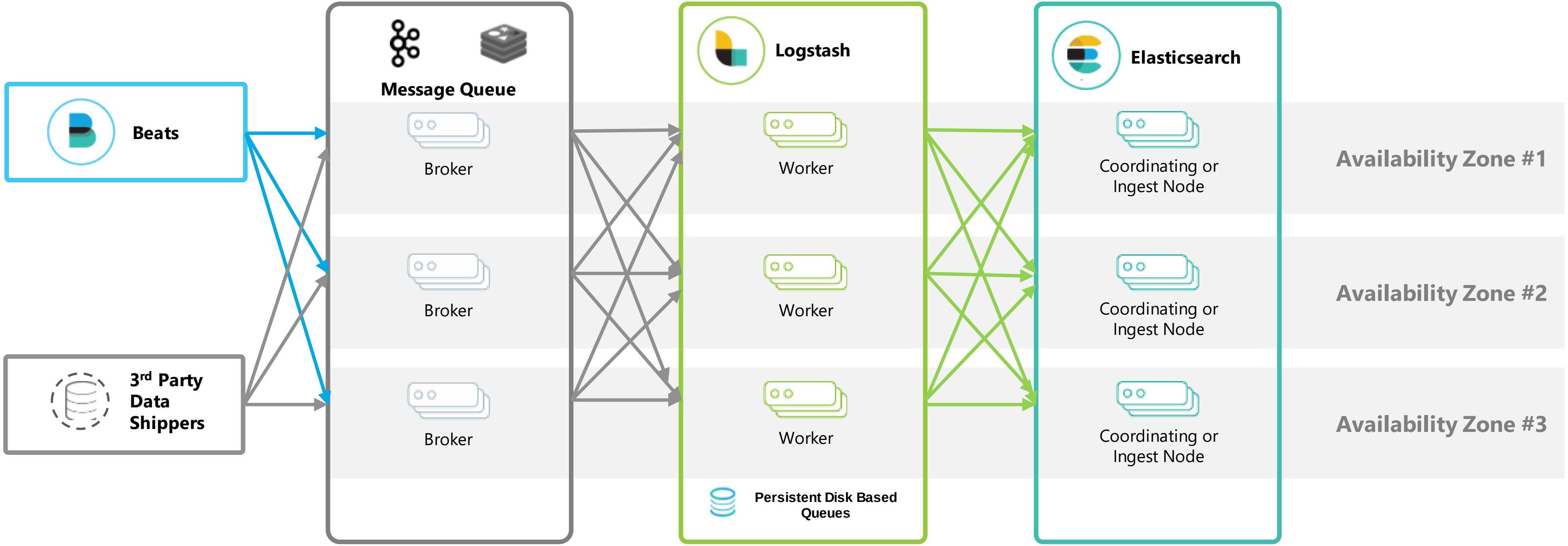
# Highly Available, Persistent Logstash with an MQ

*Adding a message queue allows for replay and queue replication, thereby avoiding message loss in the case of a unrecoverable Logstash disk failure.*



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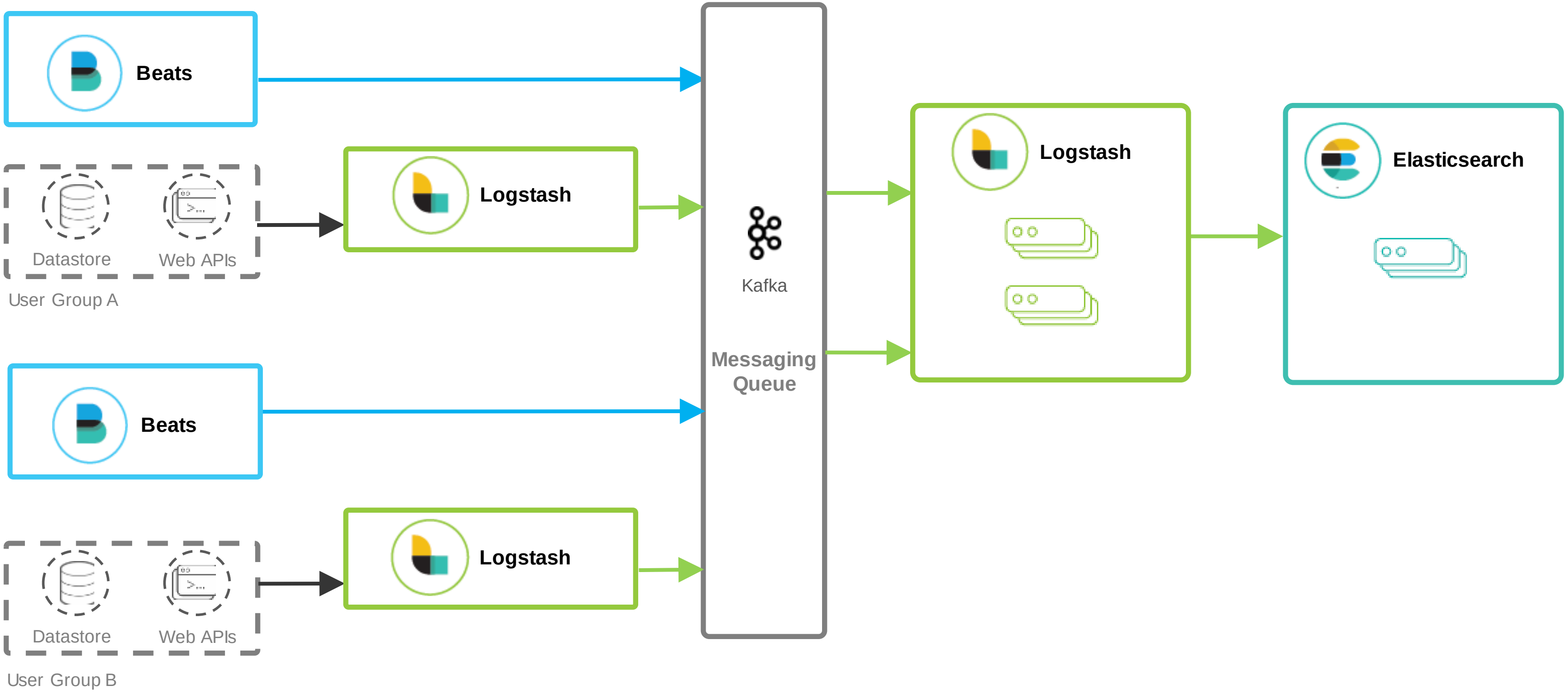
# Control of Logstash Configuration by Group

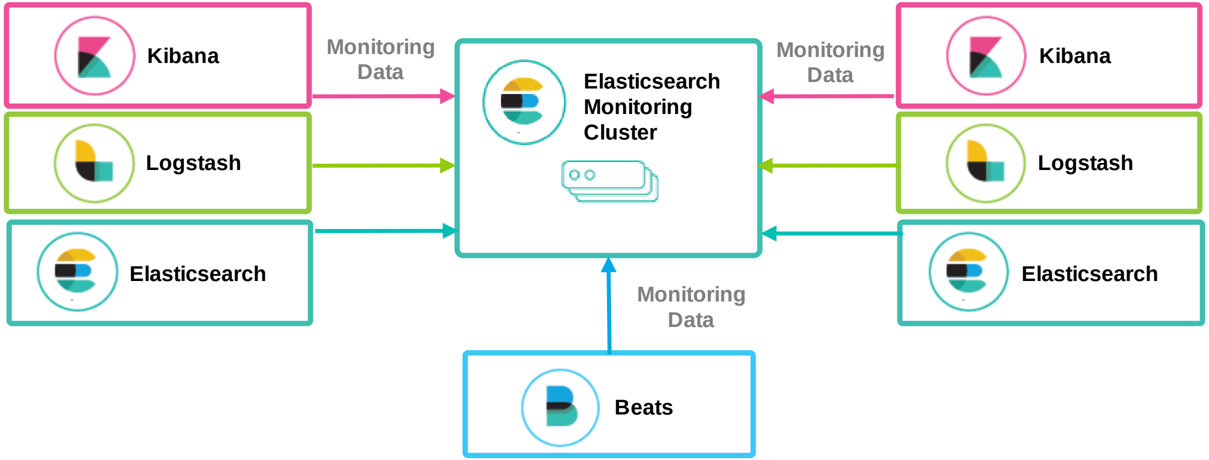
*Distribute Logstash configuration management while controlling central pipeline*



