

Twin Node

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Discussion

A Twin Node specializes the [Digital Twin](#) concept for a [Node](#).

A Twin Node maintains a controlled relationship with a corresponding Node so that selected aspects of the Node's identity, [Configuration](#), state, behavior, communication, or lifecycle are observed, represented, simulated, synchronized, or compared.

The corresponding Node may reside in the same [Test Environment](#), another Test Environment, an operational environment, a simulated environment, or an independently administered environment.

A Twin Node may obtain information from multiple eligible data sources. The applicable Configuration, communication policies, and [Quality of Service \(QoS\)](#) controls determine which information participates in the twin relationship.

The DIDO Reference Architecture describes a Digital Twin as comprising a real-world item, a software representation, and data linking the two. It also associates Digital Twins with simulation, predictive modeling, state monitoring, and response to observed state. [\[DTE9\]](#), Appendix A, *Digital Twin*.

The DIDO Reference Architecture also defines DDS publish-subscribe communication and DDS Quality of Service concepts that provide mechanisms for distributing information among publishers and subscribers. These mechanisms support the controlled exchange of state and other data associated with a Twin Node. [\[DTE9\]](#), DDS and DDS Quality of Service material.

A Twin Node does not inherently possess authority to control or modify the corresponding Node. Any interaction capable of altering the corresponding Node requires an explicitly governed capability.

Definition

a [Node](#) that serves as a [Digital Twin](#) of a corresponding Node through a controlled relationship among their selected identities, configurations, states, behaviors, or exchanged data

Source

- [\[DTE9\]](#), Appendix A, *Digital Twin*
- [\[DTE9\]](#), DDS and DDS Quality of Service material
- DIDO-TE specialization of the Digital Twin concept for [Nodes](#)

Note

A Twin Node and its corresponding Node need not execute the same implementation or use the same infrastructure.

The twin relationship identifies which characteristics require correspondence and which differences are intentional. The applicable [Test Definition](#), Configuration, and requirements establish the required degree of fidelity.

Where [DDS](#) provides communication between a Twin Node and corresponding Nodes or data sources, DDS publication, subscription, and Quality of Service policies provide realization mechanisms for the controlled exchange of data. These mechanisms do not, by themselves, define the semantic relationship between the Twin Node and its corresponding Node.

Multiple publishers may provide information relevant to the same Twin Node. The applicable Configuration and communication policies identify eligible information sources and the conditions governing their use. DDS Quality of Service policies govern communication behavior among compatible publishers and subscribers without defining the semantic authority of a source.

Example

A Twin Node subscribes to state produced by an operational Node, reproduces selected behavior under controlled Test Environment conditions, and publishes comparable outputs for [Validation](#) without modifying the operational Node.

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