GIGASPACES

SMARTDIH

Enabling and Implementing a Digital Twin with SmartDIH

The advances in modernization and digitization in manufacturing and industrial environments are leading to the broader implementation of digital twins.

A digital twin is a virtual representation of a physical object, process, or system. Digital twins allow organizations to model, simulate, monitor, and analyse real-world scenarios in a digital environment before, or in parallel, to the existence of their physical counterparts.

A key success factor for implementing a digital twin is the ability to seamlessly integrate data in real-time from a broad variety of sources and deliver it as data microservices to digital twin applications.

This is where GigaSpaces SmartDIH comes into play.

SmartDIH is an Operational Data Hub (also referred to as a Digital Integration Hub - DIH) that exposes data microservices in real-time over unified data that it consolidates from multiple data sources and systems.

SmartDIH offers the key capabilities needed to implement a digital twin.
These include:

Data Consolidation from Multiple Sources

SmartDIH utilizes event-based architecture as well as batch loading to consolidate data from multiple diverse sources - including IIoT sensors and machines, databases and systems – into a highly performant in-memory unified data layer. Event-based streaming and CDC capabilities ensure data utilized by the digital twin is always up to date and available in real-time.

Data Consistency

SmartDIH ensures data consistency between data sources and its data layer. It supports atomic data uploads from any source, including legacy systems, and provides ultra-fast data loads leveraging proprietary algorithms and parallelism to write to memory. Data event streams can continue during data load, so that services continue operating throughout. This ensures digital twins are always in sync with their physical counterparts.

Scalability and Performance

SmartDIH's hosting layer utilizes GigaSpaces's expertise in in-memory computing to provide a high performance, highly available and resilient data layer for the use of real-time digital services. Designed for high concurrency, with the ability to scale horizontally and vertically, it can support the growing data needs of digital twins as they expand in scope.

Select Digital Twin Use Cases Powered by SmartDIH

Route Optimization

Consolidating data from real-time traffic, weather, and vehicle conditions, SmartDIH can power digital twins designed for transportation and last mile delivery optimization.

Fleet Management

Relying on continuous data streams from vehicle systems and sensors, digital twins can create virtual representations of vehicle fleets, offering real-time monitoring of vehicle health, location, and fleet efficiency.

Warehouse Management

The use of digital twins of warehouses and distribution centers can help increase efficiency, reduce errors and optimize order fulfillment through real-time monitoring of inventory levels and shipping processes.

Production Line Optimization

Real-time ingestion of data streams from IoT devices, sensors, databases, and other sources, ensure the digital twin remains synchronized with the physical asset. This allows for real-time monitoring and the ability to proactively optimize processes, raw material utilization and production capacity.

Monitoring and Control

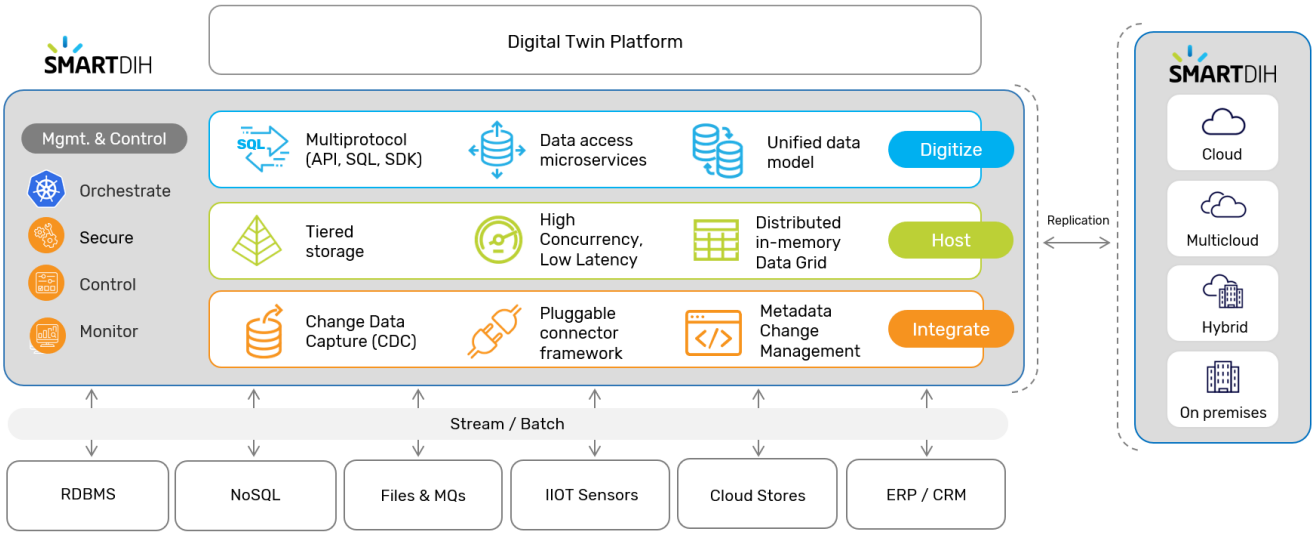
SmartDIH is managed through the SmartDIH SpaceDeck - a powerful management and monitoring console that provides end-to-end visibility of data pipelines feeding into the digital twin. SpaceDeck offers a Web UI and CLI interface for easily building and deploying new microservices in hours instead of days. This enables rapid fine-tuning of digital twin applications, simulations, and modeling to reflect changing scenarios.

