

# SCALING OPERATIONAL INTELLIGENCE INTO BUSINESS INTELLIGENCE USING OPENSEARCH & GENAI FOR GLOBAL ROLLOUTS



# SCALING OI INTO BI

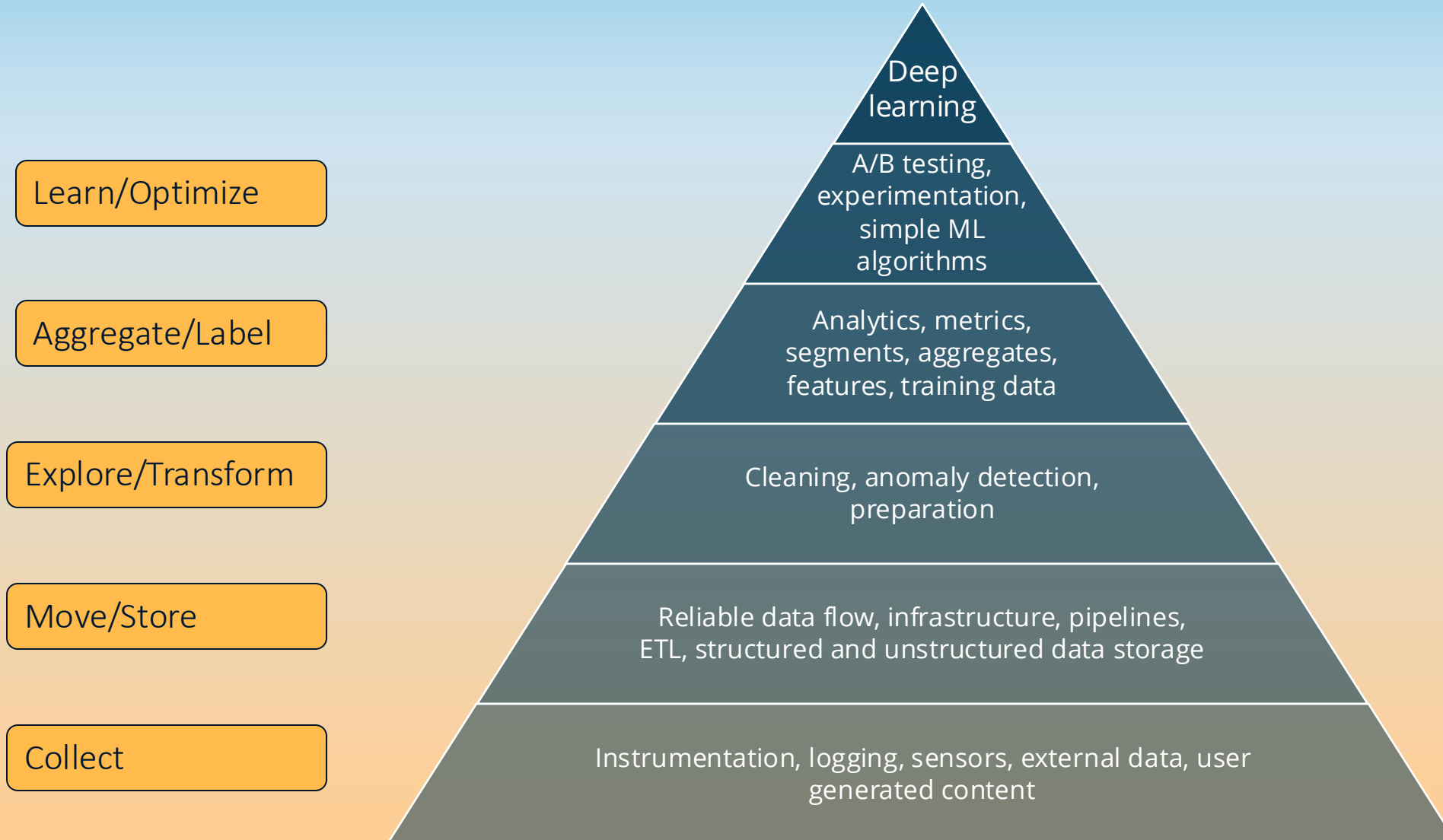


**RAMESH KUMAR MANICKAM**  
Sr Director , TransUnion



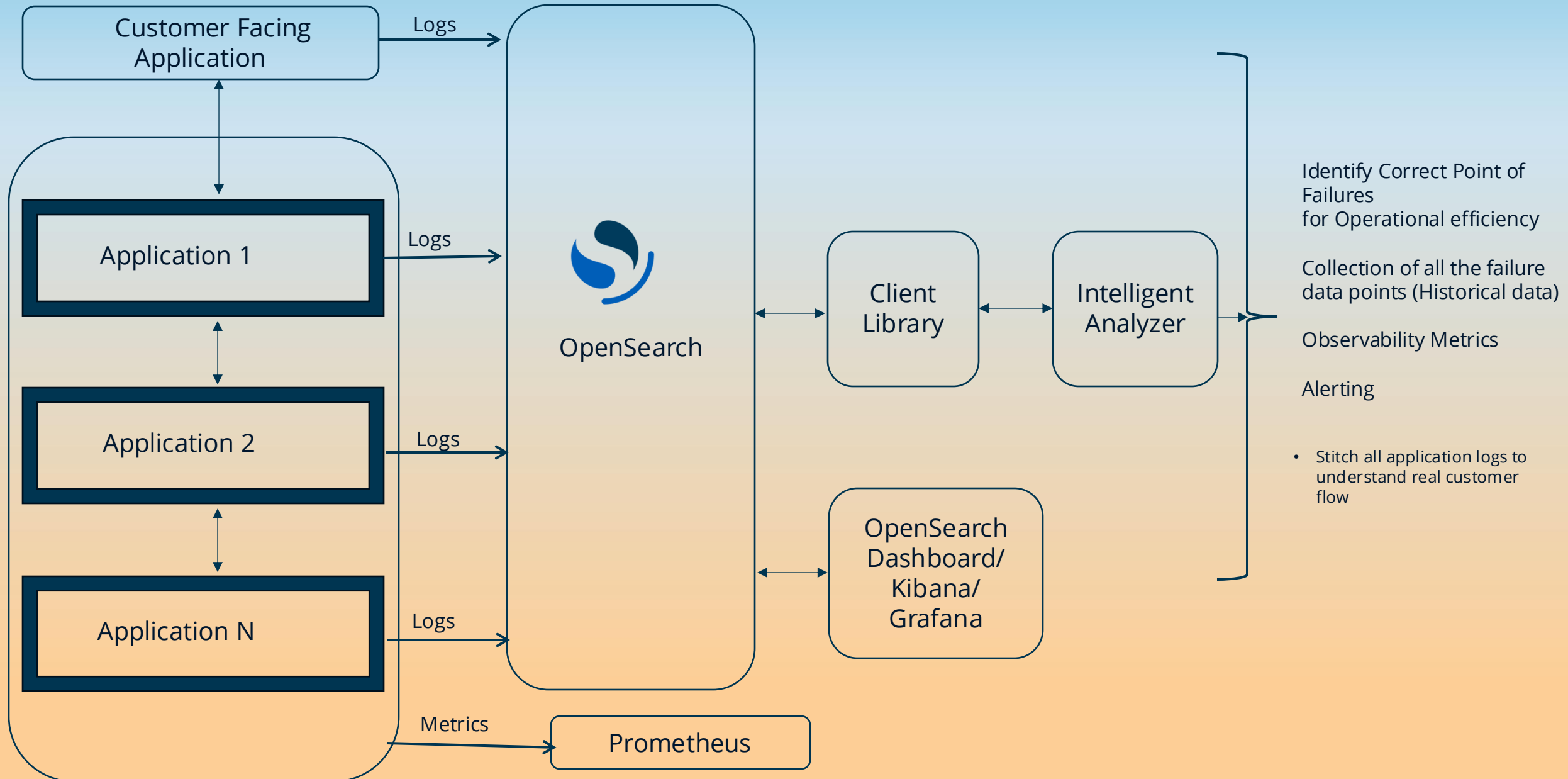
**MOHANRAJ VANJIAPPAN**  
Sr Manager , TransUnion

