SISMIQ Architecture

Identity Continuity Under Interruption

Executive Summary

Modern systems increasingly operate across distributed, spatial, and heterogeneous environments where observation is frequently degraded, delayed, or incomplete. Under conditions such as occlusion, telemetry loss, latency, or sensor interference, system failure often arises from loss of identity continuity rather than loss of computation.

SISMIQ is a foundational architectural framework that defines the conditions under which identity continuity is preserved when observation is unreliable or interrupted.

This technical brief outlines the architectural problem SISMIQ addresses, introduces its core principles, and describes the conditions under which identity continuity becomes critical at scale.

The Problem: Identity Collapse Under Partial Observability

Most modern systems assume that identity can be continuously inferred from uninterrupted sensing, telemetry, or direct observation. As systems scale, this assumption becomes increasingly fragile.

In real-world environments, systems routinely encounter:

- Occlusion of physical entities
- Temporary sensor loss or degradation
- Network latency, jitter, or interruption
- Environmental interference
- Distributed execution across heterogeneous compute domains

When observation becomes incomplete, systems often experience:

- Identity drift or duplication
- Incorrect re-association upon recovery
- Forced reinitialization cycles
- Manual correction workflows

- Compounding errors as systems scale

These failure modes become increasingly difficult to sustain at scale. As system complexity increases, manual reconciliation becomes impractical, and identity instability propagates through downstream components.

Architectural Reality at Scale

At scale, identity shifts from a visual concern to an architectural one. Systems that rely on continuous observation implicitly bind identity to visibility, leaving identity fragile when that coupling breaks. Recovery logic under these conditions is often ad hoc, heuristic, or deferred to manual intervention.

One architectural response to this gap is to treat identity as a persistent internal construct and to assign system-level responsibility for maintaining identity continuity under interruption.

Architectural Approach

SISMIQ defines an architectural framework for interruption-resilient continuity, enabling systems to:

- Maintain identity internally during periods of partial or absent observability
- Preserve temporal coherence across interruption
- Perform validated identity re-association upon recovery

These behaviors may be implemented through a variety of techniques consistent with the architectural requirements.

SISMIQ establishes architectural responsibility for identity continuity across interruption, independent of any particular inference or estimation technique, allowing systems to preserve identity behavior consistently while retaining freedom of implementation.

Core Architectural Principles

1. Identity Decoupling

Identity is maintained independently of continuous observation, allowing systems to tolerate temporary loss of sensing without collapsing state.

2. Persistent State Representation
Internal state models preserve identity relationships across time, interruption, and distributed execution.

3. Continuity Under Interruption
During interruption, systems preserve temporal coherence through bounded state continuation, maintaining state stability across gaps in observation.

4. Identity Re-Association
Upon restoration of observation, identity is re-associated with preserved internal state using state-derived identifiers and validation constraints, preventing duplication or incorrect re-association while preserving non-deterministic behavior where appropriate.

5. Distributed Consistency
Identity continuity is preserved across heterogeneous compute environments, including edge and cloud domains, despite latency or partial synchronization.

Identity Re-Association and Interruption-Resilient Continuity

A defining feature of SISMIQ is its approach to identity re-association under interruption.

When observation resumes following interruption, systems must determine whether newly observed data corresponds to an existing internal identity or represents a new entity. SISMIQ defines architectural constraints governing identity re-association following interruption.

This enables systems to resume operation without forced reinitialization, visual discontinuities, or manual correction, even in dense, dynamic, or degraded environments.

Where SISMIQ Becomes Critical

Identity continuity becomes critical in domains where interruption is a normal operating condition, including:

- Defense and mission systems operating in contested or denied environments
- Robotics and autonomous systems interacting with dynamic physical environments

- Simulation and digital twin platforms operating with delayed or incomplete telemetry
- Aerospace and space systems with intermittent communication
- Virtual production and film pipelines with occlusion, wardrobe changes, and sensor interference
- Medical and healthcare systems requiring continuity despite sensor displacement or obstruction

As these systems scale, identity instability becomes a structural bottleneck.

Conclusion

SISMIQ addresses a foundational architectural limitation in modern distributed and spatial systems: maintaining identity continuity under interruption.

By establishing architectural responsibilities for interruption-resilient continuity and identity re-association, SISMIQ frames how systems can maintain reliable behavior under real-world conditions where observation cannot be assumed.

SISMIQ applies in contexts where identity persistence, recovery, and correctness are essential to system behavior at scale. Application of these architectural principles may raise system-specific interpretation questions, particularly under real-world interruption conditions.

Contact

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