# Deployment Best Practices

# Centralized Monitoring Cluster

*Maintain isolated monitoring cluster for monitoring workload isolation*



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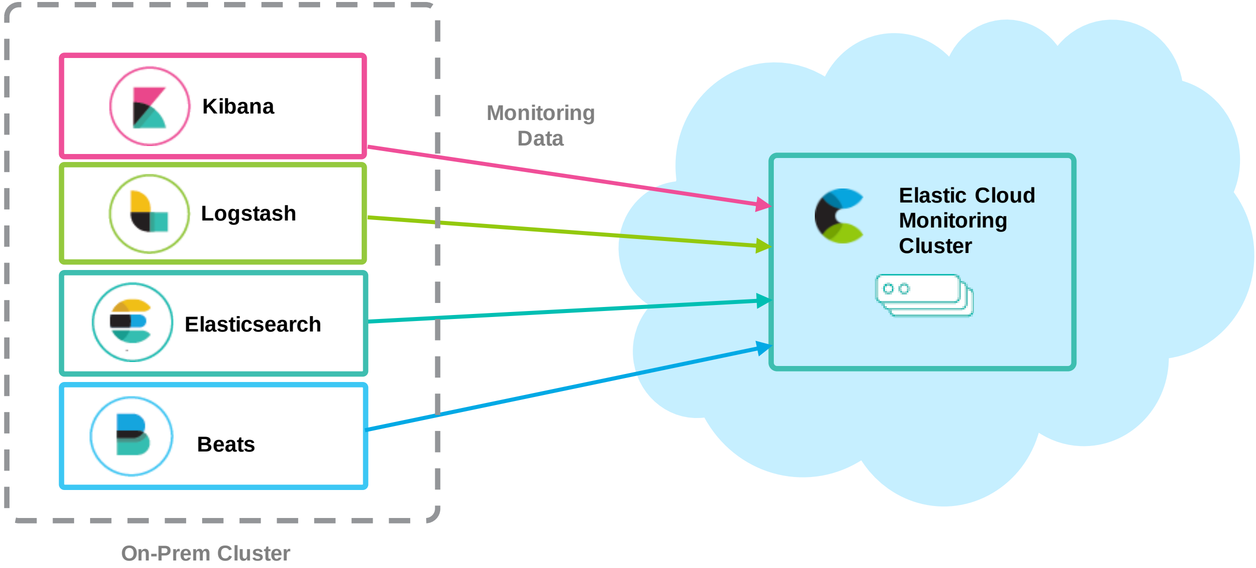
# Cloud Monitoring Cluster

*Opt-in Elastic Cloud cluster for monitoring on-premise stack*



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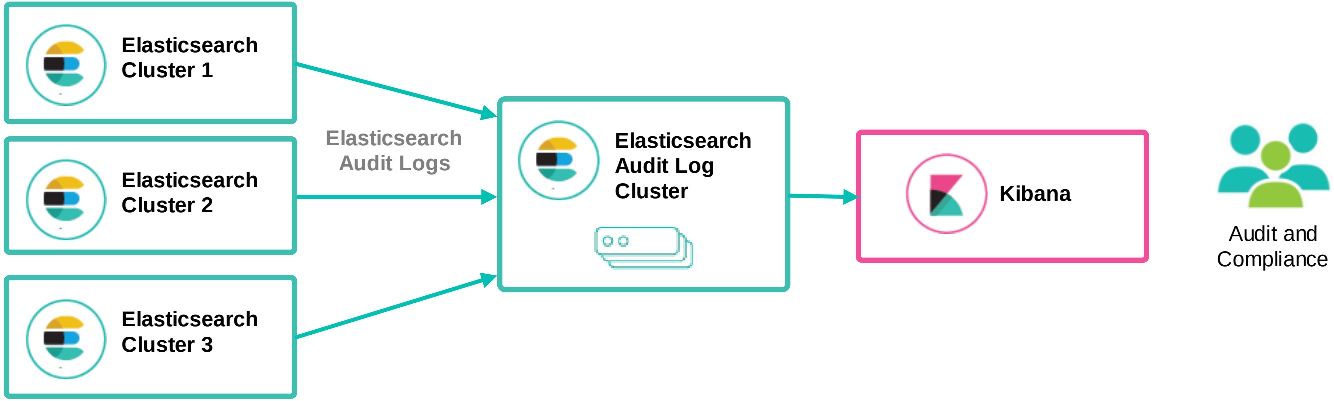
# Isolated Audit Logging Cluster

*Maintain isolated audit logging cluster for increased security and compliance*



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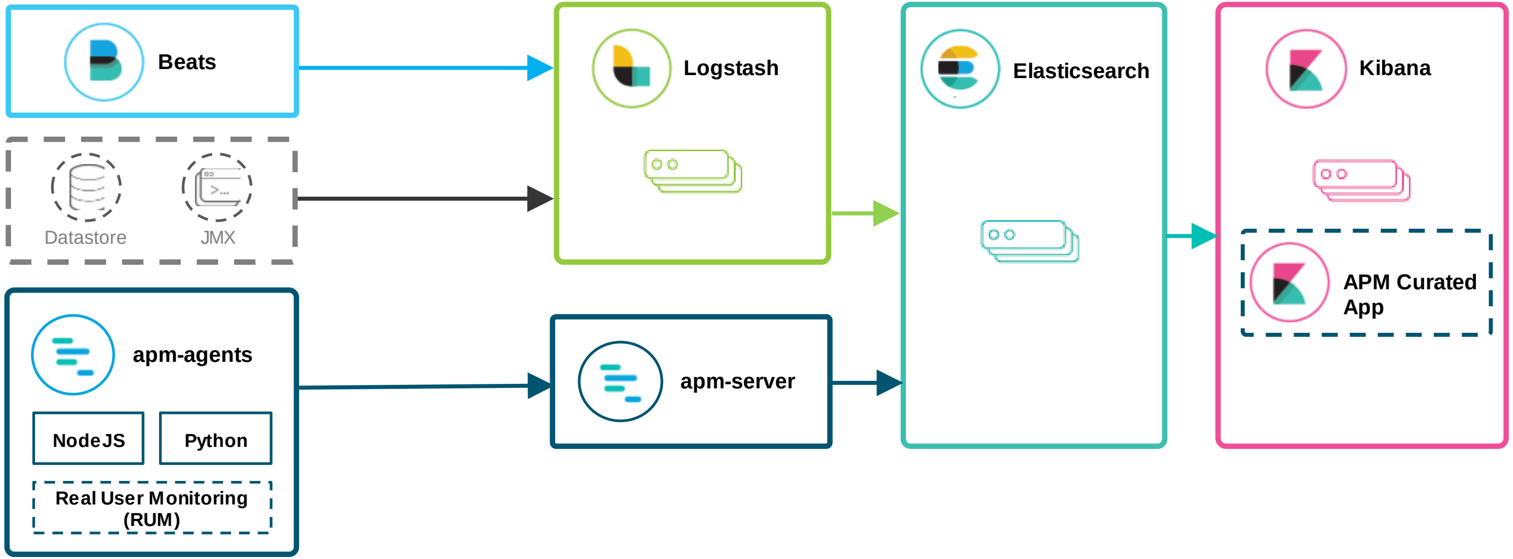
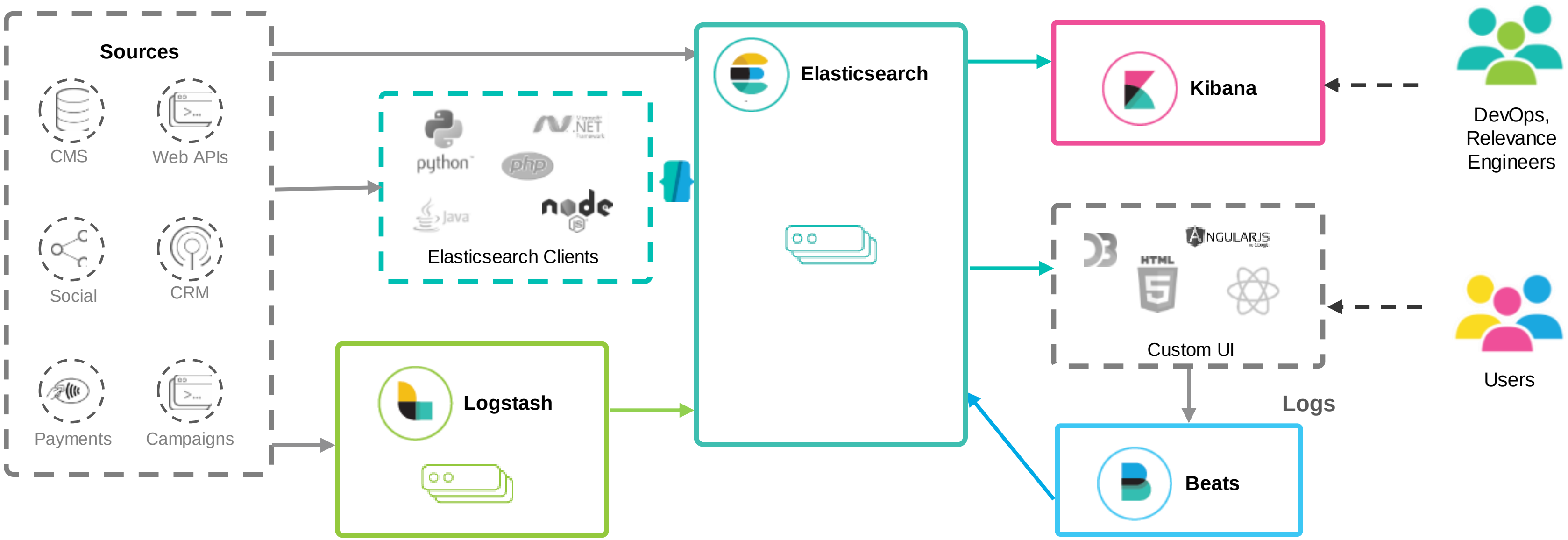
# Use-Case Architectures