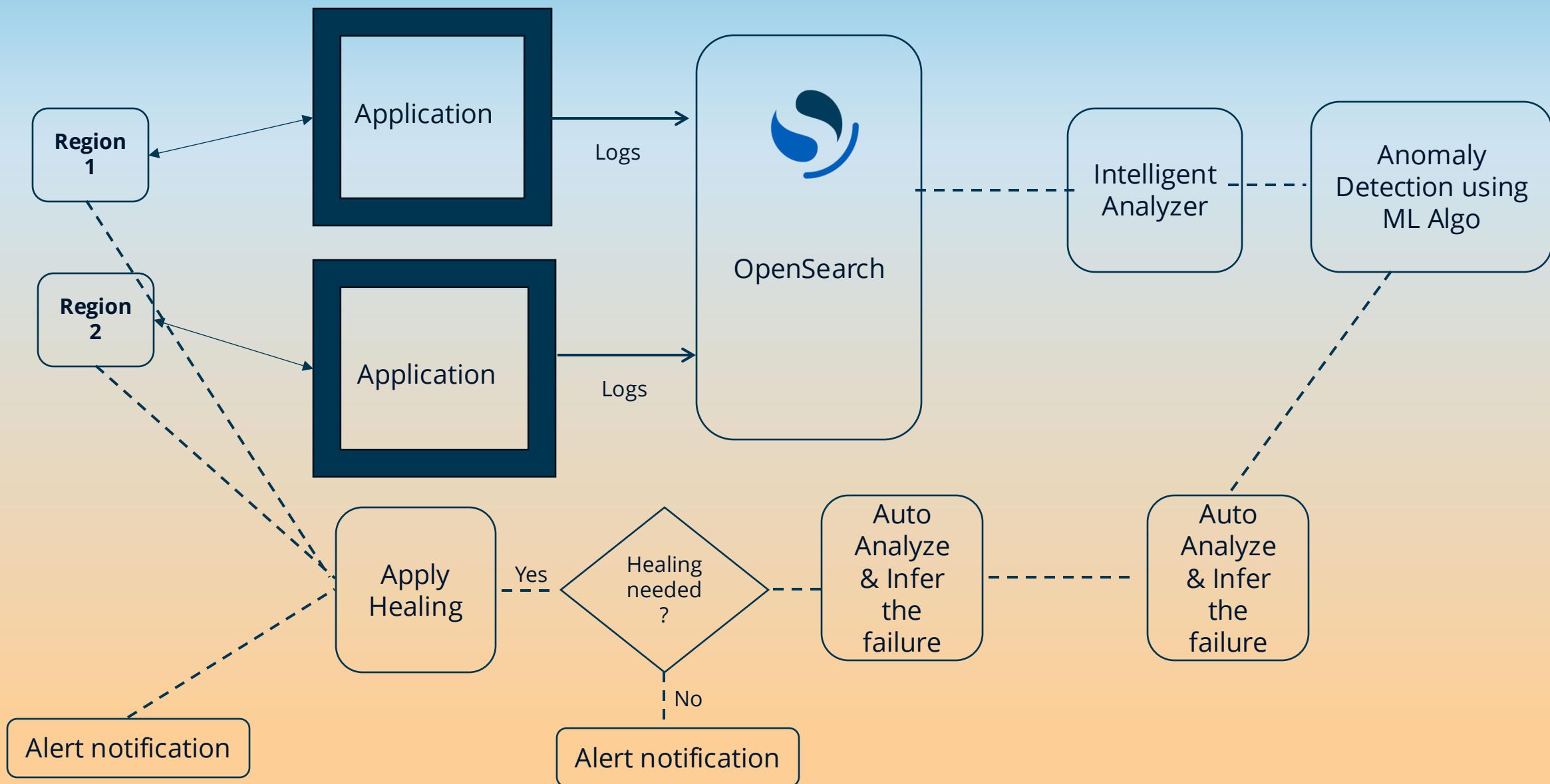
# A PYRAMID OF INTELLIGENCE NEEDS



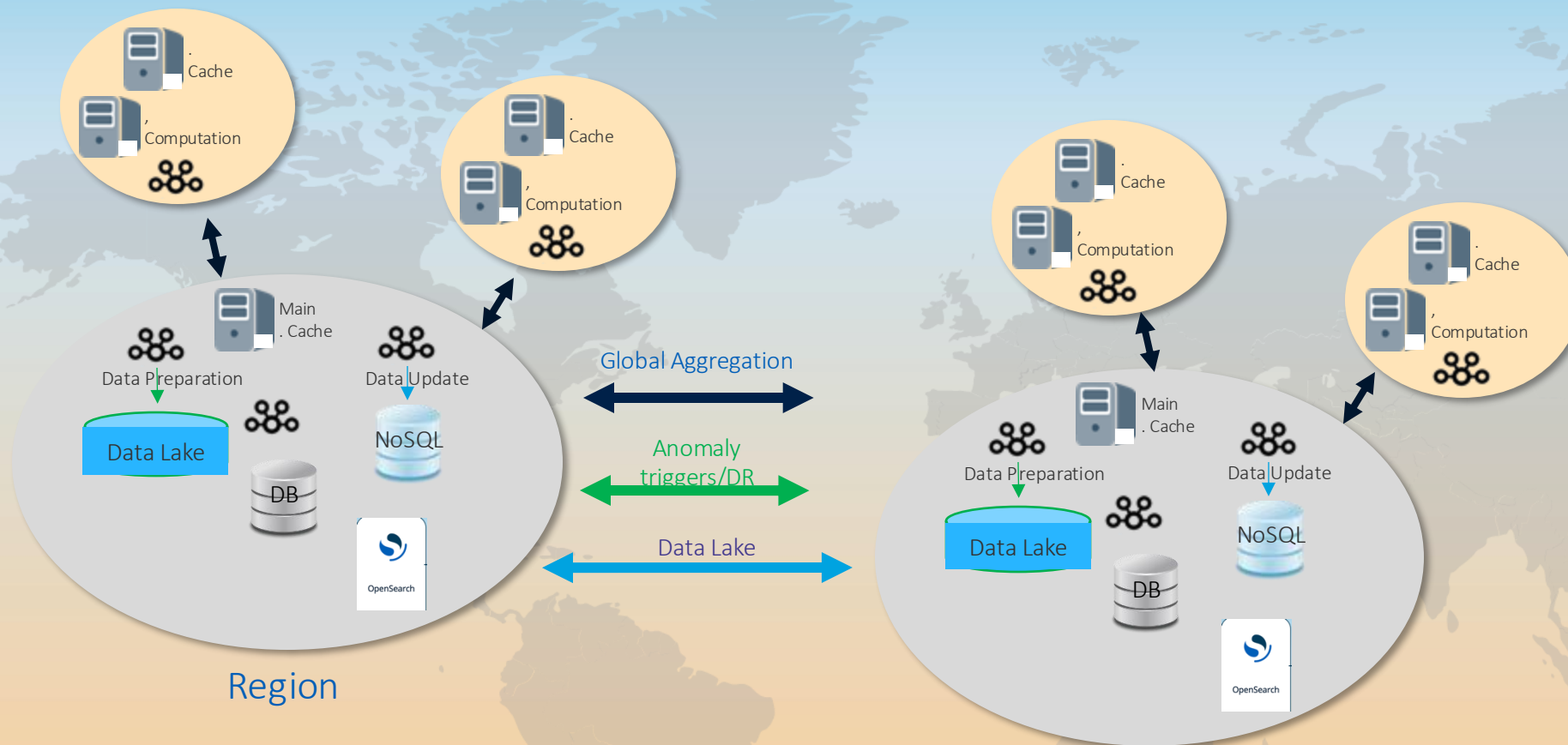
# OPERATIONAL INTELLIGENCE

- Entire Stack
  - Application Logs & Metrics
  - System Logs & Metrics
  - Alerts
- Operational Events
  - Incidents & Anomalies
  - Planned activities & Silencing





# GLOBALLY DISTRIBUTED



Region

