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Real-Time Telemetry Monitoring for Aerospace & Satellites

Balaji Palani
Product Marketing @InfluxData

Anais Dotis-Georgiou
Developer Advocate @InfluxData

Agenda

- Backstory
- The Challenge
- The Product
- The Demo

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ThalesAlenia Space
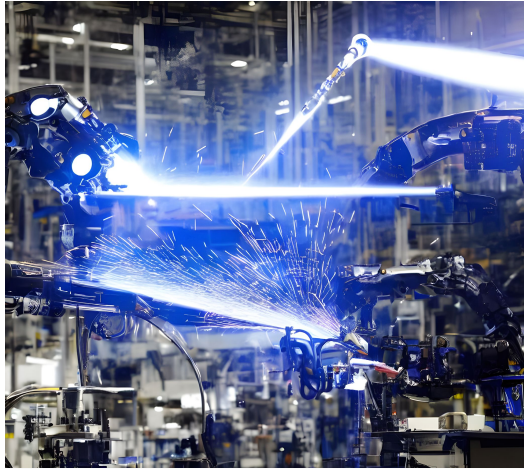a Thales / Leonardo company

LOFT ORBITAL

Commercial Space
Station Developer
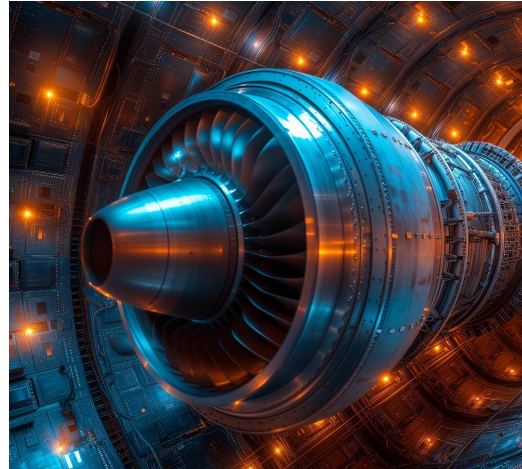
Satellite Based
Communication

