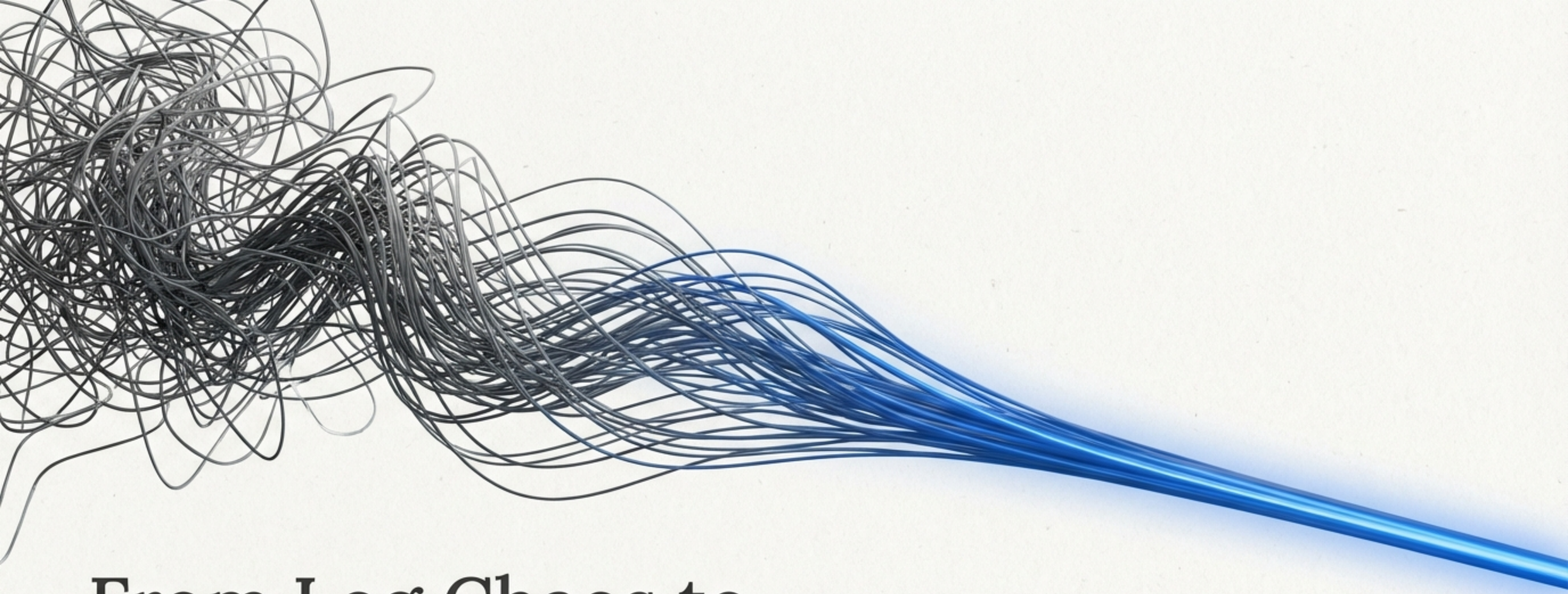


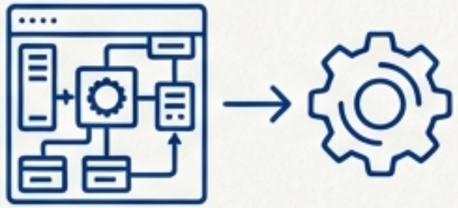
From Log Chaos to Strategic Insight

A Unified Enterprise Logging Strategy

The Vision: What Does Success Look Like?

Faster Issue Investigation

Drastically reduce mean time to resolution (MTTR) by allowing developers to trace issues across all services from a single interface.



Reduced Operational Overhead

Eliminate the need to maintain multiple, disparate logging solutions and remove direct logging to production databases.

Data for All Stakeholders

Provide a single source of truth for logs that serves Developers, Business Analysts, and Managers with tailored dashboards and alerts.

