

PIC Model: Provenance Identity Continuity (PIC) Model for Distributed Execution Systems-

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Abstract—The Executor-First Paradigm mandates that identity is an emergent property of the current execution state and its verifiable cause. The Provenance Identity Continuity (PIC) Model defines the invariants that identity MUST satisfy across the entire causal sequence of execution, addressing the inherent limitations of artifact-centric security models.

The model includes the Structural Impossibility Claim (NO-GO Result), which presents a structural impossibility argument, not a mathematical proof. Formal treatment is delegated to future work.

I. INTRODUCTION

This model is derived from a natural observation of the delegation pattern and multhop nature dei sistemi distribuiti. Even in a paper-based artifact format, delegation involves the delegator (who signs) and the delegate (who proves their identity). In such a model, an artifact loses its meaning if the delegate is removed; anyone who acquires it can claim its use, thereby nullifying the intrinsic value of the delegation artifact itself. The two minimal required entities are the delegator and the delegate. Therefore, the validity of both the delegator and the delegate must be proven—two single inputs. Any other method that introduces complexity only increases the attack surface, rendering the approach weaker from a security perspective.

II. TERMINOLOGY AND GRANULARITY

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Author's Note on Intellectual Property and Generative Assistance

The **PIC Model**, its complete axiomatic system, formal definitions, and the **Structural Impossibility Claim (NO-GO Result)** represent the sole original intellectual property and core theoretical contribution of the author.

Generative AI tools were employed exclusively for editorial refinement, stylistic polishing, structural organization, and ensuring notational consistency, and made no conceptual or scientific contribution to the model presented.

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