

Distributed Immutable Data Object Test Environment (DIDO-TE)

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Discussion

A Distributed Immutable Data Object Test Environment (DIDO-TE) is a governed testing system for evaluating [Distributed Immutable Data Objects \(DIDOs\)](#) and the [Distributed Systems](#) that maintain them.

DIDO-TE manages controlled [Test Environments](#) containing the Nodes, resources, configurations, communication facilities, execution facilities, observation facilities, and Evidence facilities required by applicable Test Definitions.

DIDO-TE supports the controlled execution of tests involving:

- DIDO Platforms
- DIDO implementations
- DIDO Nodes
- Node Sets
- State-agreement mechanisms
- Distributed transactions
- DIDO states
- State transitions
- Communication mechanisms
- Network topologies
- Deployment Targets
- Security configurations
- Operational configurations
- Application workloads

DIDO-TE separates testing concepts from the technologies used to realize them. A DIDO-TE implementation can evaluate different DIDO Platforms, Node implementations, Deployment Platforms, and communication technologies without redefining the governing testing concepts.

DIDO-TE can establish a Validated Reference Configuration, execute a Test Definition against that configuration, and preserve the resulting Test Results as Baseline Results.

After an evaluator introduces a controlled change, DIDO-TE can repeat the applicable test, compare the resulting DIDO states and Test Results with the Baseline Results, identify Differences, and preserve the Evidence required for a Validation Decision.

DIDO-TE supports testing in:

- Physical environments
- Virtual environments

- Containerized environments
- Cloud environments
- On-premises environments
- Geographically distributed environments
- [Connected Environments](#)
- [Disconnected Environments](#)
- [Air-Gapped Environments](#)

Definition

governed testing system comprising controlled Test Environments and supporting facilities for the reproducible evaluation and validation of DIDs and DIDO systems

Source

Adapted from:

- [DIDO Test Environment System Description, Version 0.2](#)
- [DIDO Reference Architecture](#)
- [Distributed Immutable Data Object \(DIDO\)](#)
- [Test Environment](#)
- United States Patent Application Publication US 2022/0237111 A1, Distributed Immutable Data Object Testing
- United States Patent US 12,086,057 B2, Distributed Immutable Data Object Testing
- DIDO-TE draft Requirements Register
- DIDO-TE Broad Agency Announcement and supporting proposal material

The definition generalizes the earlier secure and isolated virtual-node sandbox concept to include governance, reproducibility, baseline generation, comparison, validation, and Evidence while remaining independent of a particular implementation technology.

Note

DIDO-TE is the acronym for **Distributed Immutable Data Object Test Environment**.

DIDO-TE identifies the governed testing system. A [Test Environment](#) identifies a configured context within which DIDO-TE executes a particular test or related group of tests.

One DIDO-TE implementation can manage multiple Test Environments.

DIDO-TE is not a DIDO Platform. DIDO-TE can evaluate one or more DIDO Platforms.

DIDO-TE is not itself a DIDO. DIDO-TE creates, submits, observes, records, compares, and validates transactions, states, and results involving DIDs.

DIDO-TE is not limited to virtual Nodes. A DIDO-TE Test Environment can include physical, virtual, containerized, simulated, emulated, and externally operated Nodes when the applicable Test Definition permits them.

DIDO-TE does not prescribe a particular:

- DIDO Platform
- State-agreement mechanism
- Deployment Platform
- Deployment Target
- Virtualization technology
- Container technology
- Cloud provider
- Network protocol
- Test execution technology
- Evidence representation
- Comparison mechanism
- Validation mechanism

DIDO-TE can integrate with [Crucible](#) for infrastructure and Deployment operations. The integration does not make Crucible part of the DIDO-TE definition.

Example

DIDO-TE creates a controlled [Test Environment](#) containing a validated set of DIDO Nodes.

DIDO-TE executes a defined set of transactions and preserves the resulting DIDO states and Test Results as Baseline Results.

An evaluator replaces one Node with a changed implementation and repeats the same test under the applicable controlled conditions.

DIDO-TE compares the resulting DIDO states and Test Results with the Baseline Results. DIDO-TE preserves the comparison, detected Differences, execution context, and supporting Evidence for a Validation Decision.

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