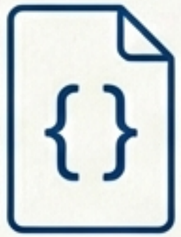
Future-Proof Architecture

Implement a scalable, cloud-native architecture that supports our current stack (Java, C#, Kubernetes) and is flexible enough for future platforms.

Our Guiding Principles

Centralized

All application logs flow into a single, unified logging platform.



Structured

Logs use a consistent JSON format instead of free-form text to enable reliable parsing and querying.

Searchable

The system must provide powerful, fast querying for developers, BAs, and managers alike.

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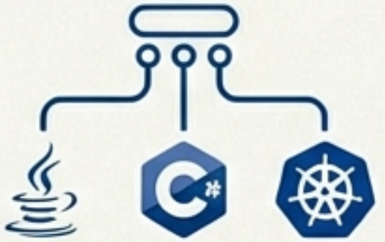
Scalable

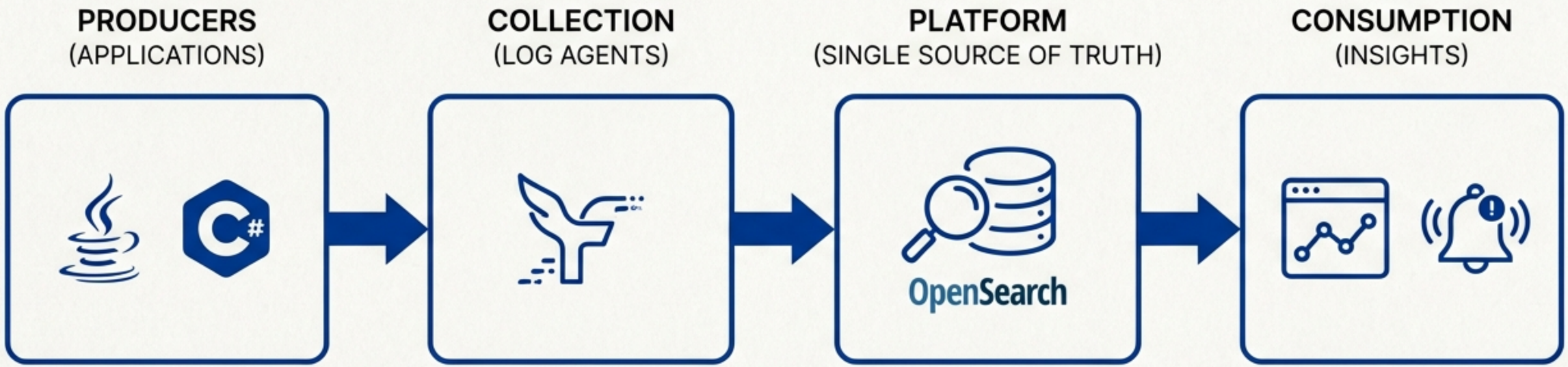
The platform must handle high log volume with minimal performance overhead for our applications.



Flexible

The solution must work seamlessly across our entire technology stack, including Java, C#, and Kubernetes.

The Recommended Architecture: Our Blueprint for Success



Applications log structured JSON to stdout/stderr

Lightweight agents collect, parse, and enrich logs

A centralized platform for ingestion, storage, and search

Dashboards, alerts, and powerful query interfaces for all users

The Cornerstone: A Common Log Schema

A consistent, structured log format is the shared language that unlocks the full power of centralized logging.

```
{
  "timestamp":    "...",
  "logLevel":     "INFO",
  "serviceName":  "...",
  "environment":  "...",
  "traceId":      "...",
  "userId":       "...",
  "message":      "...",
  "errorStack":   "..."
}
```

This schema ensures every log entry is searchable, filterable, and can be correlated across the entire request lifecycle.

The Crossroads: Should We Build a Custom Service or Adopt an Industry Standard?

Build a Custom Solution

‘Flexible, customizable, and under our control.’

Adopt a Proven Platform

‘Battle-tested, community-supported, and feature-rich.’