# Application Metric Collection with Elastic APM



# Application or Enterprise Search: Compact



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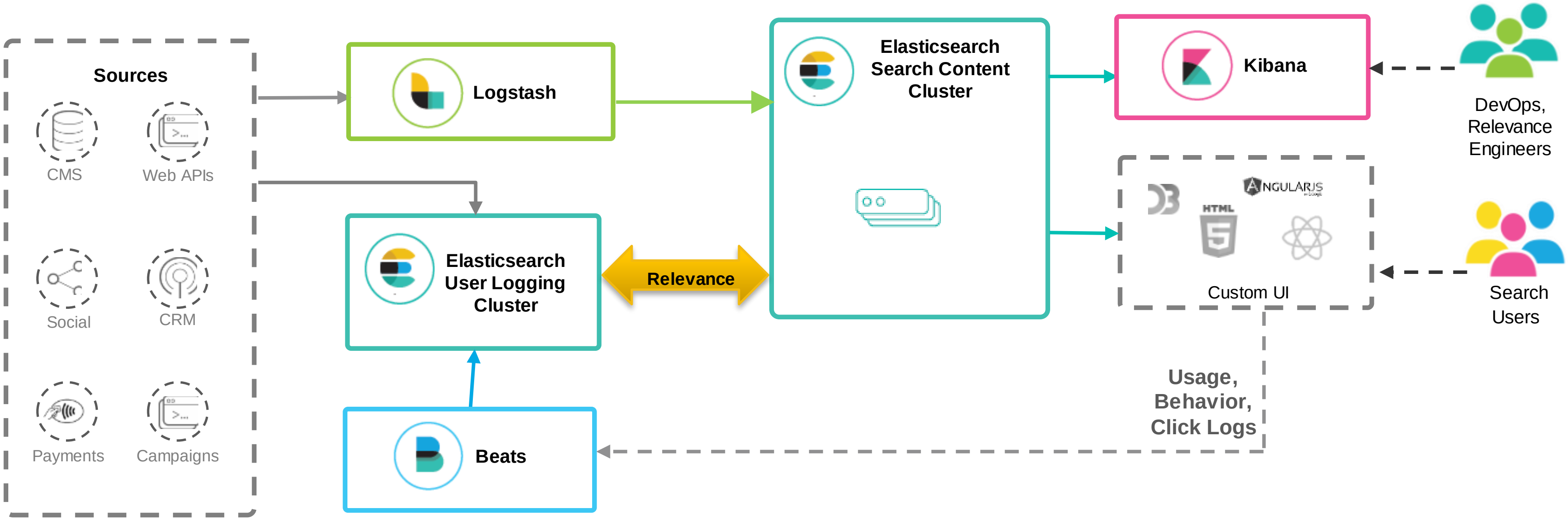
# Application or Knowledge Search: Scaled

*A dedicated cluster for logs/intelligence*


Sources
CMS
Web APIs
Social
CRM
Payments
Campaigns
Logstash
Elasticsearch Search Content Cluster
Kibana
DevOps, Relevance Engineers
Elasticsearch User Logging Cluster
Relevance
ANGULARJS
HTML 5
Custom UI
Search Users
Usage, Behavior, Click Logs
Beats

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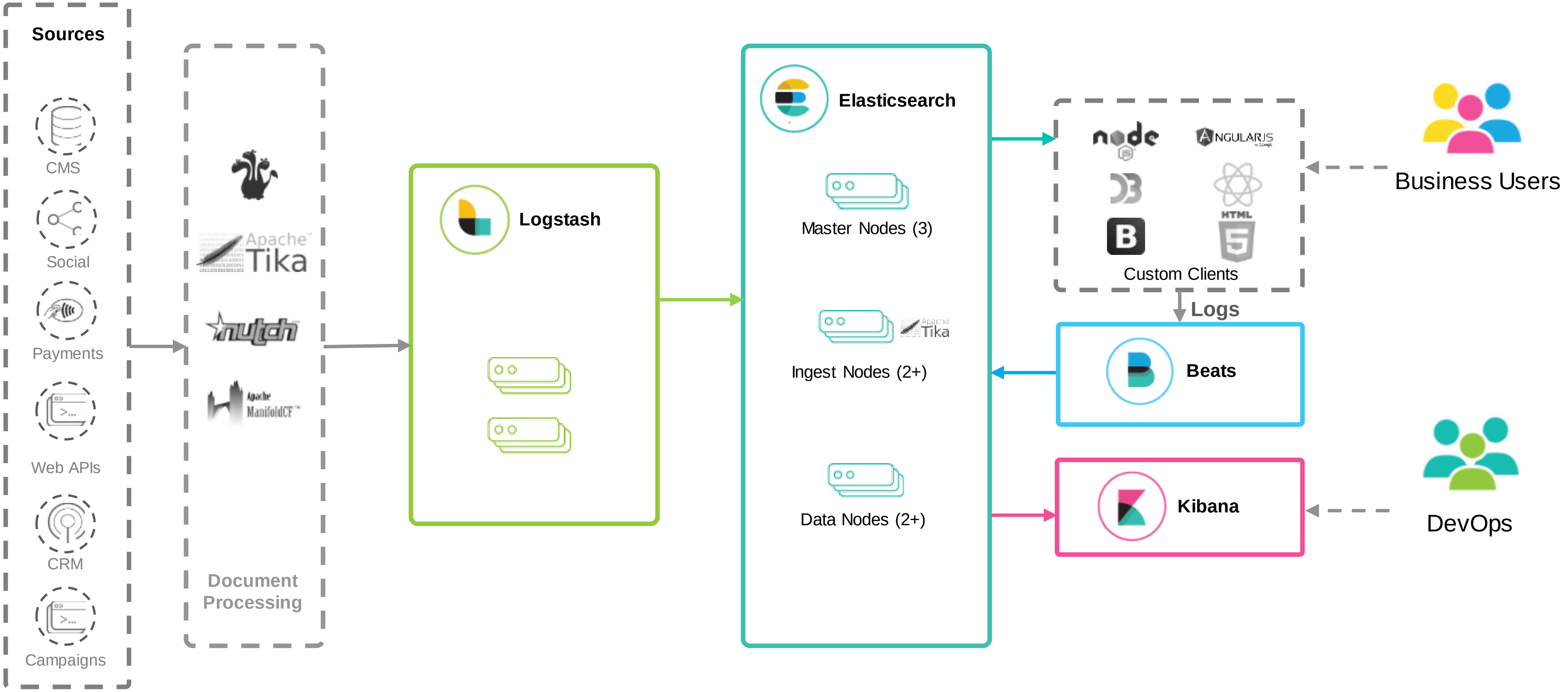
# Enterprise Search: Scaled