Telemetry Monitoring for the entire lifecycle

Manufacturing Floor

100,000+
Sensors

Development & Testing
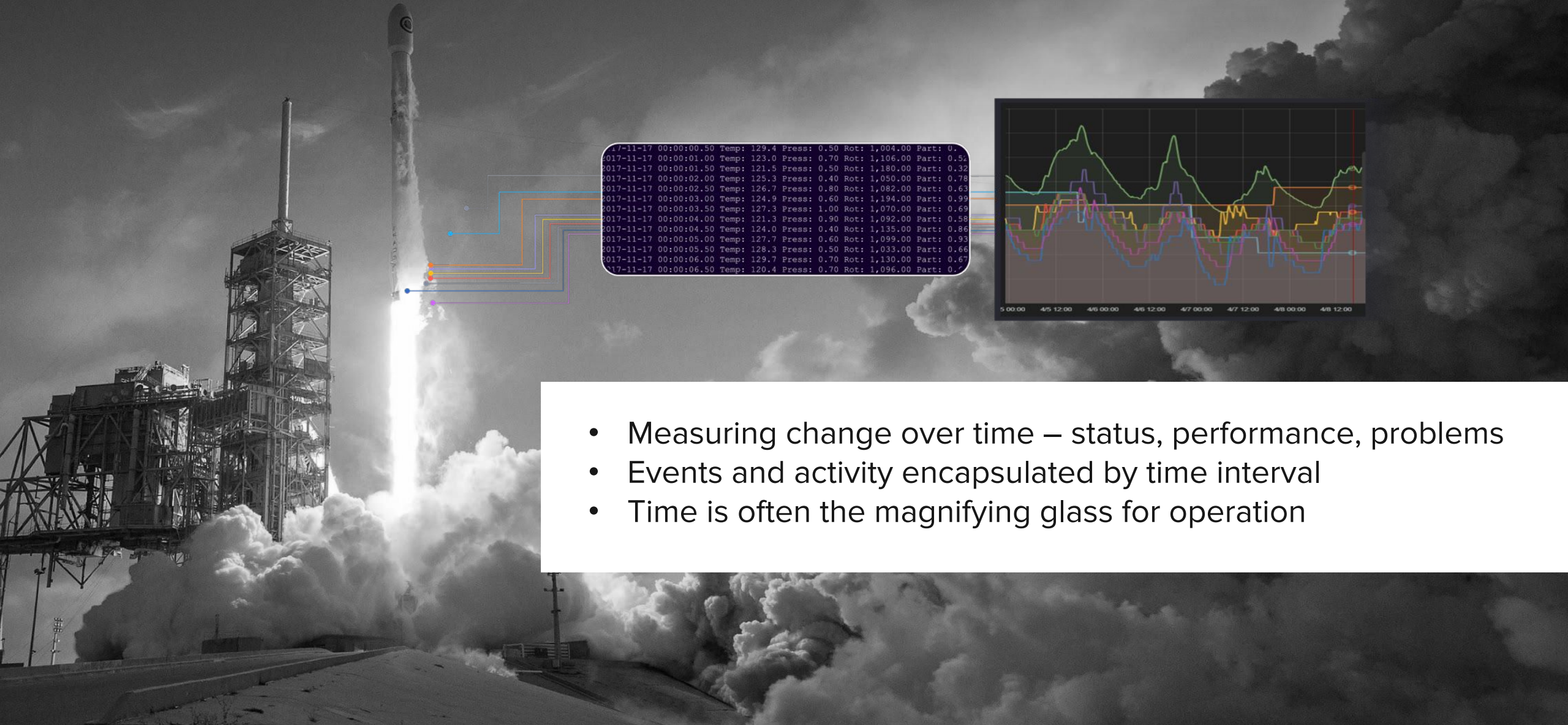
1 Billion+
Datapoints
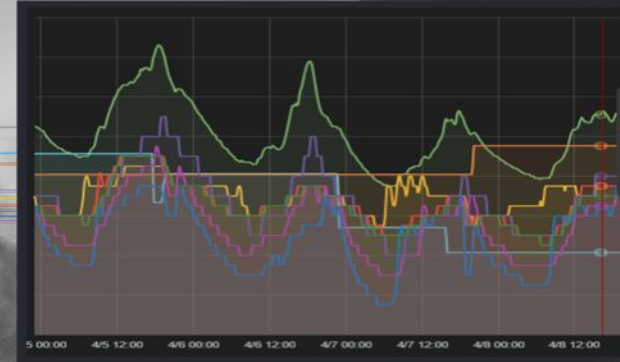
Take off & Landing

<1 second
Data Frequency

In-flight Operations

Billions
Device Tags

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Aerospace use cases "speak" time series

- Measuring change over time – status, performance, problems
- Events and activity encapsulated by time interval
- Time is often the magnifying glass for operation

Challenges with managing time series data

Massive Scale

Data is continuously arriving at high speed and volume

Real Time Action

Applications must analyze data within streams and act in real time

Data Cardinality

Higher number of tags collected cause high cardinality impacting performance

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Most tools
(including relational databases)
simply cannot handle these
challenges

Relational datastores are not a fit for purpose

- **Scale** – Cannot ingest large volumes of data in short time period

- **Slow queries** – Not architected for real-time querying

- **Lifecycle management** – Sharding & data retention are not built-in

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Uniquely equipped for time series data

Scale

Designed to scale for large volumes of time series data

Distributed

Non-blocking high volume writes and reads

Availability

Write and read availability are prioritized over consistency

Management

Data lifecycle management with built-in data retention

Flexible

Schema on write

InfluxDB 3.0: Columnar database for high performance & lower TCO
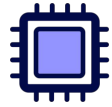
Real Time

Hot data in memory

Sub-second responses for recent data

Optimized for low latency analytical queries

Lowest cost storage

Cold data in object store

Superior compression & reduced TCO

Optimized for lowest cost long term storage

Unlimited Cardinality

Optimized writes & reads

One datastore for all time series data

Optimized for ingest scale & speed

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Use case architecture | **Aerospace Monitoring**

COLLECT

Launch Telemetry & Tracking
- Space Shuttles
- Satellite Telemetry
- Tracking Data
- Launch Metrics

Satellite Manufacturing
- Factory Floor
- Machinery
- Assembly Line

Custom API

telegraf™
Open sources agent
300+ plugins

MQTT, OPC-UA
System
Kubernetes
Custom

InfluxDB Client Libraries

STORE

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| Security | Mgmt API | Data Lifecycle Service | Service Health | Admin UI |

Parquet Catalog Service

CONTROL

Ingestor | Querier | Compactor

COMPUTE

STORAGE

QUERY

Visualization

Apps

AI/ML Tools

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InfluxDB enables 10x more storage at reduced costs

