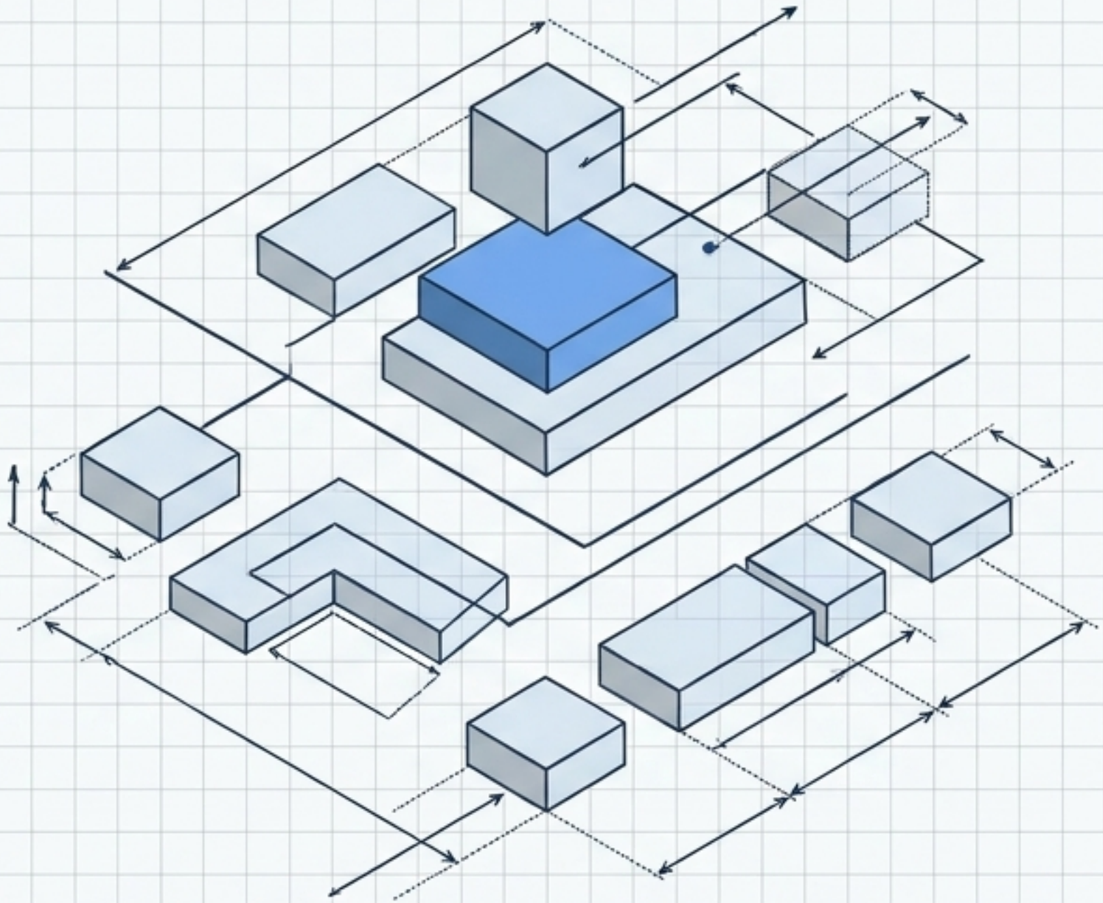
Distributed Authoritative Governance Model

Multi-Plane Zero Trust Architecture in SkyDefended InfraApp (v1.1)



Document: D06 - IAM + PIM + ABAC
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NEXOCYBER NETWORKS

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The Paradigm of Authoritative Sovereignty

SkyDefended InfraApp implements a sovereign layer of distributed authoritative governance built on explicit cryptographic trust.