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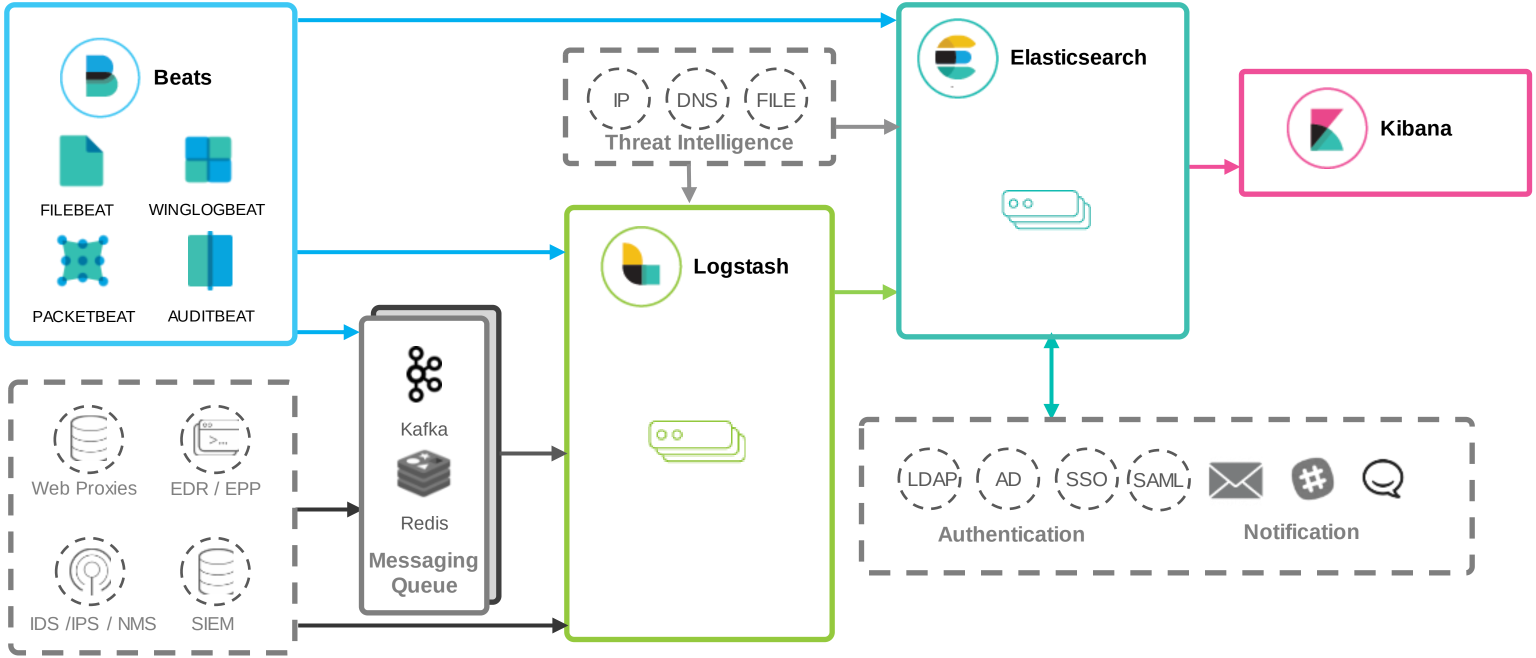
# Security Analytics Enterprise



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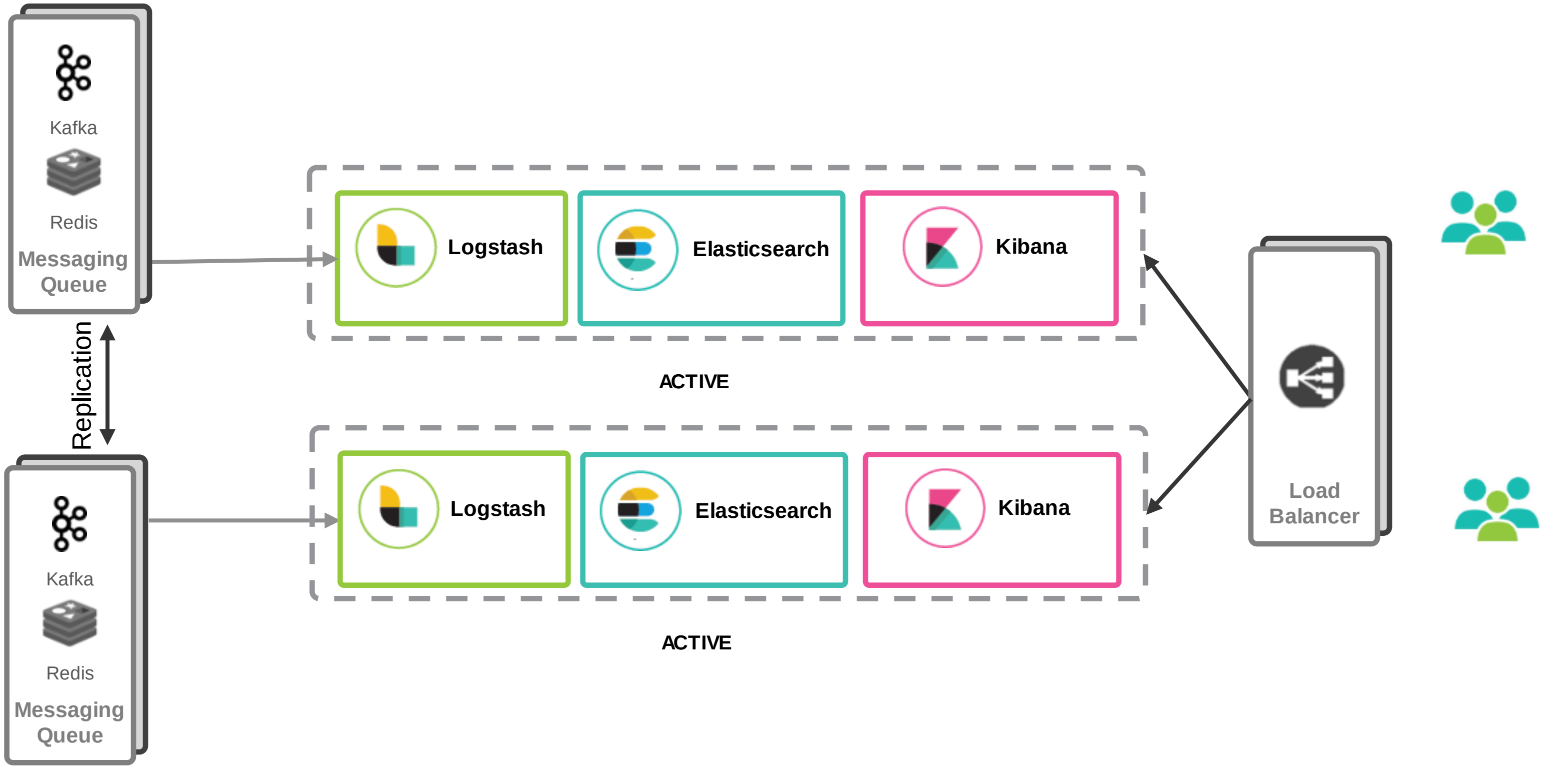
# Multi Data Center