Lowest cost storage

Cold data in object store

Superior compression & reduced TCO

Optimized for lowest cost long term storage

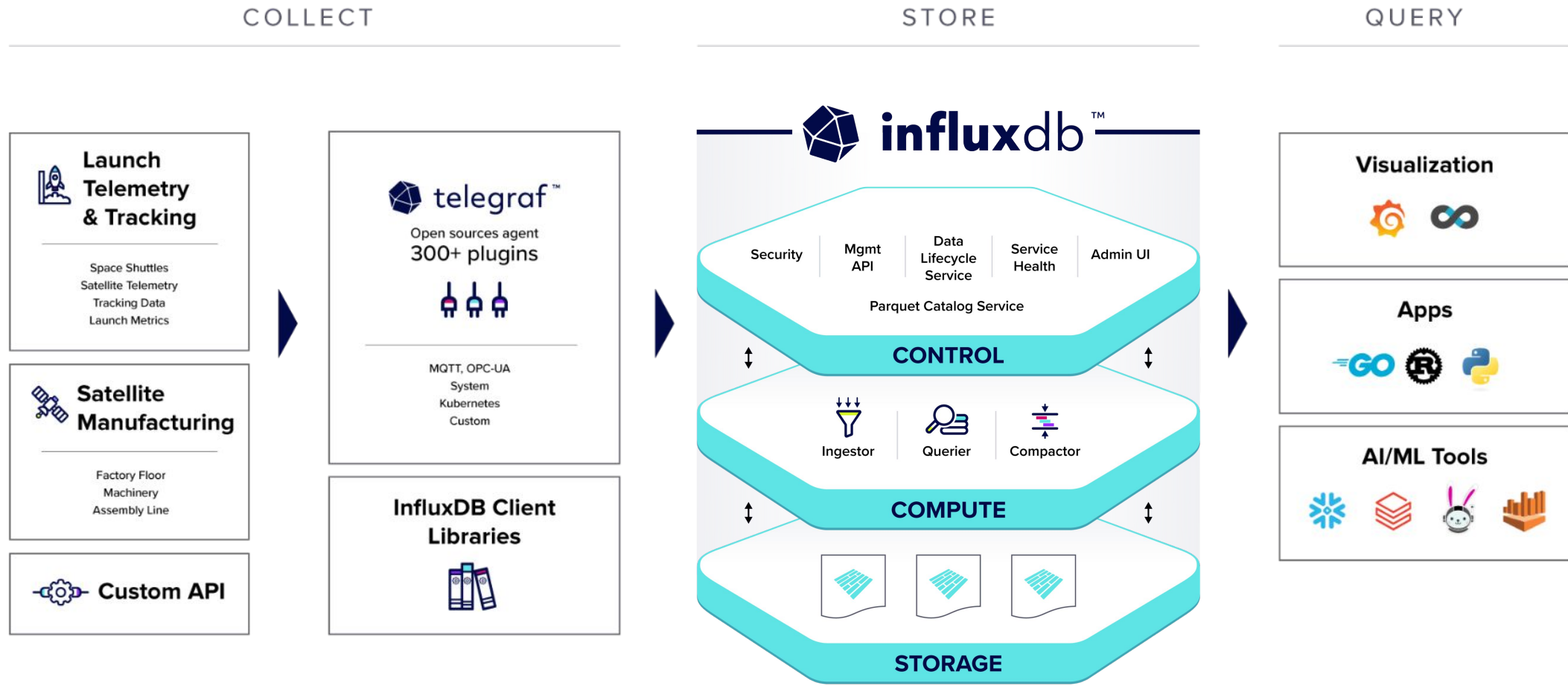InfluxDB persists aged data as Apache Parquet to provide the highest compression on cloud object store (e.g. S3) which is 3-5x cheaper than SSD.