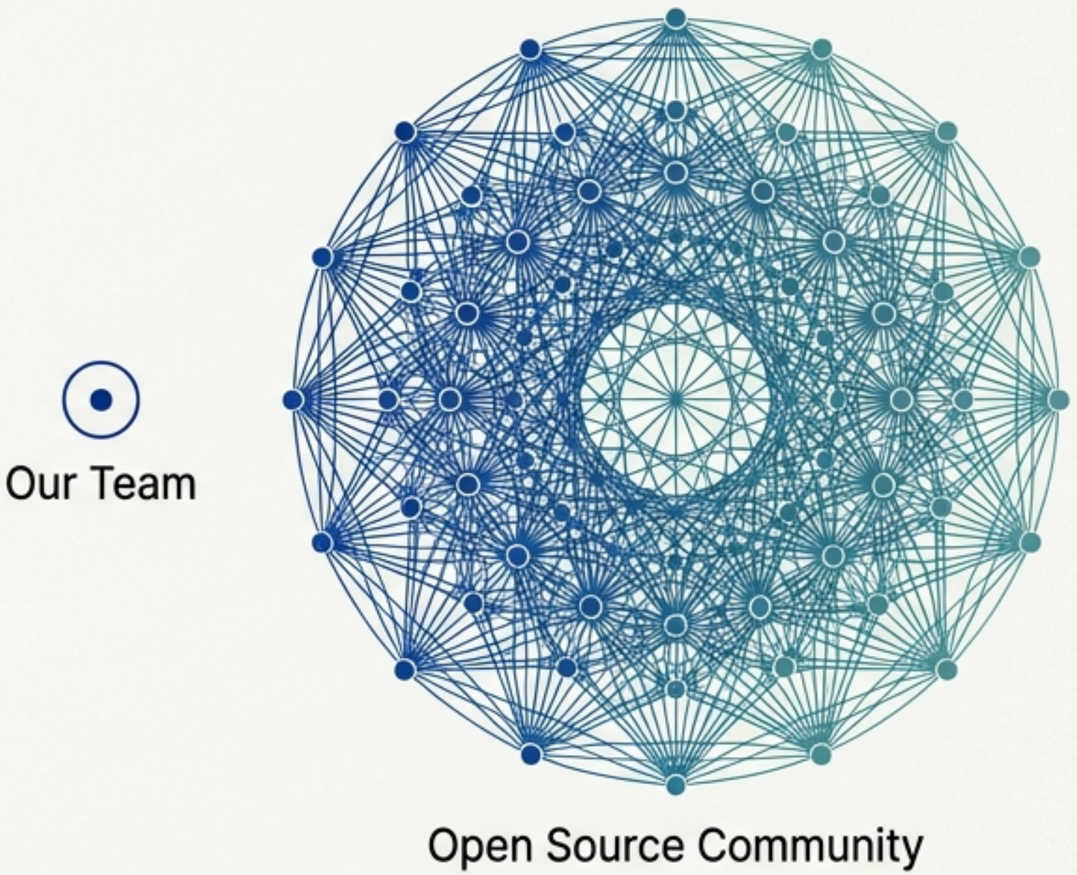
Let's examine the trade-offs of reinventing a solved problem.

The “Build” Trap: Reinventing a Highly Complex System

Building a custom logging service is a classic architectural trap. What seems simple on the surface hides immense complexity.

A production-grade system must handle:

- Millions of events per second
- Bursty traffic & log storms
- Backpressure to protect applications
- Schema evolution and management
- Efficient indexing & sub-second search
- Retention policies & tiered storage
- Role-Based Access Control (RBAC)
- User-friendly dashboards & alerting