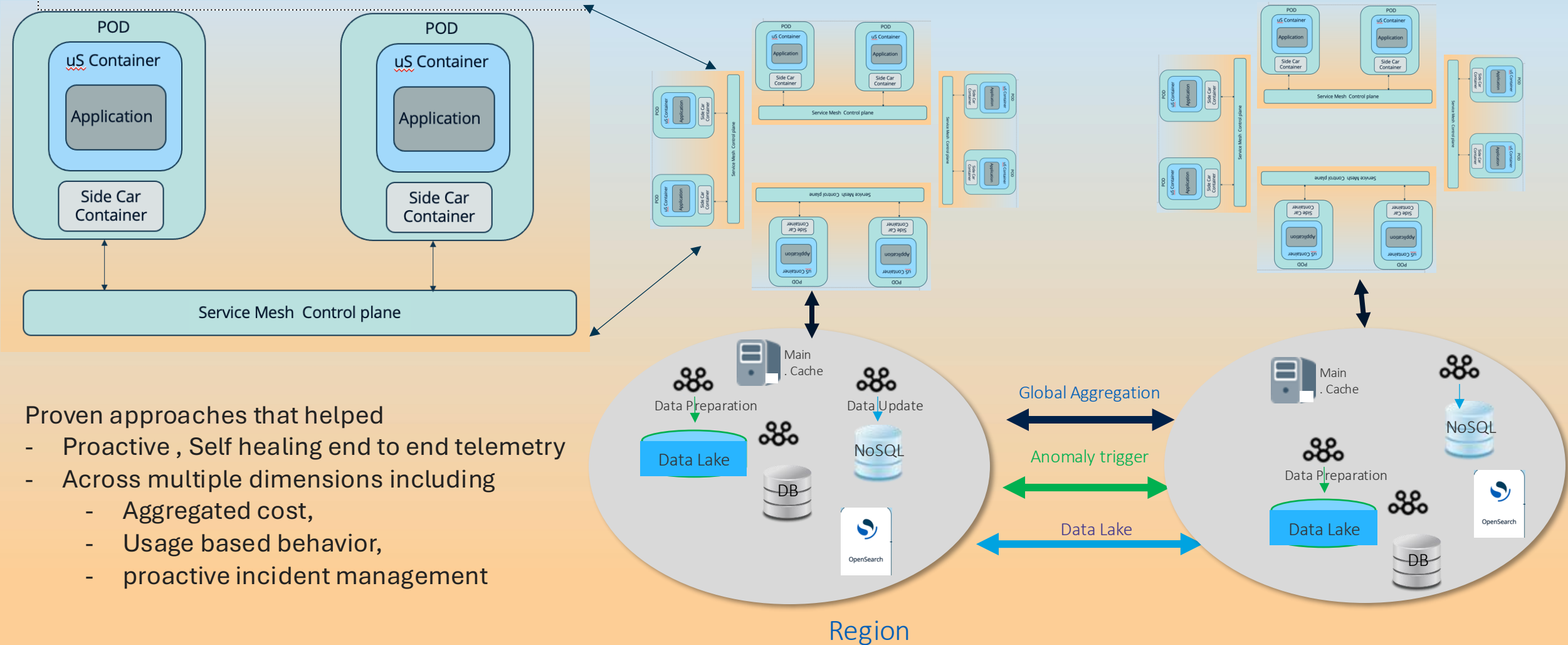
## Regions

Global roll out of cloud native applications and products require secure and scalable observability that spans Monitoring , Alerting , Logging and Traceability across Microservices and Systems/Stacks

- Multi-Cloud compatibility
- Svcmesh and kafka operability
- Elasticity, resiliency, scalability
- Architecture set-up and monitoring