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Company A migrated from PostgreSQL to InfluxDB 3.0 to power their long term telemetry store for satellite constellation
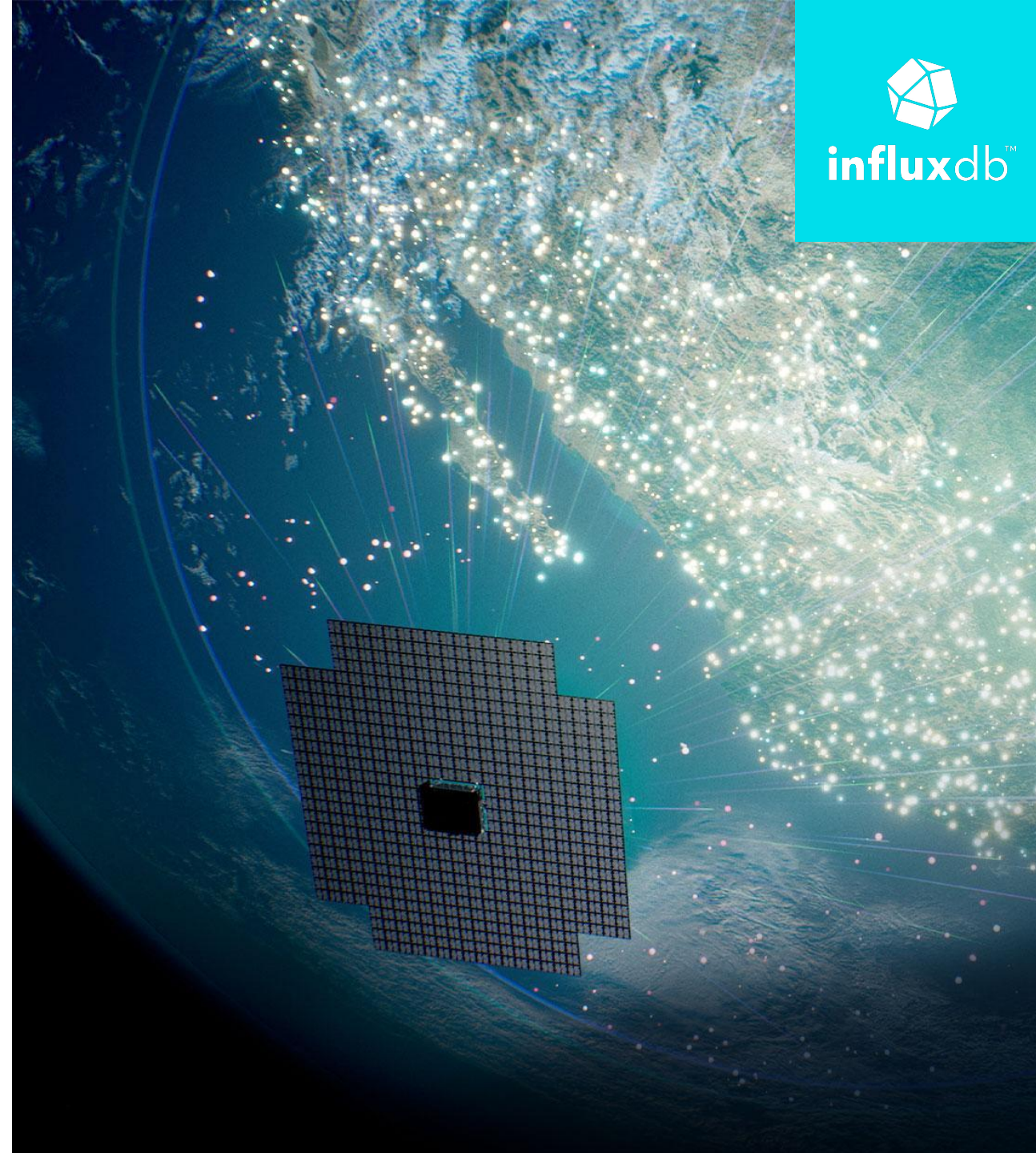
STORY:
Mission is to connect every person on the planet with a high-speed internet from almost anywhere in the world

PROBLEM:
Collect, analyze & store 100K+ metrics per second from hundreds of satellites

INFLUXDB VALUE:
- Fast query responses for queries over long time ranges
- Cost-effective support for data retention over 10+ years

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InfluxDB enables storing metrics, events, traces in a single store without cardinality concerns

Unlimited Cardinality

Optimized writes & reads

One datastore for all time series data

Optimized for ingest scale & speed

InfluxDB enables analysis and storage of all of the required time series data with all the required metadata for all of devices and sources without limitations and helps Reduce Operational Complexity.