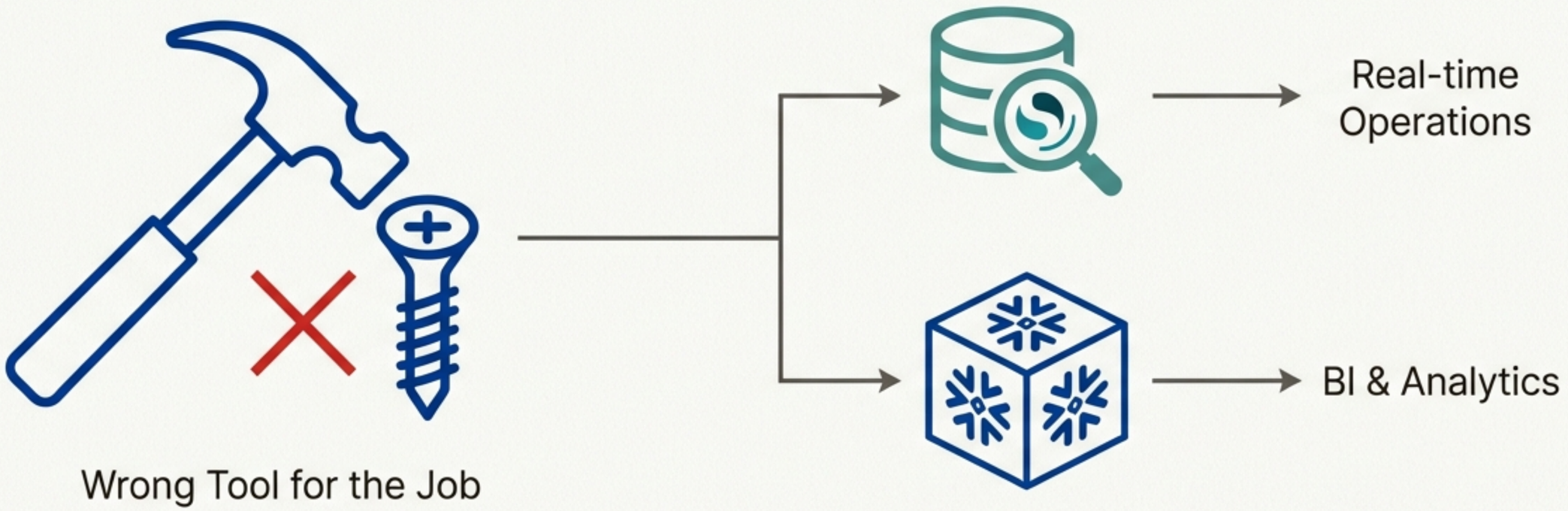


Open-source tools took hundreds of engineers years to get this right. Our focus should be on building business value, not foundational infrastructure.

The “Snowflake” Trap: The Right Tool for the Wrong Job

Snowflake is an exceptional platform for data analytics, business intelligence, and long-term data warehousing.

However, is it suited for the high-frequency writes and near-real-time search required for operational logging and incident response?



