



3rd Press Release

AUTO-TWIN's autonomous digital twin generation system

The AUTO-TWIN project is progressing towards the objective of generating, maintaining, and updating autonomous digital twins from process mining data. Figure 1 shows the architecture of the autonomous digital twin generation system which, starting from process data will allow to generate DES simulation models.

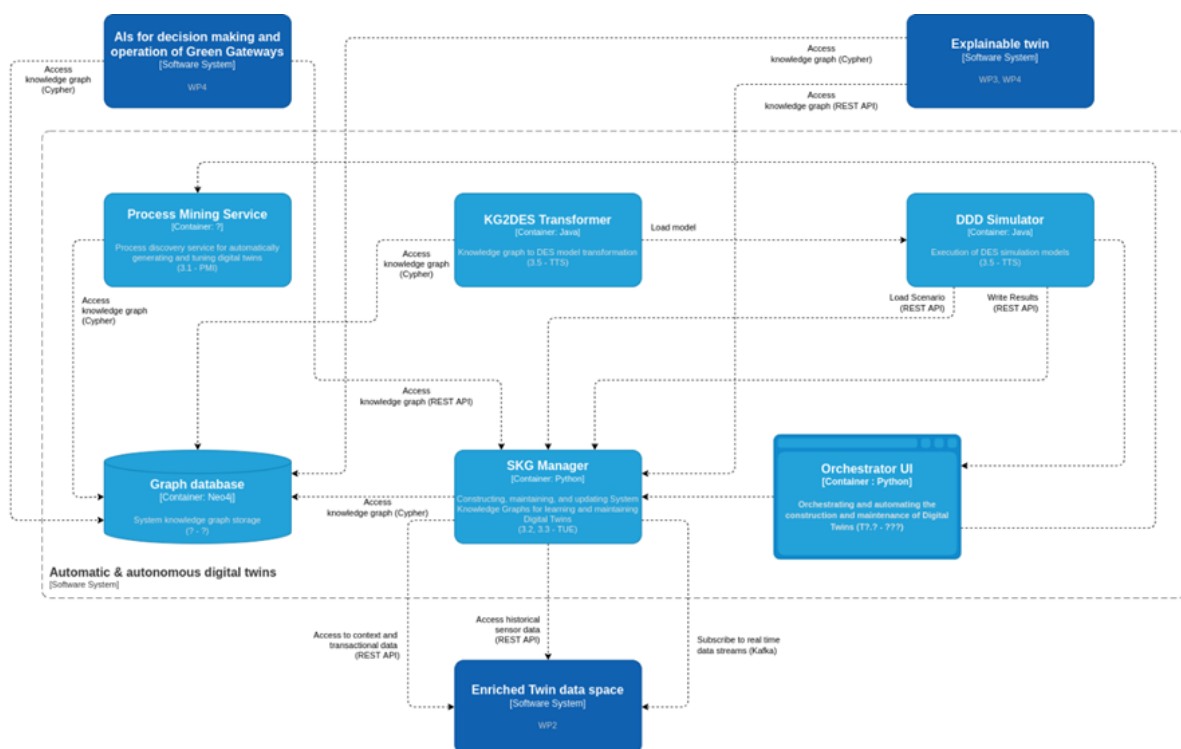


Figure 1 Architecture of the autonomous digital twin generation system

The enriched twin data space aggregates in a single source data coming from IoT sensors, MES system, ERP and other possible data origins available in the shop floor.

The core of this system is the System Knowledge Graph Manager which act as coordinator between the different components. The SKG manager accesses the Enriched Twin data space to retrieve historical and context data previously stored or subscribes to real-time data streaming services updating the SKG and storing the data structure in the Neo4j database.

The Process mining service accesses the SKG and performs the process discovery creating a meta-model which describes the process model extracted from SKG data.

The KG2DES transformer uses data created by the process mining model to create a DDD Simulator DES model which is uploaded and saved in the DDD Simulator component.

The DDD Simulator is a DES simulation environment which executes digital twins, once the model is loaded, different scenarios can be created configuring model parameters and simulation run executed, sending the results back to the SKG manager for model validation or to the GUI for evaluation.

An orchestrator web-based UI provides a central user interface for the user to access all the functions of the systems.

The development phase is starting this month, and we are aiming to test the first deployment using a virtual plant test case in the first quarter of 2024, and after that a first experimental case will be deployed on a surgical tool sterilization system.

ABOUT THE PROJECT

AUTO-TWIN: Data-driven method based on a process mining approach for Automated Digital Twin generation, operations, and maintenance in circular value chains is a 36-month project that is funded under the HORIZON Research and Innovation Actions.

AUTO-TWIN addresses the technological shortcoming and economic liability of the current system-engineering model by introducing a breakthrough method for automated process-aware discovery towards autonomous Digital Twins generation, adopting an (International Data Space) IDS-based common data space and integrating novel hardware technologies into the digital thread, to create smart Green Gateways.

CONSORTIUM

The Consortium is consisted of 13 partners from 7 countries and is under the coordination of the Politecnico di Milano.



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