# Cloud Native Apps

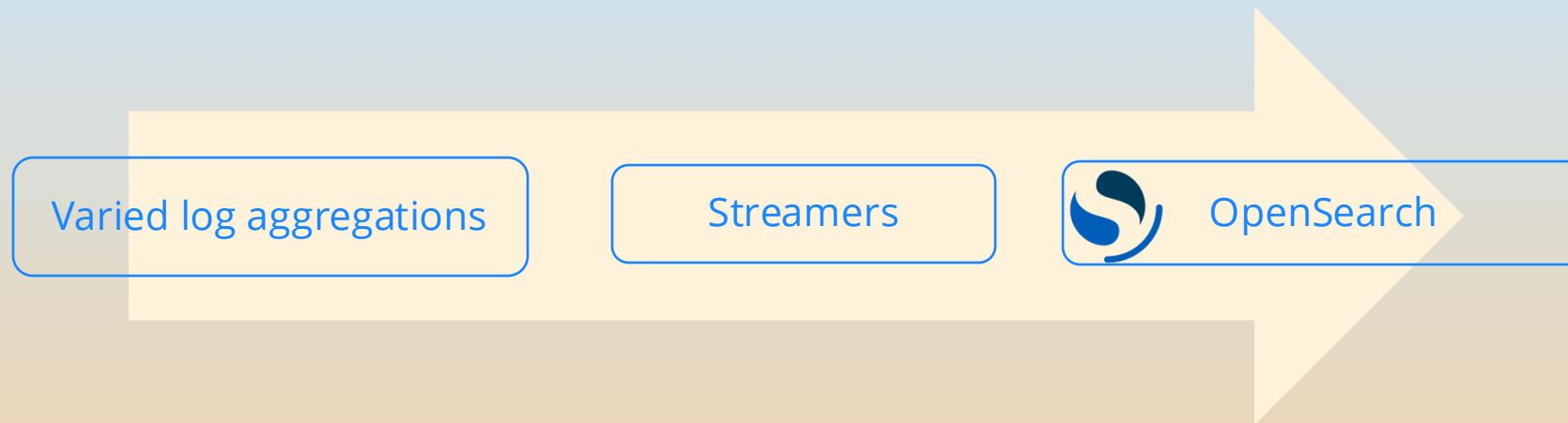


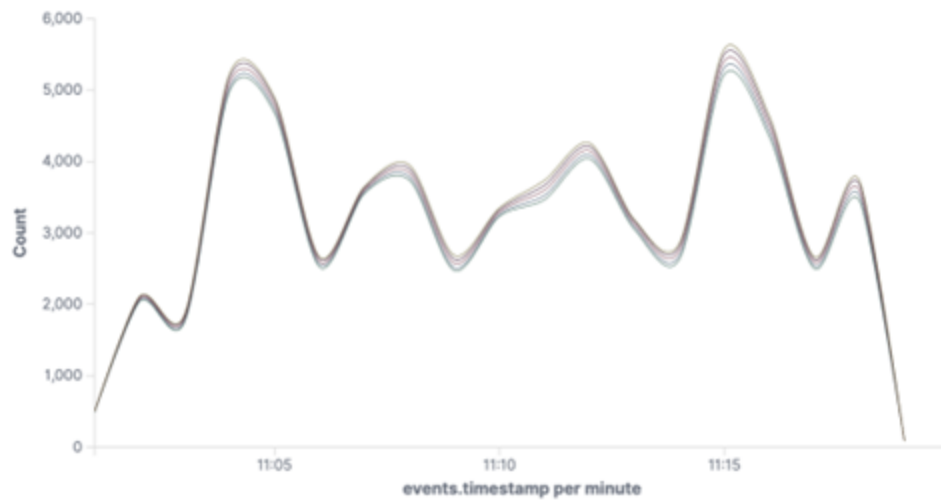
Proven approaches that helped

- Proactive , Self healing end to end telemetry
- Across multiple dimensions including
  - Aggregated cost,
  - Usage based behavior,
  - proactive incident management



# Cohabiting, migrating from Other technologies to OpenSearch





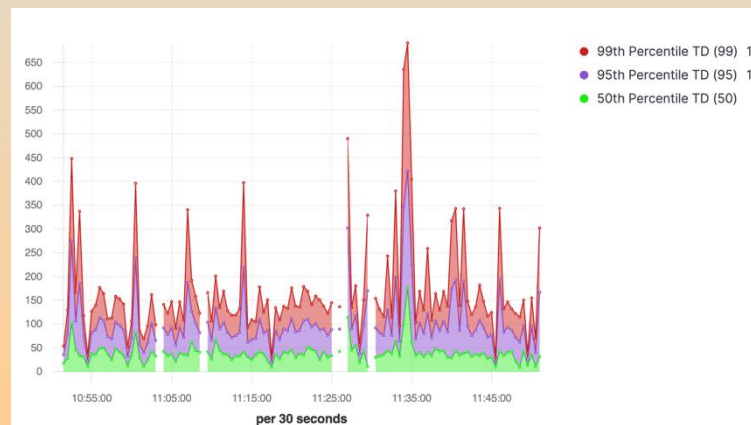
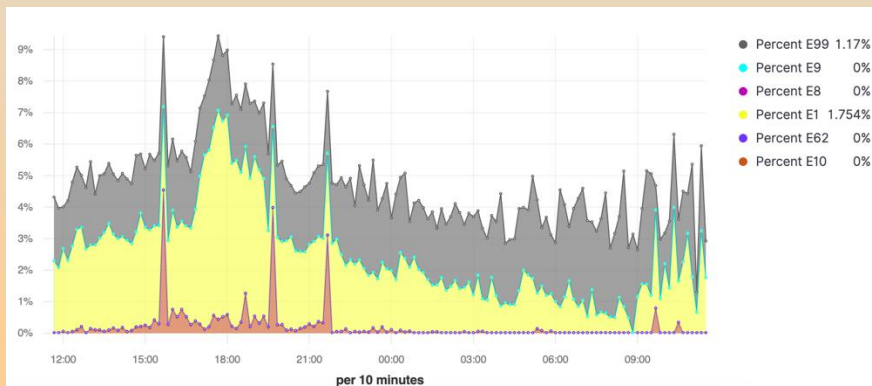
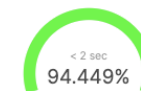
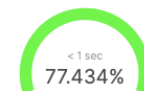
Average event.serviceelapsed