Flexible Deployment

Designed for containerization and orchestration, SmartDIH can run in containerized environments, making it suitable for modern cloud-native applications. This flexibility allows for easier deployment and management of digital twins in cloud platforms, as a service or on-premises.

Key Features

- **Real-time Data Processing:** SmartDIH excels in processing and analyzing data in real-time. In the context of digital twins, this means it can handle the constant stream of data coming from physical objects and their digital counterparts, ensuring that the digital twin is always up-to-date and accurate.
- **In-Memory Computing:** GigaSpaces is a leader in in-memory computing. SmartDIH stores and processes vast amounts of data at high speeds. In the digital twins framework, this enables instant access to historical and real-time data for analysis and decision-making.
- **Scalability:** Digital twins often involve a multitude of interconnected objects and their representations. SmartDIH is horizontally scalable, allowing it to grow as the complexity and scope of a digital twin increases.
- **Data Integration:** SmartDIH can easily integrate with various and diverse data sources and systems, which is crucial for digital twins. It can ingest data from IoT devices, sensors, databases, and other sources, ensuring that the digital twin remains synchronized with the physical asset.
- **Event-Driven Architecture:** SmartDIH supports event-driven architecture, making it suitable for scenarios where events trigger actions in the digital twin. This aligns well with the reactive nature of digital twins, where changes in the physical asset should immediately reflect in its digital counterpart.
- **Machine Learning Integration:** SmartDIH can integrate with machine learning models, enabling predictive analytics for digital twins. This enables anticipation of future states and potential issues of the physical assets.
- **High Availability:** Ensuring the availability and reliability of digital twins is critical. SmartDIH offers high availability features to minimize downtime and data loss, enhancing the robustness of the digital twin environment.



SmartDIH – Driving Real-time Data for Digital Twins

SmartDIH plays a key role in consolidating data and exposing the real-time data services that drive digital twin platforms. By integrating, transforming, and unifying data from multiple diverse sources, while ensuring data consistency, availability, and scalability, it empowers organizations to harness the full value of digital twins for achieving operational excellence across their environments.

About GigaSpaces

GigaSpaces is a global pioneer in in-memory computing, building one of the market's first Digital Integration Hubs - an out-of-the-box solution that simplifies organizations' digital transformation, enabling them to develop and launch digital services at a rapid pace.

The company's flagship product is SmartDIH - an operational data hub that powers real-time modern applications. It unleashes the power of customers' data by transforming data silos into assets, turning organizations into digital-first, data-driven enterprises.

Residing at the intersection of data and application integration, SmartDIH consolidates data from multiple heterogeneous systems into a highly performant data layer. Low code tools empower data professionals to deliver data microservices in hours, rather than days, shortening developing cycles and ensuring data consistency across all digital channels.

With SmartDIH, organizations provide their customers and internal stakeholders with always-on services based on fresh data.

SmartDIH is part of the GigaSpaces Smart suite of products, alongside the award-winning Smart Cache solution.

GigaSpaces offices are located in the US, Europe, and Israel, serving customers such as American Airlines, Morgan Stanley, Bank of America, CSX, Goldman Sachs, Société Générale, Credit Agricole, Avanza Bank, Avaya, CLSA, and UBS.

GigaSpaces is an IBM Gold Partner and has business partnerships with Boomi and Capgemini.

For more information visit www.gigaspaces.com.