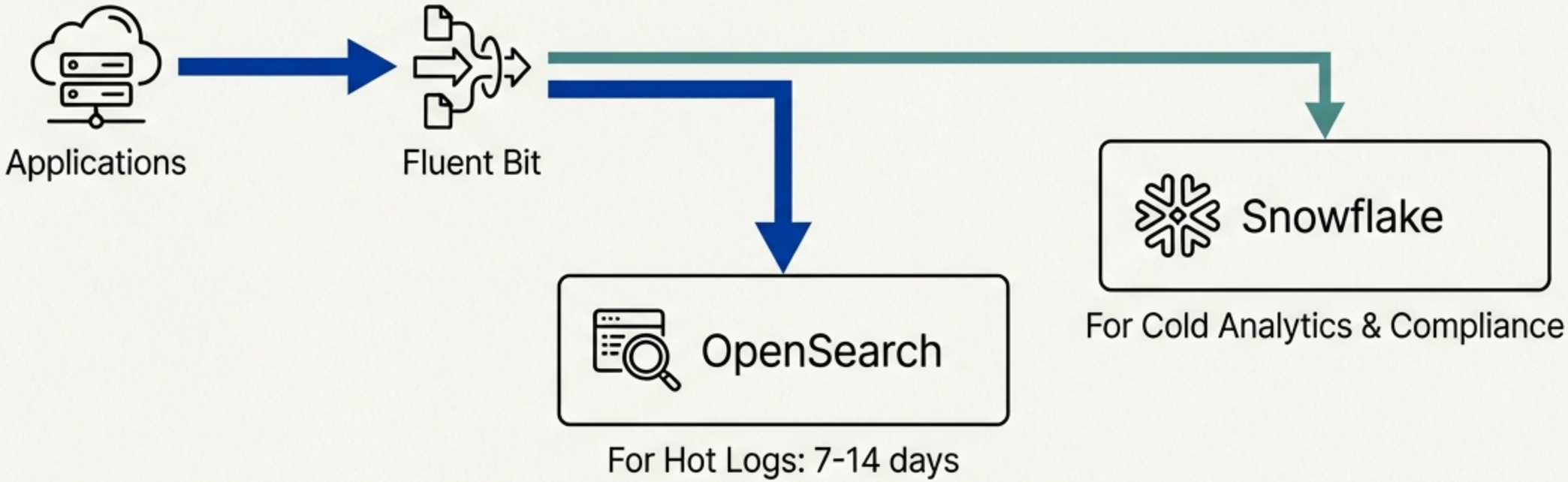
Wrong Tool for the Job

Real-time Operations vs. Historical Analytics: A Capabilities Mismatch

Requirement	Logging System (ELK/OpenSearch)	Snowflake
High-Frequency Writes	✓ Optimized	✗ Not Ideal
Near-Real-Time Search	✓ Seconds / Milliseconds	✗ Minutes
Free-Text Search	✓ Native	✗ Limited
Complex JSON Indexing	✓ Native	⚠ Possible, but Costly
Backpressure Handling	✓ Built-in	✗ Requires External Logic
Real-Time Dashboards	✓ Native	⚠ BI-Oriented
Real-Time Alerting	✓ Native	✗ Not Natively Real-time

The Best of Both Worlds: A Pragmatic Hybrid Architecture

The industry-standard pattern is to use the right tool for each job. A dedicated logging platform handles real-time needs, while Snowflake can be used for long-term analytics and compliance.



Hot Tier (OpenSearch)

Fast, interactive debugging and real-time dashboards for incident response.

Cold Tier (Snowflake)

Cost-effective long-term storage, deep historical analysis, and BI reporting.

Unlocking Value for Every Stakeholder

For Developers

- Trace requests across all microservices with a single query.
- View full, formatted stack traces instantly.
- Stop writing and maintaining custom logging code for SQL tables.

For Business Analysts

- Access pre-built dashboards for key business flows (e.g., failed transactions).
- Track volume trends and processing times without needing developer assistance.
- Query on human-readable business fields like `orderId` and `customerId`.

For Managers

- Monitor high-level KPIs like system health and error rates in real time.
- Receive automated alerts on SLA/SLO breaches.
- Gain insight into system performance and stability trends.

Our Practical 6-Step Migration Plan

1. **Define and Ratify the Common Log Schema**
   Agree on the universal JSON standard for all teams.
2. **Instrument Applications**
   Update Java (Logback/Log4j2) and C# (Serilog/NLog) apps to produce JSON logs to stdout.
3. **Deploy Log Agents**
   Roll out Fluent Bit/Filebeat as a DaemonSet in Kubernetes and as services on servers.
4. **Stand Up Central Platform**
   Provision and configure the chosen OpenSearch/ELK cluster.
5. **Migrate & Decommission**
   Gradually shift services to the new platform and decommission the legacy SQL Server-based logging.
6. **Build Shared Dashboards & Alerts**
   Create the initial set of high-value dashboards for all key stakeholders.

Our Recommendation: Clarity and Conviction

DO THIS

- ✓ Use OpenSearch / ELK or Loki for centralized logging.
- ✓ Standardize on a common JSON log schema.
- ✓ Deploy Fluent Bit / Filebeat for universal log collection.
- ✓ Keep logging infrastructure boring, proven, and reliable.

AVOID THIS

- ✗ Writing logs directly to Snowflake for real-time operations.
- ✗ Building custom logging microservices.
- ✗ Using SQL databases as primary log stores.

Logging is foundational infrastructure — build business value *on top of* it, not from scratch.

Next Steps & Discussion

Formalize the Decision: Draft an Architecture Decision Record (ADR) to document this strategy.

Design the Hybrid Architecture: Detail the integration points between OpenSearch and Snowflake.

Establish a Governance Team: Form a small group to oversee the schema definition and rollout plan.

Open Discussion: Address any remaining questions and concerns.