# Multiple Data Centers, Duplicate Data



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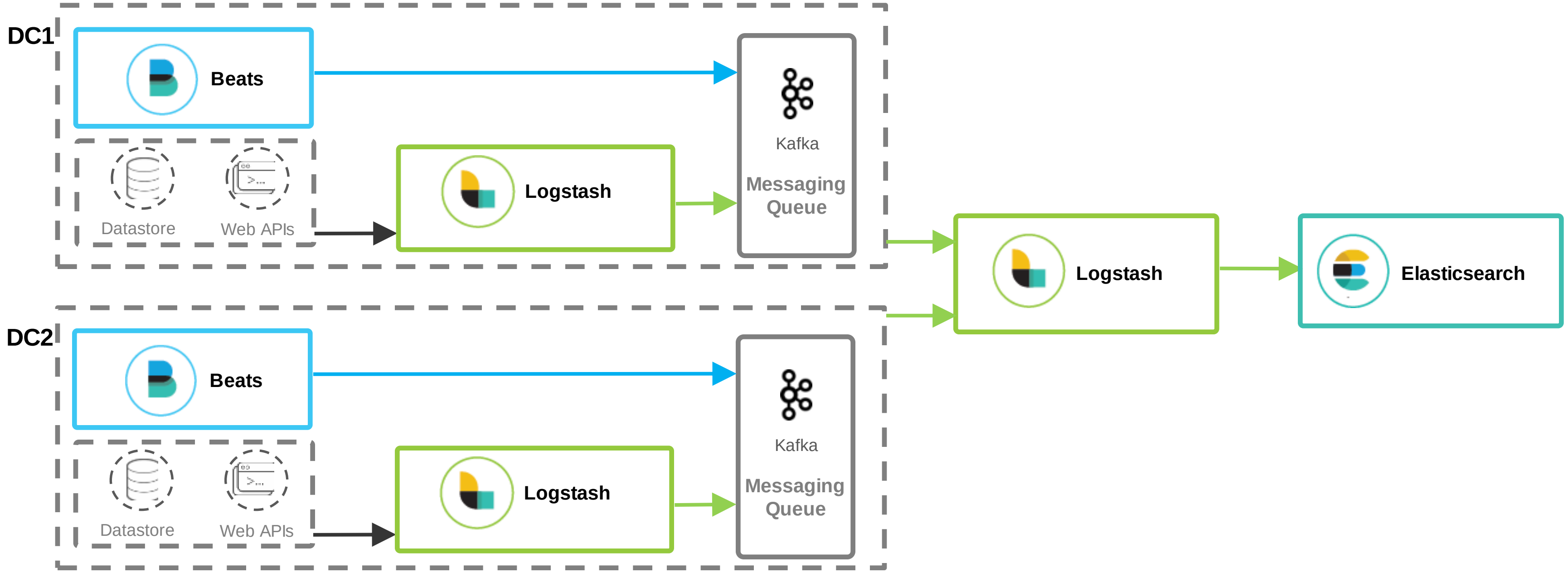
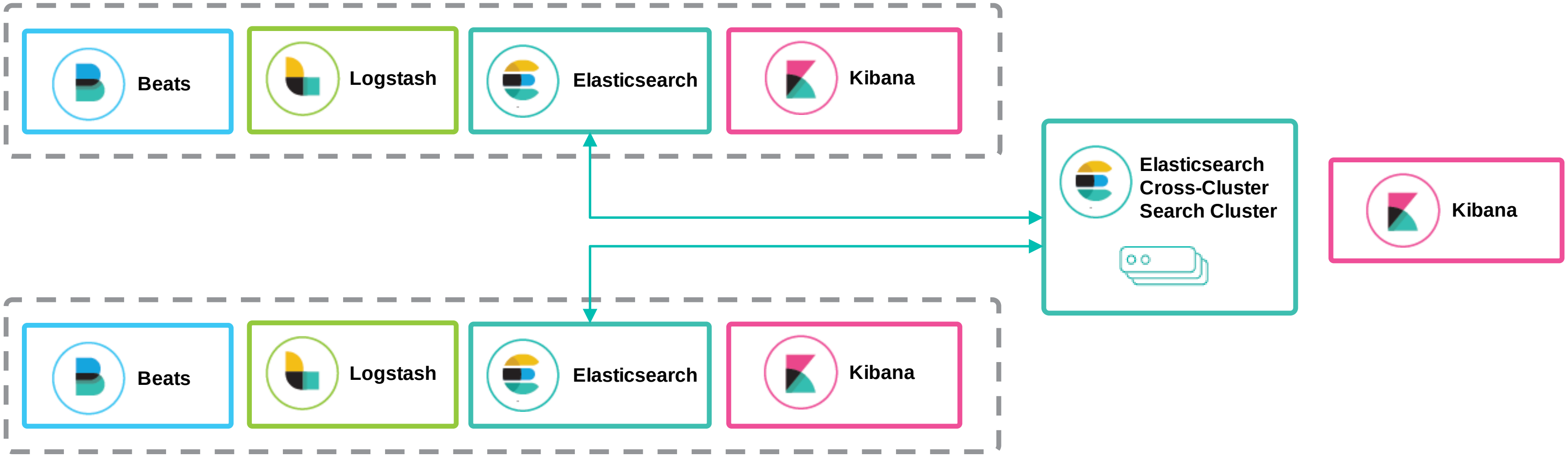
# Multi Data Centers with a Queue at Each DC



# Multi Data Center, Distinct Data and Cross-Cluster Search



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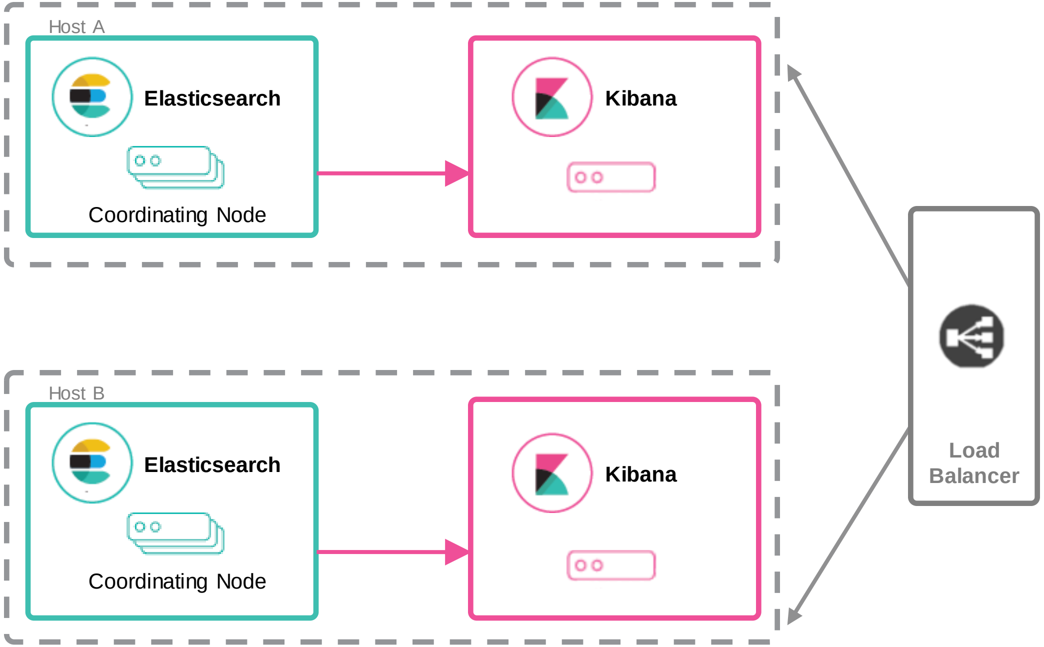
# Scaling Kibana