Average event.serviceelapsed



Average event.serviceelapsed



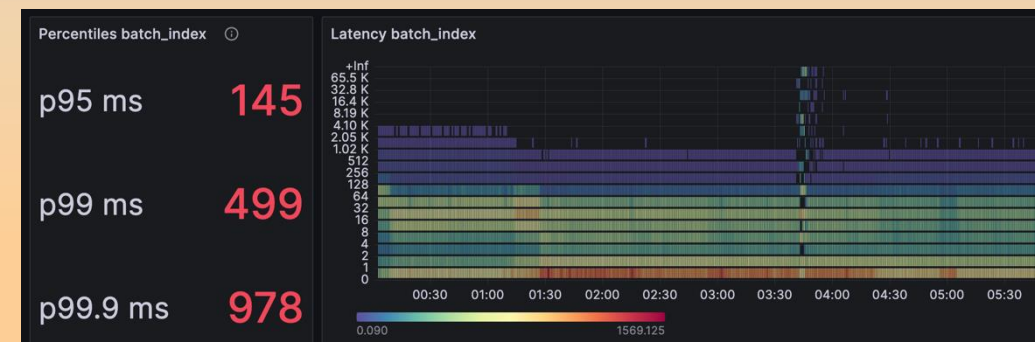
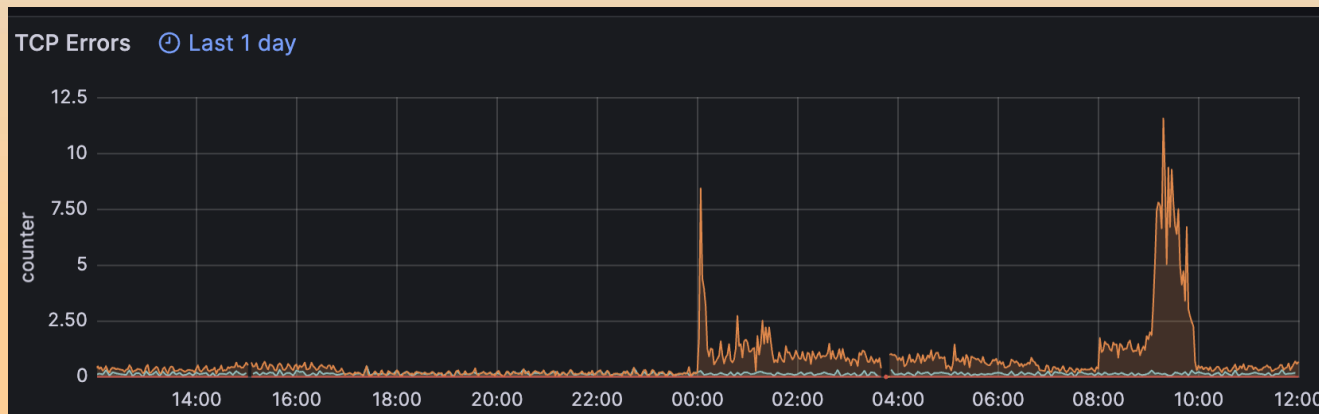
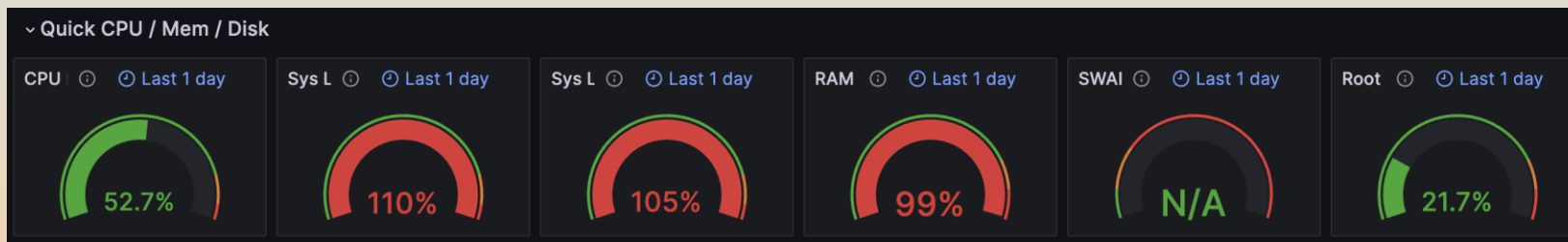
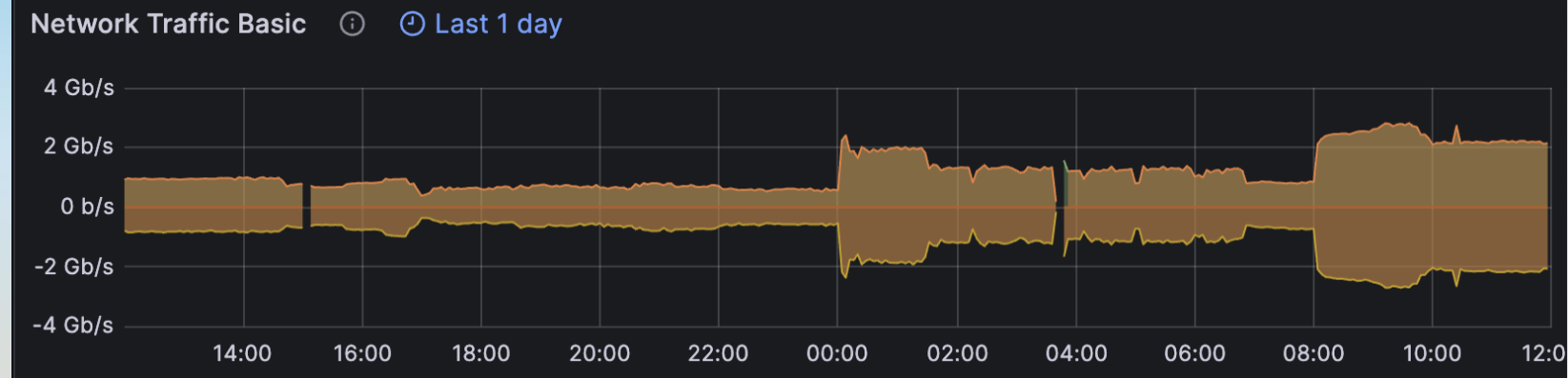
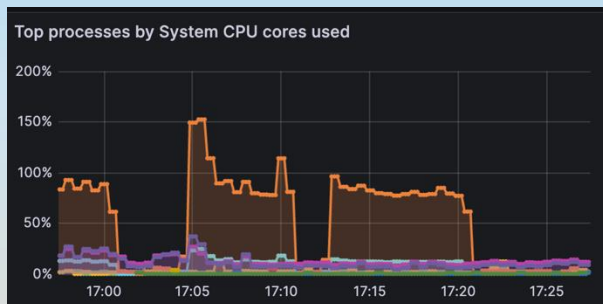
Error Rate  
**6.358%**

Total Error Rate for ...

