

# Plug-and-Play Smart Edge Solutions: Tourisme Participations' Success with EdgeLake



## ORGANIZATION

Tourisme Participations, a French company, has operated 15 cruise boats on the three main lakes of the French-Swiss Alps region since 2010. It provides year-round transportation services (point-to-point routes similar to buses) and leisure cruises, including sightseeing tours and onboard dining experiences.

Seeking to enhance customer experience while reducing pollution and noise, the company's CEO initiated a transition from diesel to electric propulsion. To drive their digital transformation, he partnered with [AnotherTrail](#), a technology integrator specializing in innovative solution design and commercialization.

AnotherTrail is a French Alps based boutique high tech company focusing on creating and delivering innovative solutions that deliver clients visible value add beyond the 'technicality', and can be replicated. AnotherTrail operates across France and Switzerland and has driven many complex and demanding projects in networking, scientific equipment (CERN...), airports and more.

## CHALLENGE

Managing a fleet of electric ships presents unique challenges compared to diesel-powered vessels. Batteries are costly and require careful financing and monitoring, while integrating old and new technologies must be done seamlessly without disrupting operations.

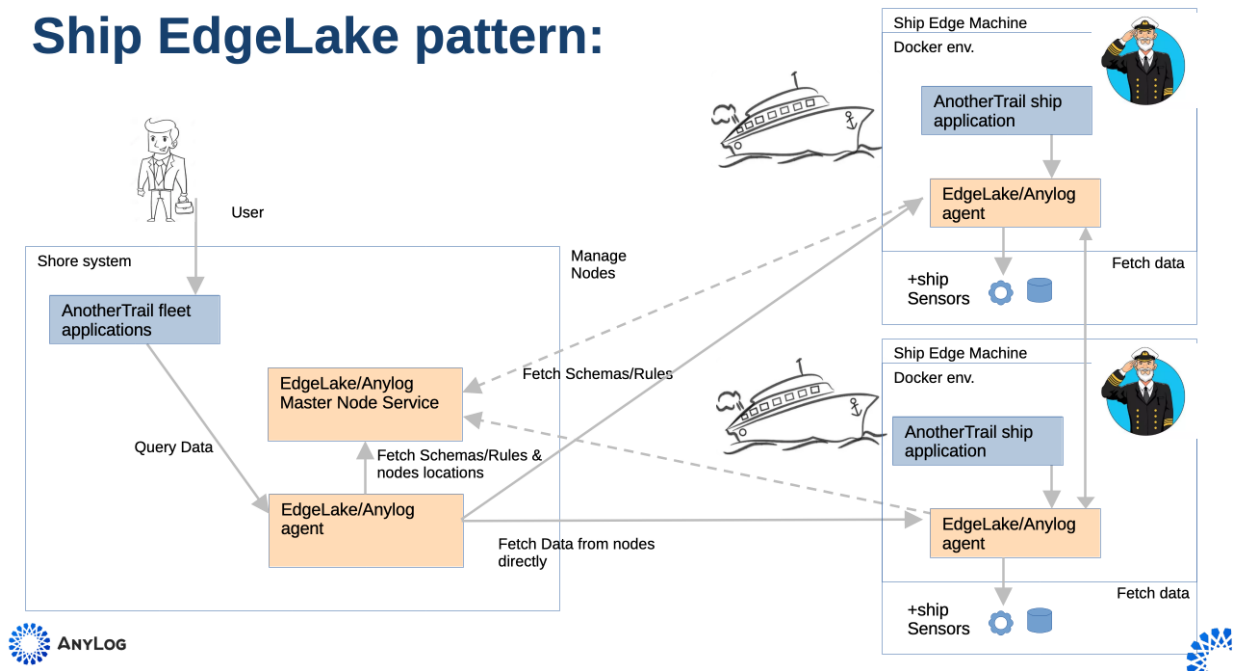
A major challenge was ensuring a deployable, cost-effective solution. Sending large volumes of data to the cloud for processing was too expensive. AnotherTrail needed to design a scalable system that would enable rapid deployment while allowing for future expansion. The solution had to align digital transformation with physical fleet upgrades, covering fleet operations from onboard systems to mooring charging stations.

Key requirements included monitoring:

- **Batteries, inverters, chargers, generators, and engines**
- **AI-driven insights** for battery lifespan prediction, energy-efficient routing, generator optimization, weather tracking, predictive maintenance, and onboard system monitoring.
- Given the long lifecycle of ships (major overhauls occur roughly every 25 years), the solution also had to support long-term operation with minimal maintenance demands.

AnotherTrail implemented **EdgeLake** to address Tourisme Participations' operational challenges, enabling real-time edge data management, AI-driven insights, and decentralized processing. This ensured efficient fleet management while reducing cloud dependency and operational costs.

## Ship EdgeLake pattern:



### On Ships: EdgeLake for Localized, Intelligent Data Processing

Each ship is equipped with various onboard systems, including propulsion management, energy storage, and auxiliary services. These systems generate large volumes of data, primarily accessible via Modbus interfaces. Instead of streaming this data to the cloud, EdgeLake enables local storage and processing through onboard Edge Systems.