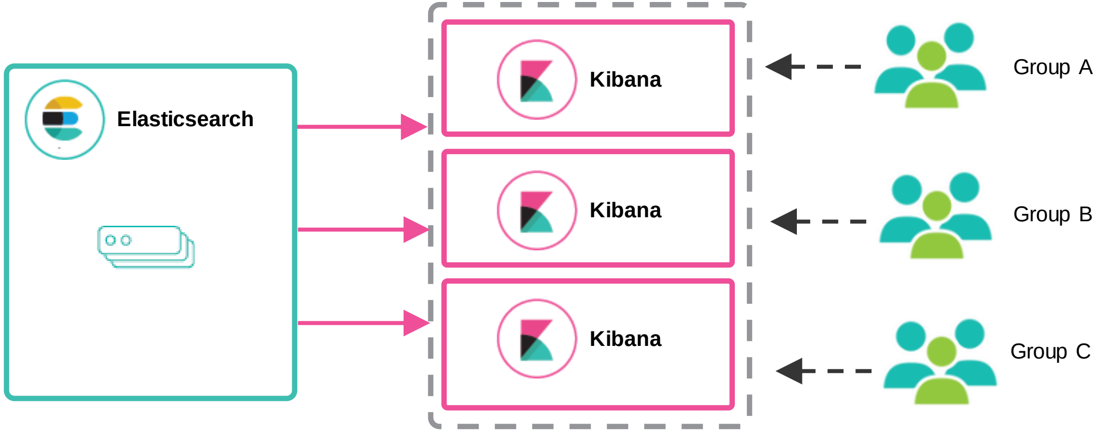
# High Availability

*Pair two coordinating nodes with two independent Kibana nodes*



# Separating Content by Groups

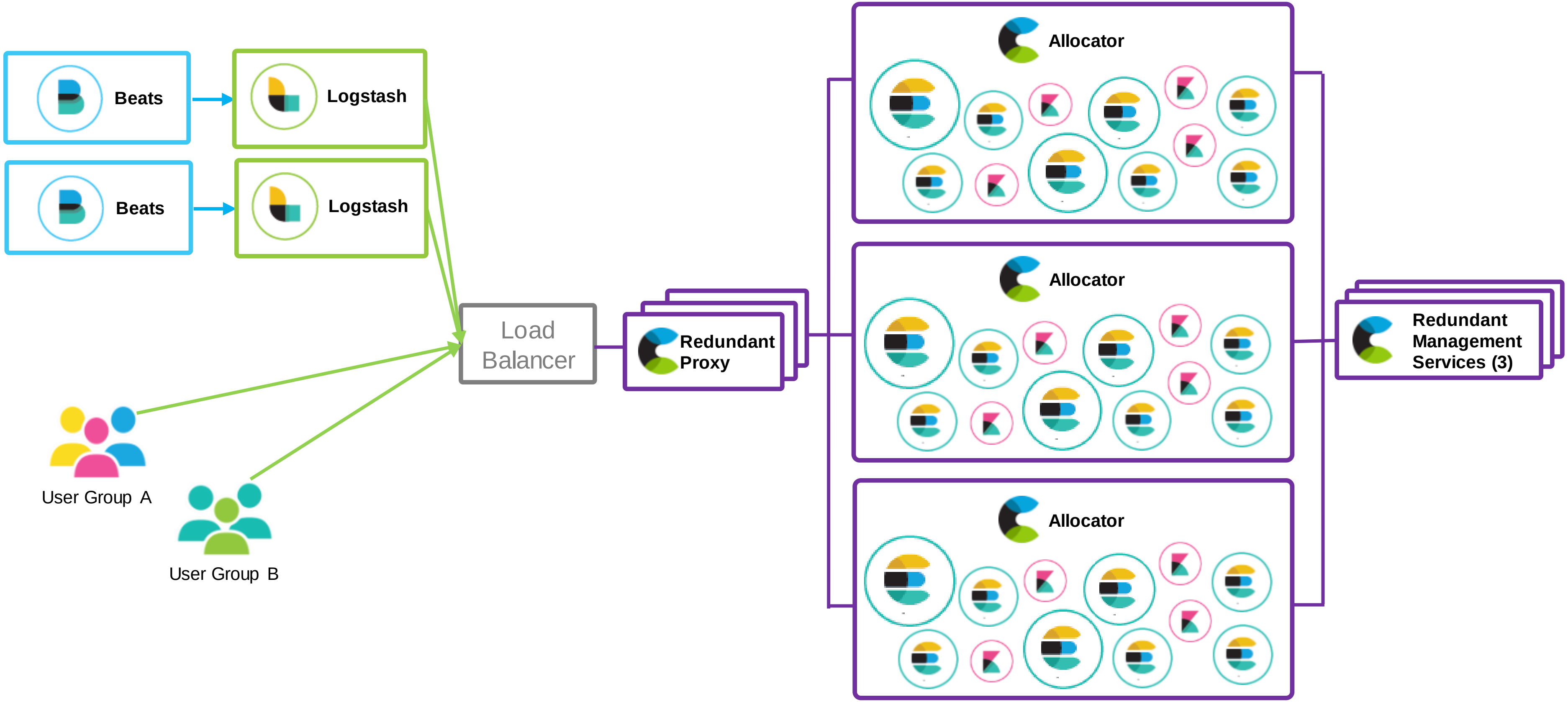
*Isolate user content by group in different Kibana instances*



# Elastic Enterprise

## A SaaS that fits the enterprise

# Elastic Cloud Enterprise



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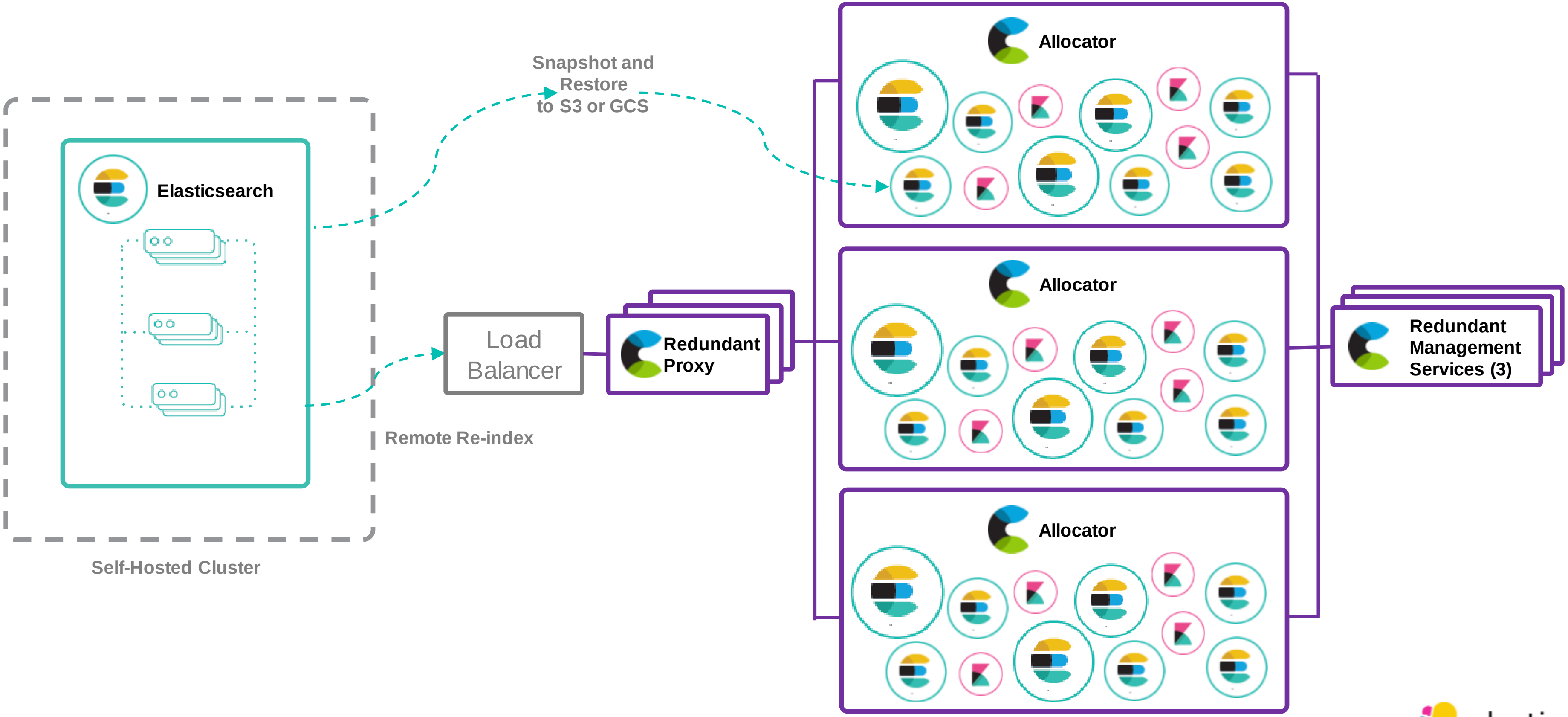
# Moving to Elastic Cloud Enterprise