Total Queries  
**2,548**

Total Failed Queries

Total Failed Queries  
**162**

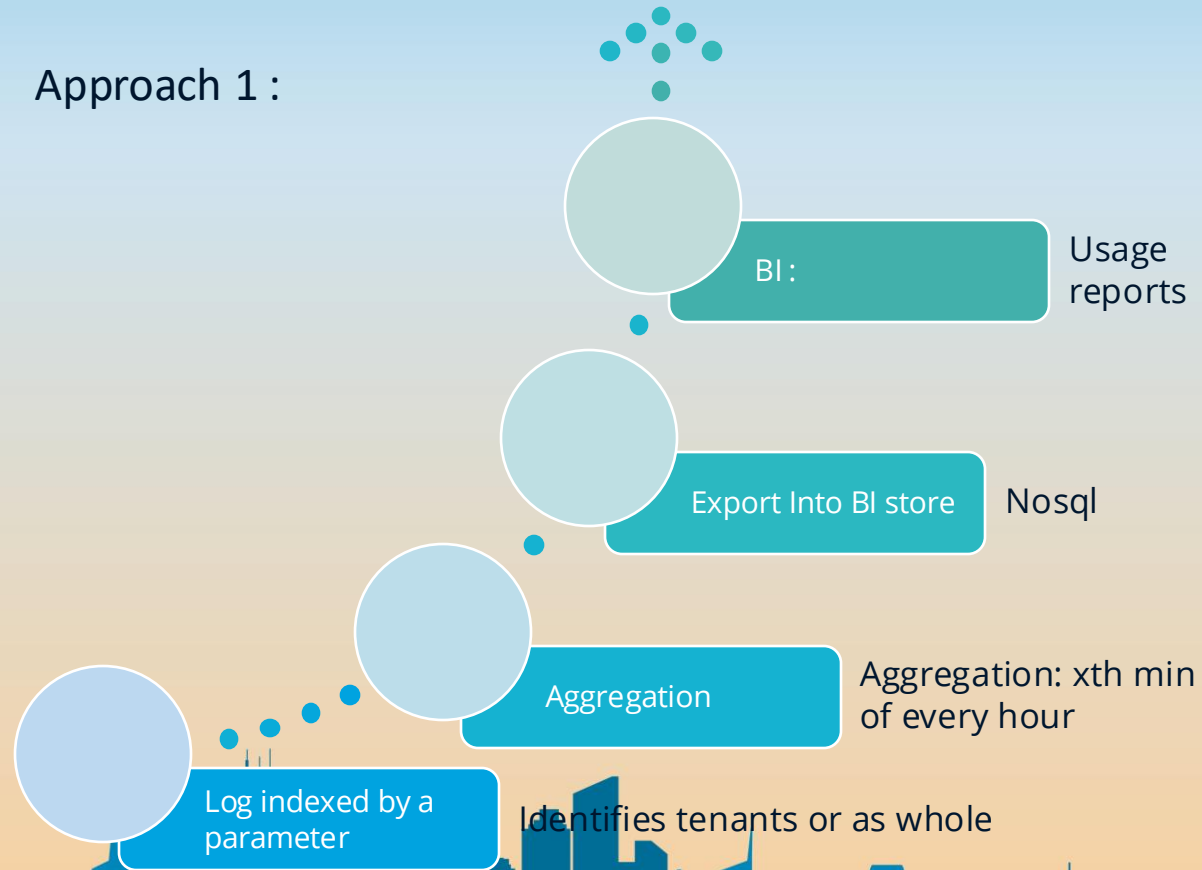


## BUSINESS INTELLIGENCE

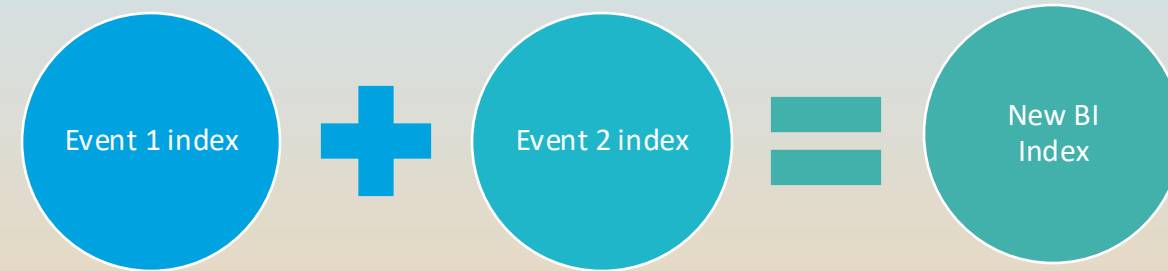
- Current
  - Aggregation of Operational intelligence
    - Average, Peak, Lowest, Range – over a day/week/month
  - Align with Business season
    - Peak Season
    - Regional Spread
- Forecast / Scale
  - Readiness for uptick/downtick
  - Ready for switch
- Visualize
  - Business Event correlation

# CHARTING TOWARDS BUSINESS INTELLIGENCE

## Approach 1 :



## Approach 2 :



Metric Merge/Upsert based on event id/traceid

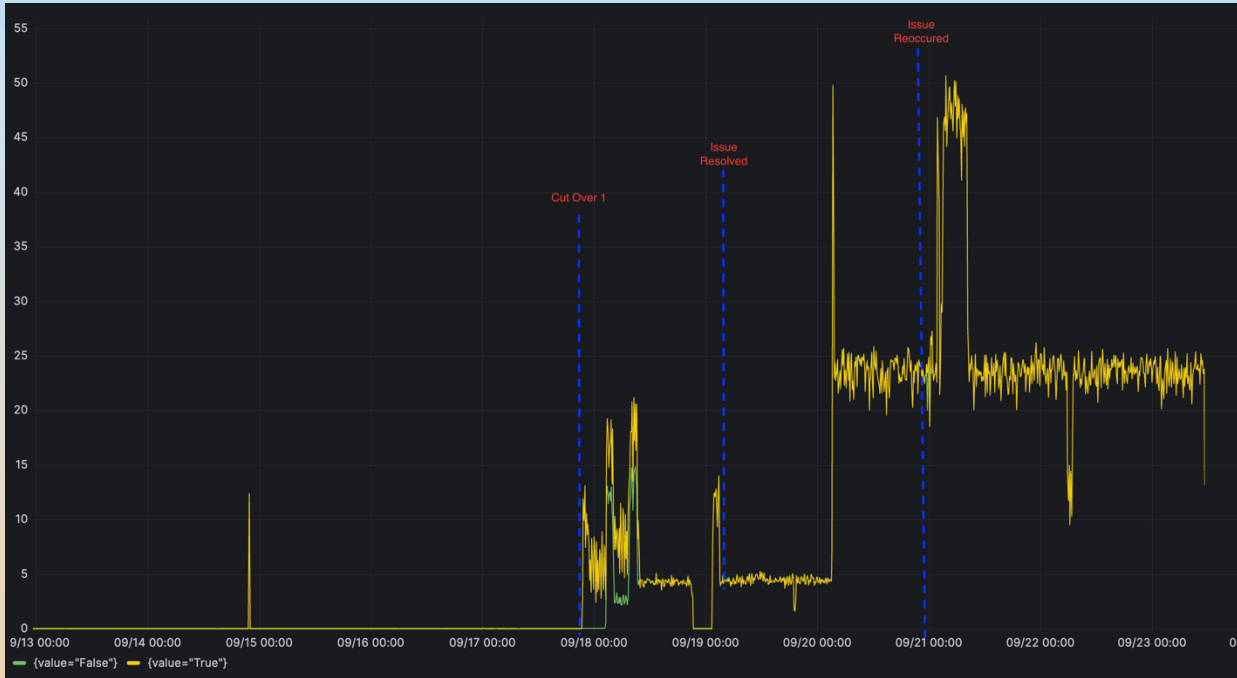


# Operational to Business Intelligence

- When did we see a similar behavior as  $T=x$  to  $T=y$
- How do we annotate operational events to Operational incidents
- What was the annotation ( business event) that occurred during that event
- How do we annotate business events to Operational behaviors
- What was the Operational incident that occurred during that event



