IoTwins: Distributed Digital Twins for industrial SMEs: a big-data platform

Description

The IOTWINS project will deliver large-scale industrial test-beds leveraging and combining data related to the manufacturing and facility management optimization domains, coming from diverse sources, such as data APIs, historical data, embedded sensors, and Open Data sources. The goal is to build a reference architecture for the development and deployment of distributed and edge-enabled digital twins of production plants and processes. Digital Twins collect data from manufacturing, maintenance, operations, facilities and operating environments, and use them to create a model of each specific asset, system, or process.These models are then used to detect and diagnose anomalies, to determine an optimal set of actions that maximize key performance metrics. IOTWINS proposes a hierarchical organization of digital twins modeling manufacturing production plants and facility management deployment environments at increasing accuracy levels:

- IoT twins: featuring lightweight models of specific components performing big-data stream processing and local control for quality management operations (low latency and high reliability);
- Edge twins: deployed at plant gateways and/or at emerging Multi-access Edge Computing nodes, providing higher level control knobs and orchestrating IoT sensors and actuators in a production locality, thus fostering local optimizations and interoperability;
- Cloud twins: performing time-consuming and typically off-line parallel simulation and deep-learning, feeding the edge twin with pre-elaborated predictive models to be efficiently executed in the premises of the production plant for monitoring/control/tuning purposes

Barcelona Supercomputing Center - Centro Nacional de Supercomputación