*Options for easily moving your Elasticsearch cluster*



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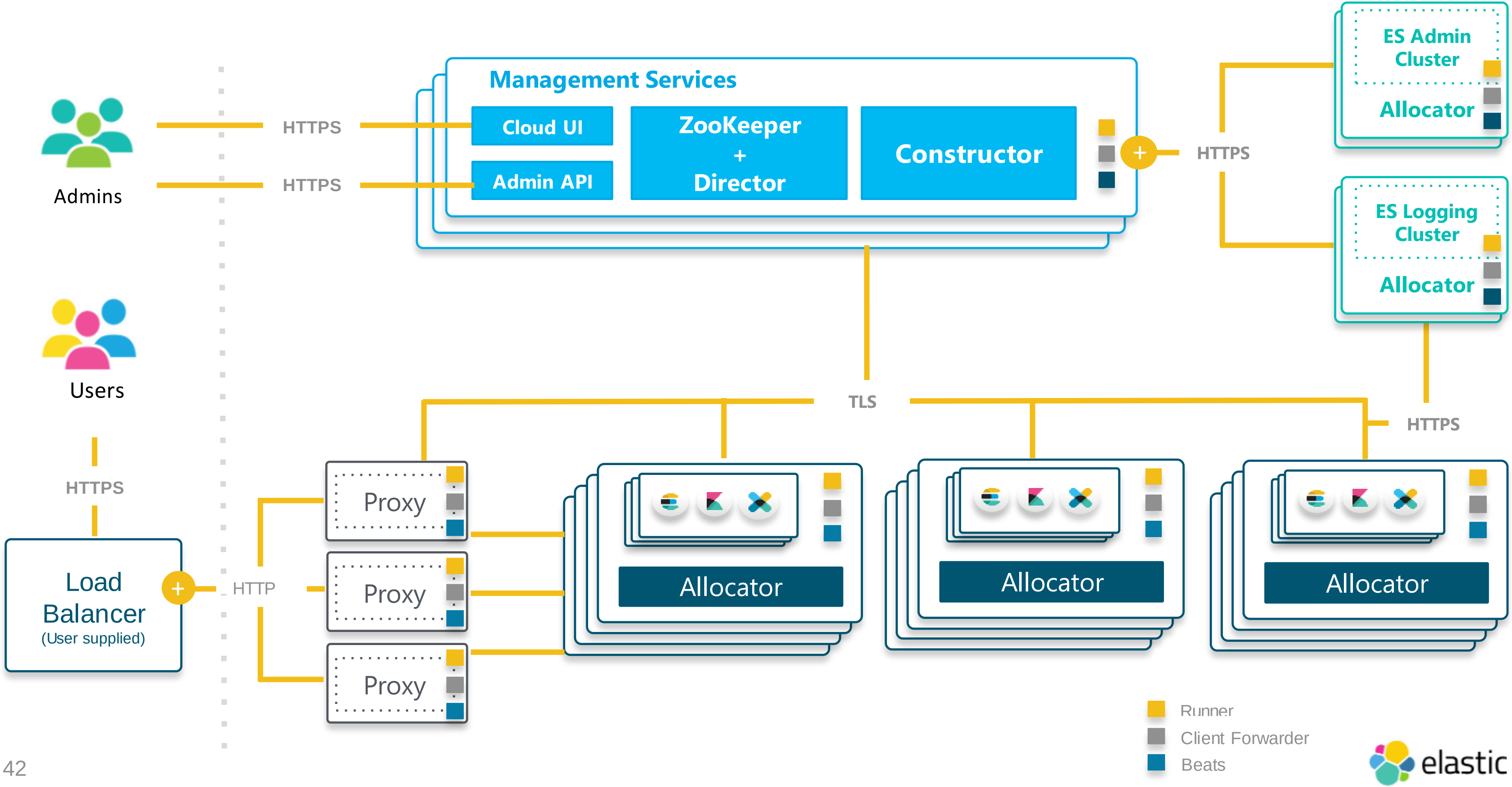
# Elastic Cloud Enterprise high level architecture



# Hardware

# Hardware Recommendations

*For On-Premise or IaaS Cloud Deployments*

**Logstash**

**Heavy Worker**

16 CPU cores
32 GB RAM
Any Storage

6 TB

**Elasticsearch**

**Cool Data (Logging)**

8 CPU cores
64 GB RAM
SSD, SAS, Fast SAN

4 TB

**Elasticsearch**

**Warm/Uniform Data (Logging)**

8 CPU cores
64 GB RAM
SSD, SAS, Fast SAN

2 TB

**Elasticsearch**

**Hot Data (Logging)**

8+ CPU cores
64 GB RAM
SSD

**Kibana**

**Heavy Reporting**

2 CPU cores
8 GB RAM
Any Storage

**Logstash**

**Regular Worker**

8 CPU cores
16 GB RAM
Any Storage

**Elasticsearch**

**Ingest**

8 CPU cores
32 GB RAM
Any Storage

**Elasticsearch**

**Machine Learning**

8 CPU cores
64 GB RAM
Any Storage

1 TB

**Elasticsearch**

**High Throughput Search**

16 CPU cores
32 GB RAM
SSD

**Kibana**

**Regular**

2 CPU cores
4 GB RAM
Any Storage

**Logstash**

**Light Worker**

4 CPU cores
8 GB RAM
Any Storage

**Elasticsearch**

**Tribe or Cross-Cluster**

4 CPU cores
16 GB RAM
Any Storage

**Elasticsearch**

**Coordinating**

4 CPU cores
16 GB RAM
Any Storage

**Elasticsearch**

**Master**

4 CPU cores
8 GB RAM
Any Storage

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** Data volumes are guidelines*

# Hardware Recommendations

*For Elastic Cloud Enterprise Deployments*

- *Data volumes are guidelines*
- *Multi data tiers available from ECE 1.2*

| | SEARCH 1:16 | HOT 1:32 | WARM OR UNIFORM 1:64 | COOL 1:96 |
|---|---|---|---|---|
| Logstash<br>**Heavy Worker**<br>16 CPU cores<br>32 GB RAM<br>Any Storage | 8 TB<br>Elastic Cloud Enterprise<br>**Heavy Instance (Search)**<br>64+ CPU cores<br>512 GB RAM<br>SSD | 16 TB<br>Elastic Cloud Enterprise<br>**Heavy Instance (Hot)**<br>64+ CPU cores<br>512 GB RAM<br>SSD | 32 TB<br>Elastic Cloud Enterprise<br>**Heavy Instance (Warm)**<br>64 CPU cores<br>512 GB RAM<br>SSD, SAN, SATA | 48 TB<br>Elastic Cloud Enterprise<br>**Heavy Instance (Cool)**<br>64 CPU cores<br>512 GB RAM<br>SSD, SAN, SATA |
| Logstash<br>**Regular Worker**<br>8 CPU cores<br>16 GB RAM<br>Any Storage | 4 TB<br>Elastic Cloud Enterprise<br>**Regular Instance (Search)**<br>32+ CPU cores<br>256 GB RAM<br>SSD | 8 TB<br>Elastic Cloud Enterprise<br>**Regular Instance (Hot)**<br>32+ CPU cores<br>256 GB RAM<br>SSD | 16 TB<br>Elastic Cloud Enterprise<br>**Regular Instance (Warm)**<br>32 CPU cores<br>256 GB RAM<br>SSD, SAN, SATA | 24 TB<br>Elastic Cloud Enterprise<br>**Regular Instance (Cool)**<br>32 CPU cores<br>256 GB RAM<br>SSD, SAN, SATA |
| Logstash<br>**Light Worker**<br>4 CPU cores<br>8 GB RAM<br>Any Storage | 2 TB<br>Elastic Cloud Enterprise<br>**Light Instance (Search)**<br>16+ CPU cores<br>128 GB RAM<br>SSD | 4 TB<br>Elastic Cloud Enterprise<br>**Light Instance (Hot)**<br>16+ CPU cores<br>128 GB RAM<br>SSD | 8 TB<br>Elastic Cloud Enterprise<br>**Light Instance (Warm)**<br>16 CPU cores<br>128 GB RAM<br>SSD, SAN, SATA | 12 TB<br>Elastic Cloud Enterprise<br>**Light Instance (Cool)**<br>16 CPU cores<br>128 GB RAM<br>SSD, SAN, SATA |

| CONTROL PLANE |
|---|
| Elastic Cloud Enterprise<br>**Dedicated Director + Coordinator + Proxy**<br>4 CPU cores<br>32 GB RAM<br>Any Storage |
| Elastic Cloud Enterprise<br>**Dedicated Proxy**<br>4 CPU cores<br>16 GB RAM<br>Any Storage |

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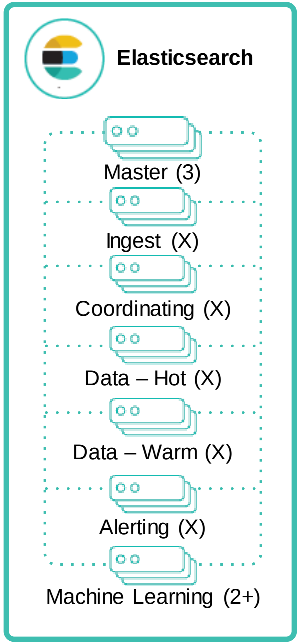
# Inside a Cluster

# Elasticsearch Node Types

*Nodes can play one or more roles, for workload isolation and scaling*



- Master Nodes
  - Control the cluster, requires a minimum of 3, one is active at any given time
- Data Nodes
  - Hold indexed data and perform data related operations
  - Differentiated Hot and Warm Data nodes can be used
- Ingest Nodes
  - Use ingest pipelines to transform and enrich before indexing
- Coordinating Nodes
  - Route requests, handle search reduce phase, distribute bulk indexing
  - All nodes function as coordinating nodes
- Alerting Nodes
  - Run alerting jobs
- Machine Learning Nodes
  - Run machine learning jobs