## Annotations



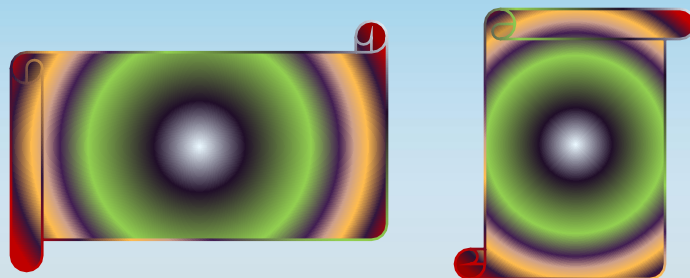
## Replay for individual APIs

```
{
  "apiName": "[REDACTED]",
  "matchCount": 10,
  "misMatchCount": 0,
  "matchPercentage": "100,100,100,100,100,100,100,100,100,100",
  "differencesAsString": ""
},
{
  "apiName": "[REDACTED]",
  "matchCount": 9,
  "misMatchCount": 1,
  "matchPercentage": "100,100,100,100,100,100,100,98.15,100,100",
  "differencesAsString": ""
},
}
```

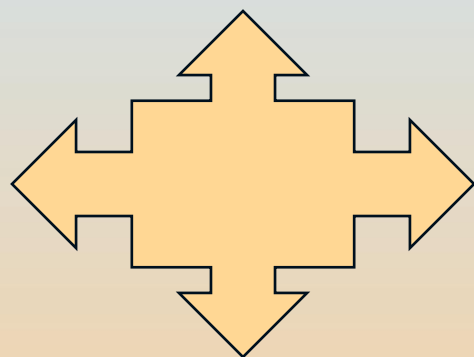
## Open Search Java Client Library Usage – More Configuration driven and less in code

```
OpenSearchRequest openSearchRequest = requestBuilder
    .query(ElkRequestForQuery.sendElkRequest(searchFilters, source, index: null))
    .POST()
    .build();
OpenSearchResponse<String> openSearchResponse = ElkClient.execute(openSearchRequest, String.class);
```

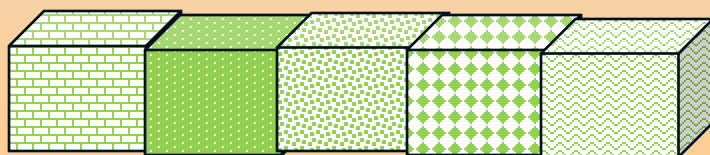
# OpenSearch Assistant toolkit – Building Blocks