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Aircraft Manufacturing

Problem: data historian and machine-specific monitoring tools can't handle data volume

- potential for millions of dollars in aircraft repair work, scrapped work, and delayed delivery due to tiny variations in conditions

- AVEVA Wonderware + machine-specific monitoring failed to keep up volume and query performance.
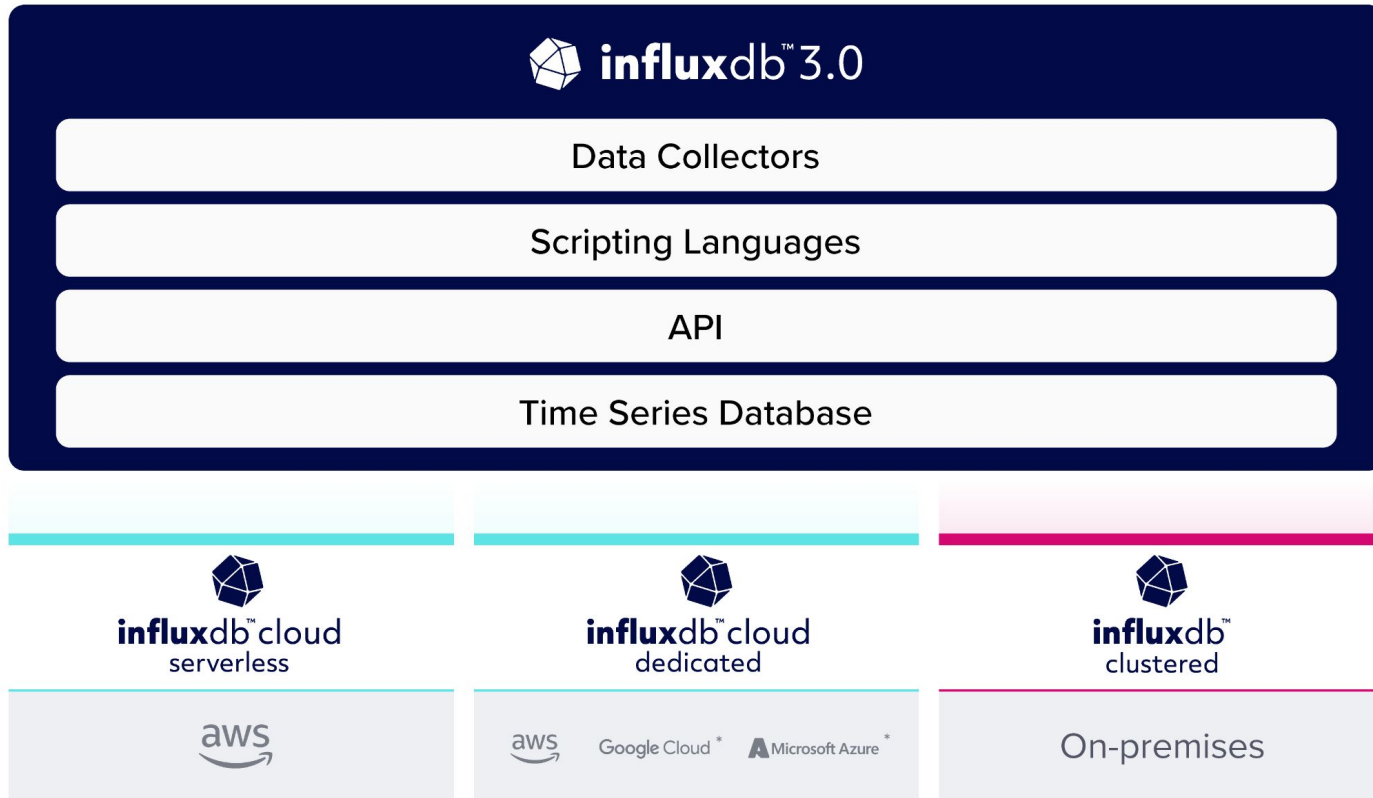
- Unable to provide the factory-wise view

InfluxDB results:

- Team is now monitoring more than 3000 parameters / second in one factory-wide view

- Met stringent security and compliance requirements for both commercial and military clients

Demo

InfluxDB: Run on cloud & on-premises

Cloud Serverless

- managed service for small & medium workloads

Cloud Dedicated

- managed service for large enterprise workloads

Clustered

- software for large enterprise workloads in self-managed environments

InfluxDB 3.0: Fast, Real Time & Cost Effective

InfluxDB 3.0 provides

45x	**90%**
Better write throughput	Reduction in storage costs
100x	**45x**
Faster queries for high cardinality data	Faster queries for recent data

Compared to InfluxDB OSS

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THANK YOU