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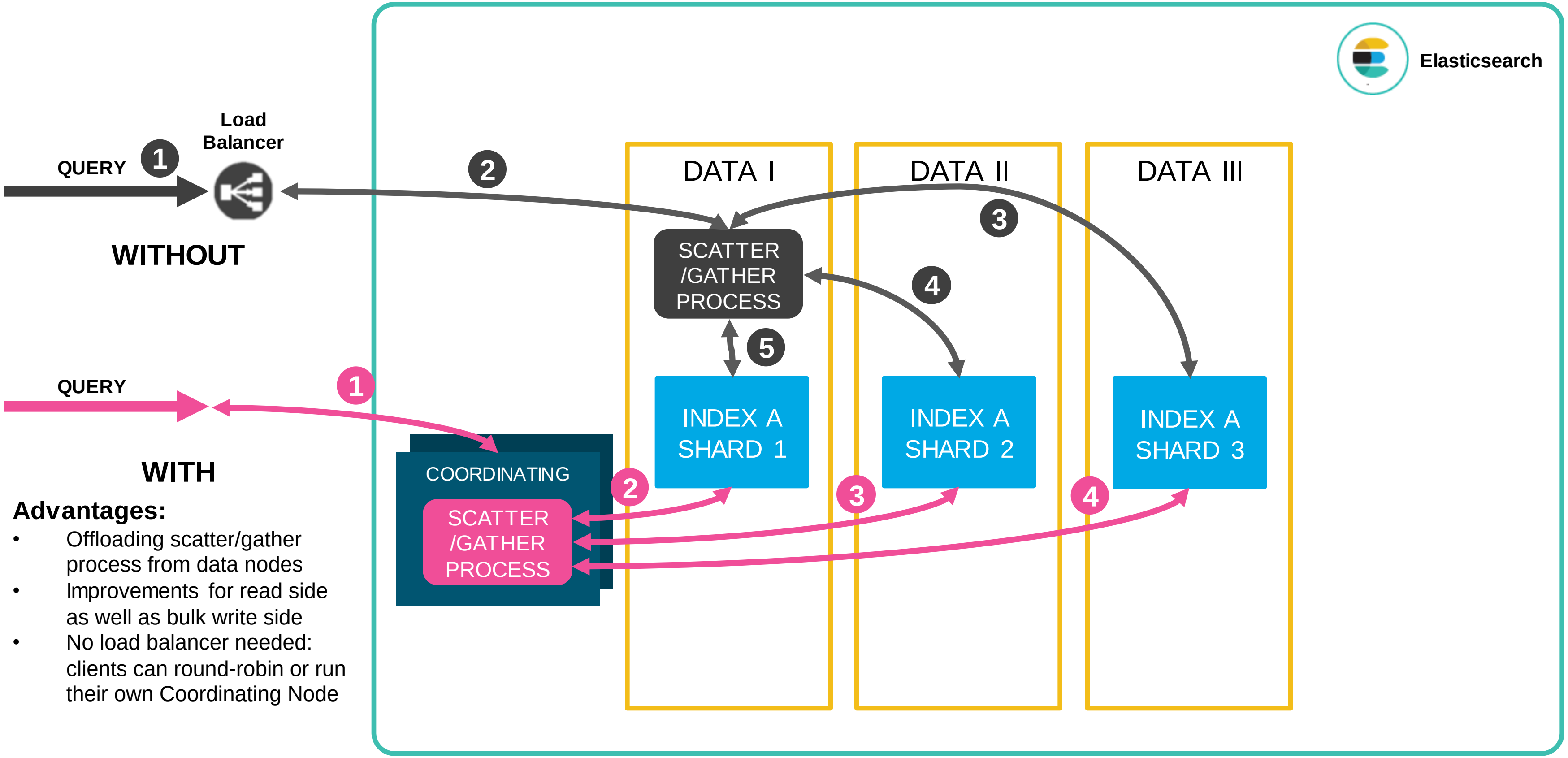
# Elasticsearch Coordinating Nodes Detail



**Advantages:**

- Offloading scatter/gather process from data nodes
- Improvements for read side as well as bulk write side
- No load balancer needed: clients can round-robin or run their own Coordinating Node

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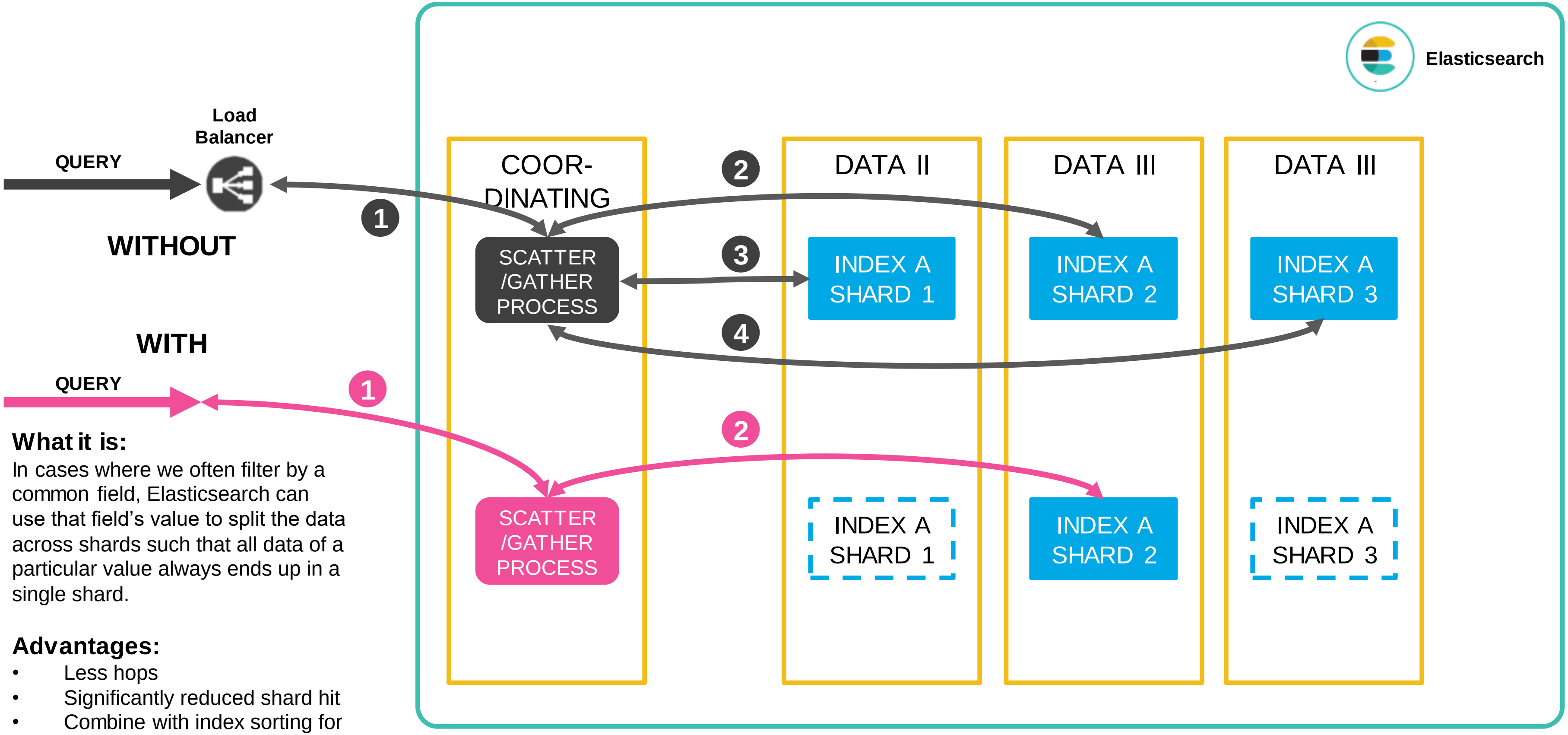
# Elasticsearch Custom Routing



**What it is:**
In cases where we often filter by a common field, Elasticsearch can use that field's value to split the data across shards such that all data of a particular value always ends up in a single shard.

**Advantages:**

- Less hops
- Significantly reduced shard hit
- Combine with index sorting for crazy-fast searching