*UI components* for building interactive conversation-based experiences

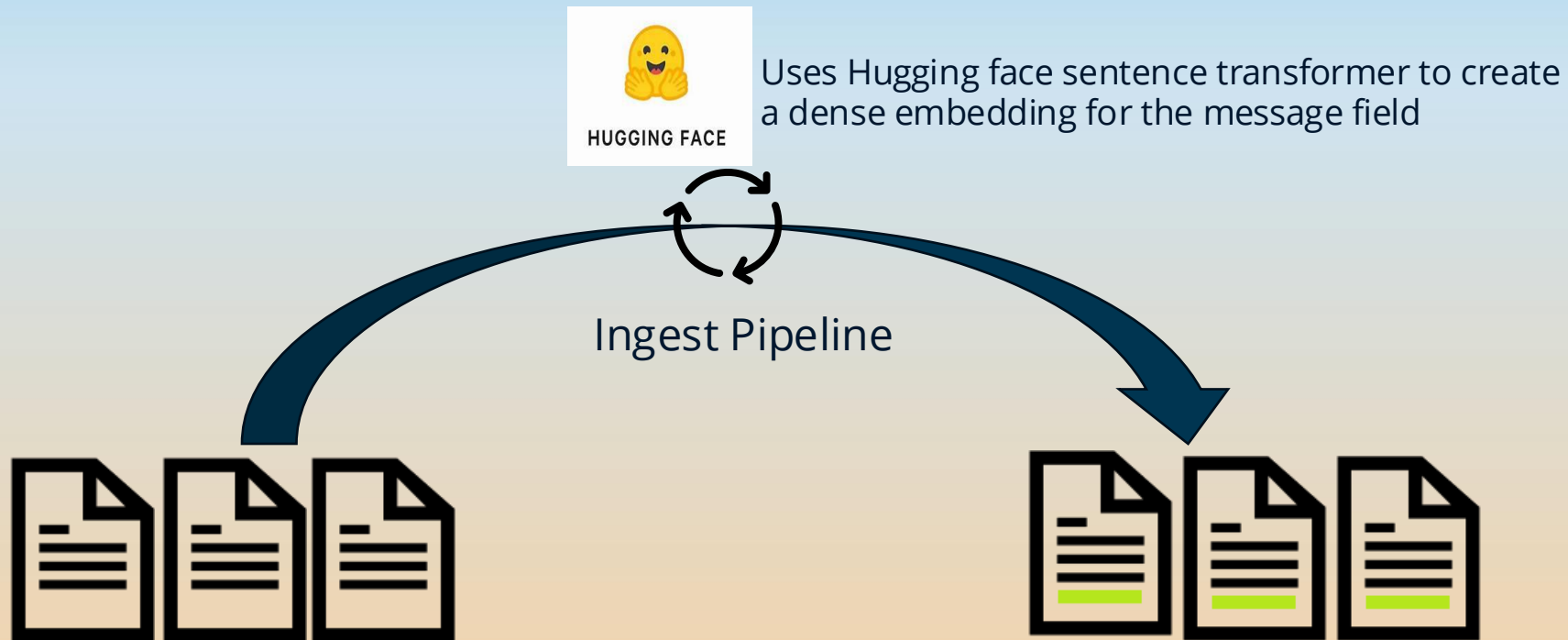


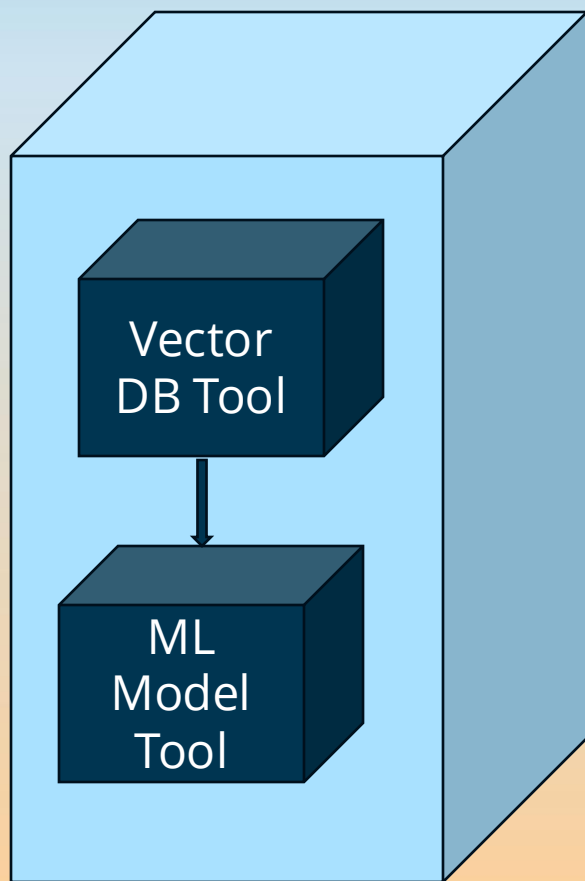
The *ML framework* that allows OpenSearch to connect the assistant to an LLM or a fine-tuned model



*Skills* that define and automate various tasks performed by the assistant

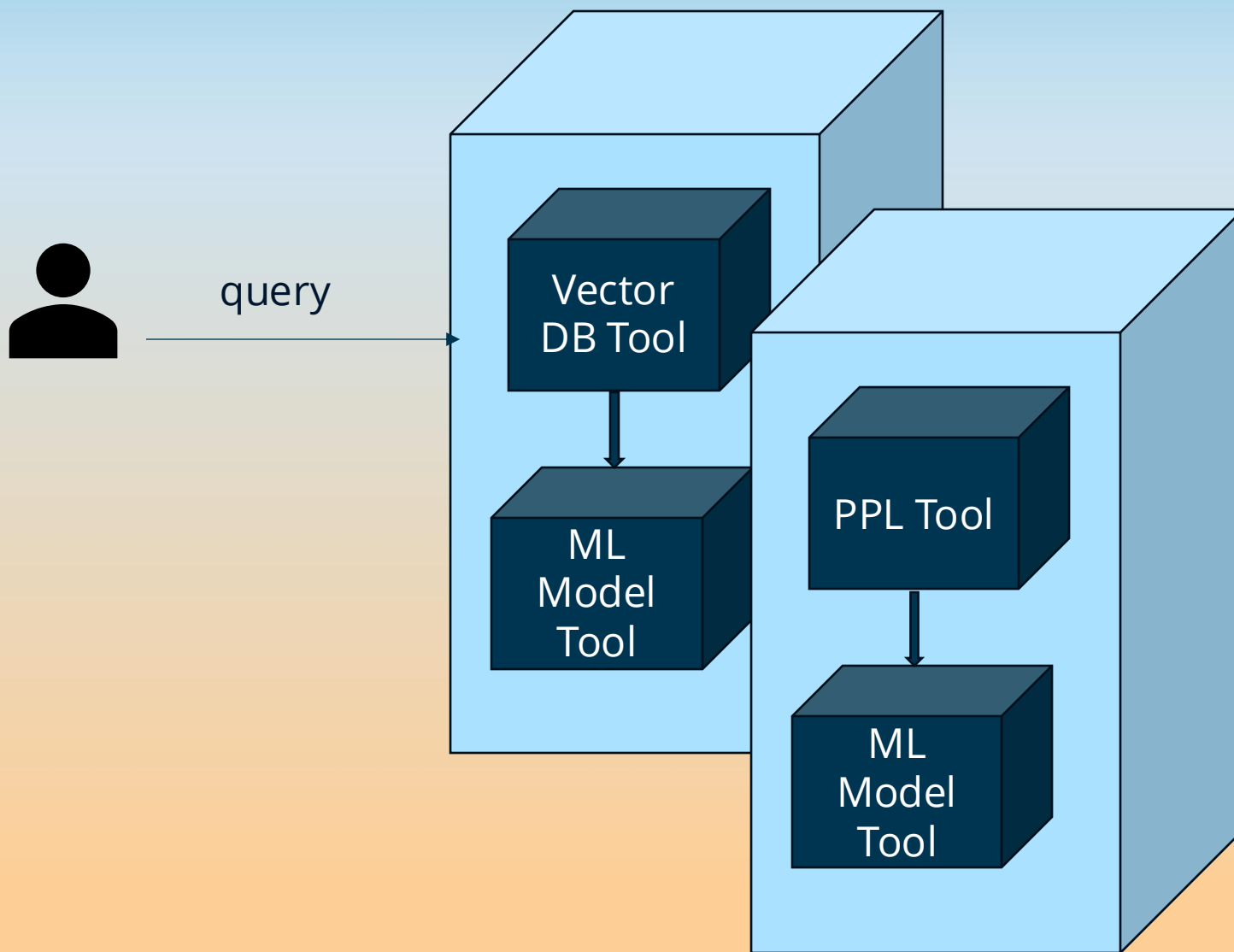
# Ingestion flow





- Flow Agent
  - Runs tools sequentially, in the order specified in its configuration.
  - The workflow of a flow agent is fixed
  - In search using flow agent  
“user query” -> “knowledge base search plus LLM” -> “return answer (with evidence)”.
- Example Flow Agent for retrieval-augmented generation
  - The flow agent will run the Vector DB tool and ML Model tool.
  - Vector DB tool is configured with the model ID for the text embedding model
  - ML Model tool is configured with the external LLM model
  - Operations guide , Runbooks, Playbooks , troubleshooting guides can go here.

# WHAT HAPPENS BEHIND THE SCENE?



- Flow Agent
  - Runs tools sequentially, in the order specified in its configuration.
  - The workflow of a flow agent is fixed
- Example Flow Agent using PPL tool
  - The flow agent will run the PPL tool and ML Model tool.
  - PPL tool is configured with the model ID, the index name and user question
  - ML Model tool is configured with the external LLM model and uses the context from previous steps.

# RECAP : BI OPENSEARCH VALUE PROPOSITION

## Operational:

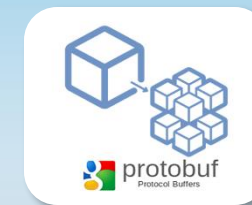
- Derive Operational metrics
- Cloud native with multi region support
- Configurable trade-off CPU / RT / quality



Cloud native  
with multi  
region



Event driven  
architecture



Micro  
Services



Configuration  
over code



Analytics  
Factory



Optimized stack  
strategies

## Business :

- Flexible architecture: one single application with configurable flow
- Business Driven configuration
- search strategy for exponential scenarios, Business KPI



Targeted  
actions per  
customers



Target  
Business  
KPIs

# Thank You

## Q&A