#### Key components:

- **Shipboard Edge System:** Each ship is equipped with an ARM-based CPU running Linux within a containerized environment.
- **EdgeLake-AnyLog Operator:** Runs in a container and aggregates data from ship systems via Modbus and Python scripts.
- **Data Sources:**
  - **Torqueedo integrated propulsion system** (engines, batteries, chargers, converters, vessel diagnostics).
  - **Custom-built energy management system** (for ships using non-Torqueedo solutions).
  - **Backup generator** (for range extension).
- **Connectivity:** Ships operate in 4G-covered areas, ensuring reliable data transmission within a 12km range.

#### EdgeLake's Role Onboard

- **Local Data Storage:** The EdgeLake agent stores raw and processed data locally on the ship, preventing unnecessary cloud traffic.
- **Data Pruning & Summarization:** Using EdgeLake rules, only relevant data is retained, reducing storage and bandwidth costs.

- **AI & Rule-Based Insights:**
  - Battery performance tracking & lifespan prediction to optimize energy use.
  - "Next Best Boat" decision-making—captains receive AI-driven recommendations on which vessel to deploy based on energy levels and charging schedules.
  - **Predictive maintenance alerts** for critical systems (e.g., early failure detection in propulsion or HVAC systems).
  - **Generator efficiency optimization** to minimize fuel consumption when used.
  - **Route optimization** based on real-time weather and energy conditions.
  - **Monitoring of non-propulsion systems** (kitchen appliances, storage, lighting, etc.).

With EdgeLake, ships remain **fully operational even in the event of connectivity loss**, as all essential data processing occurs onboard.

## On Shore: Management & Seamless Fleet-Wide Data Access

A shore-based EdgeLake system serves as a central hub for fleet-wide management and analytics. It provides a unified interface for accessing distributed ship data while keeping it decentralized.

### Key components:

- **Linux-based central server** hosting AnotherTrail's fleet management applications, including Grafana dashboards for real-time monitoring.
- **Two EdgeLake-AnyLog agents:**
  - **Query Service:** Acts as a SQL gateway, allowing shore-based applications to query fleet data as if it were centralized.
  - **Master Node:** Store fleet-wide metadata, schemas, and rule sets, managing EdgeLake's decentralized infrastructure.

### How It Works

- **EdgeLake Agents on Ships & Shore Form a Network:**
  - Each ship runs an EdgeLake agent that processes and stores local data.
  - The shore-based master node maintains metadata and policies.
  - Shore applications can query ship data as if it were in a central database, without transferring raw data off the ships.
- **Decentralized Query Execution:**
  - When a dashboard or application needs data, it queries an EdgeLake node.
  - The queried node gathers the relevant data from the distributed fleet and presents it in a unified, SQL-accessible format.
- **Blockchain-Based Security (Optional):**
  - An alternative deployment model uses blockchain technology to maintain integrity across the fleet's infrastructure.

By utilizing EdgeLake's in-place data management, all data is kept local, enhancing security and reducing latency compared to cloud-only storage. The open, containerized plug-and-play nature of the platform enables rapid deployment, eliminating the need for one-off development efforts.

- **Platform Build Cost:** no development costs—fully plug-and-play solution, Low-cost hardware and setup
- **Lower Operational Costs:** No data transfer to the cloud, No dependency on cloud services, Self-managed infrastructure.
- **Automated alerts:** Enables SMS text alert management for critical alarms via PLC and remote devices.
- **Enhanced security:** Blockchain-based infrastructure ensures fleet-wide data protection.
- **Operational efficiency:** EdgeLake's SQL-based queries provide real-time, unified data access instead of fragmented data streams.
- **Improved fleet reliability:** Predictive analytics enhance maintenance strategies, reducing failures and associated costs.
- **Full data control:** Tourisme Participations retains complete data ownership and custody.
- **Resilient architecture:** The decentralized model ensures continuous operation even when connectivity is lost.
- **Cloud efficiency:** Cloud integration is used for redundancy and archival at significantly lower costs compared to full cloud data services.
- **Scalability:** Open architecture supports easy expansion to more sensors with additional boats, by adding edge nodes and without architectural changes.

More specifically, the cost of an edge infrastructure monitoring solution is based on multiple components, summarized below with relevant savings:

Cost component	Savings
System deployment	Replacing multi-month projects with EdgeLake's plug-and-play setup, reducing deployment to just days.
System maintenance	A single software stack supports all targeted use cases, minimizing upkeep efforts.
Interoperability	Open architecture enables seamless integration with southbound connectors (e.g., MQTT) and northbound connectors (e.g., REST), ensuring smooth integration with analytics systems.
Infrastructure	Low-cost Edge Nodes reduce reliance on expensive servers, licensing fees, and ongoing IT support.
Cloud	Lowered cloud dependency by generating insights directly at the edge, using the cloud only for archival storage at minimal costs.

Tourisme Participations and AnotherTrail plan to expand EdgeLake's capabilities by integrating AI-driven predictive models and federated learning into the fleet's operations.

Planned enhancements include:

1. **Onboard AI Inference:** Ships will run AI models locally to make real-time decisions, such as optimizing battery performance and recommending efficient routes.
2. **Federated Learning:**
  - Ships will train AI models independently using their own operational data.
  - These partial models will be aggregated into a main model hosted on the shore-based EdgeLake Master Node.
  - The improved model will then be deployed back to the ships for further refinement.
3. **Decentralized AI Processing:** By leveraging EdgeLake's decentralized architecture, inference and model training will happen locally at the edge, reducing cloud reliance while improving system intelligence over time.