SISMIQ Architecture

Identity Continuity Under Interruption

Executive Summary

Modern systems increasingly operate across distributed, spatial, and heterogeneous environments where continuous observation cannot be guaranteed. Under real-world conditions—such as occlusion, telemetry loss, latency, or degraded sensing—many systems fail not because computation stops, but because **identity continuity collapses**.

SISMIQ is a foundational system architecture designed to preserve and restore identity continuity when observation breaks. By decoupling identity from continuous visibility, SISMIQ enables systems to maintain coherent internal state and to re-establish identity relationships following interruption—without forced reinitialization.

This technical brief introduces the architectural problem SISMIQ addresses, outlines its core principles, and describes where 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. This assumption does not hold at scale.

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 are **unsustainable at scale**. As systems grow in complexity, manual reconciliation becomes impractical, and identity instability propagates across dependent subsystems.

Architectural Reality at Scale

At scale, identity is no longer a visual problem—it is an architectural one.

Systems that rely on continuous observation implicitly couple identity to visibility. When that coupling breaks, identity becomes fragile. Recovery logic is often ad hoc, heuristic, or deferred to manual intervention.

SISMIQ addresses this architectural gap by treating identity as a **persistent internal construct**, rather than a transient byproduct of observation.

The SISMIQ Approach

SISMIQ introduces an architectural framework for **Interruption-Resilient Continuity**.

Rather than relying solely on uninterrupted sensing, SISMIQ enables systems to:

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

This is achieved through **Surface-Independent State Mapping (SISM)**, which allows identity to persist independently of continuous surface visibility or direct observation.

SISMIQ does not prescribe a specific algorithm or implementation. Instead, it defines architectural behavior and system responsibilities that enable identity continuity across interruption.

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. Predictive Continuity

During interruption, systems maintain temporal coherence using bounded estimation rather than halting or resetting.

4. Identity Re-Binding

Upon restoration of observation, identity is deterministically re-associated with internal state using state-derived identifiers, preventing duplication or incorrect reassociation.

5. Distributed Consistency

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

Identity Re-Binding and Interruption-Resilient Continuity

A defining feature of SISMIQ is its approach to **identity re-binding**.

When observation resumes following interruption, systems must determine whether newly observed data corresponds to an existing internal identity or represents a new entity. SISMIQ provides an architectural framework for this decision, using state-derived identifiers and continuity constraints rather than naive proximity or surface similarity alone.

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 unavoidable in domains where interruption is expected rather than exceptional, including:

- Defense and mission systems operating in contested or denied environments
- Virtual production and film pipelines with occlusion, wardrobe changes, and sensor interference
- 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
- 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: the inability to preserve identity continuity under interruption.

By defining an architectural approach to interruption-resilient continuity and identity re-binding, SISMIQ enables systems to operate reliably under real-world conditions where observation cannot be guaranteed.

SISMIQ is applicable wherever identity persistence, recovery, and correctness are critical to system behavior at scale.

Contact

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