Identity-Centric

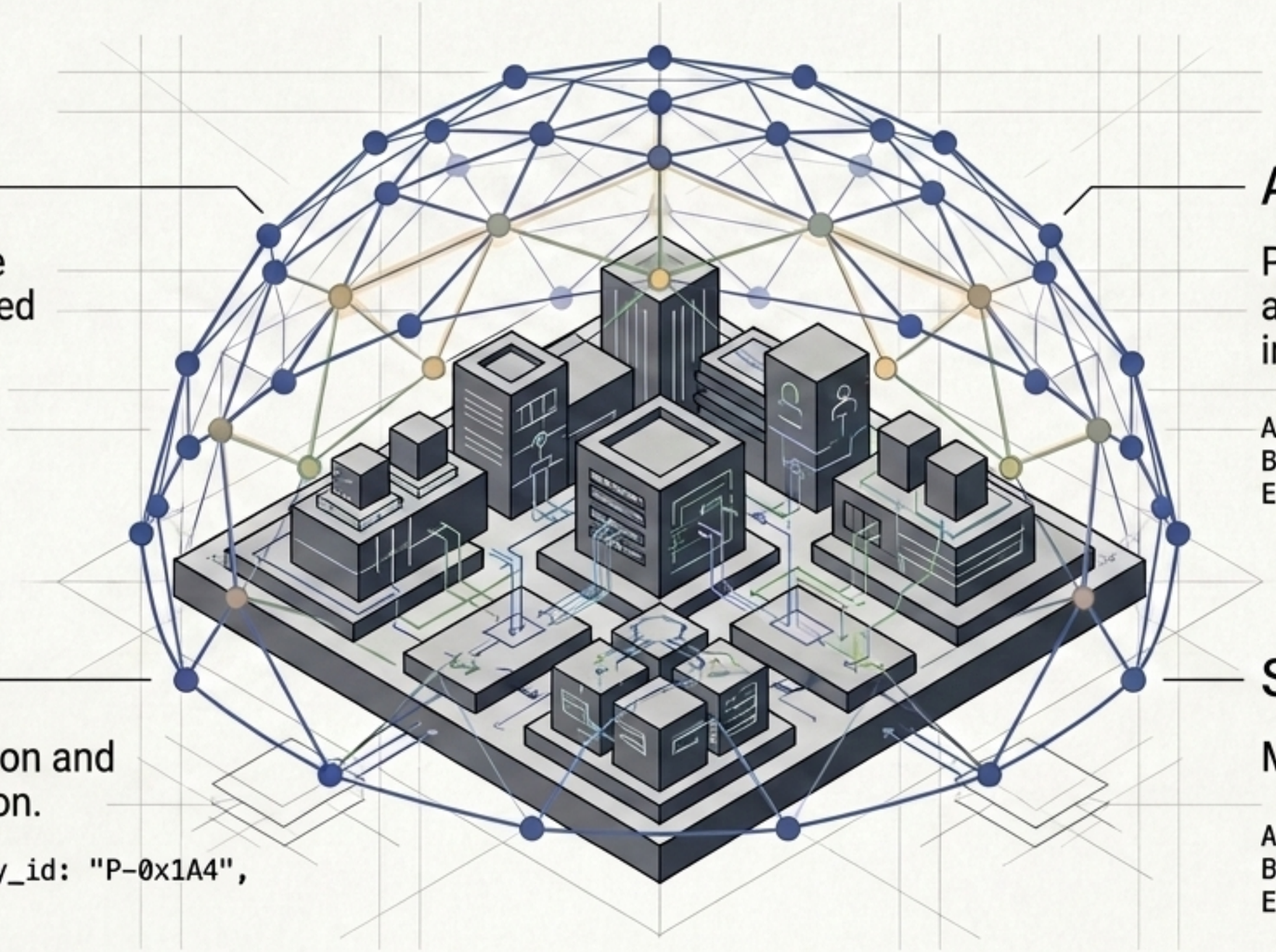
Authorization follows the cryptographically validated identity.

```
PKI_VALIDATED: true;
ASSERTION_BOUND: user_did
```

Application Autonomy

Provides the unified administrative layer without invading business logic.

```
ADMIN_LAYER: unified_control;
BUSINESS_LOGIC: untouched;
ENFORCEMENT: decentralized
```



Context-Aware

Distributed local validation and real-time ABAC evaluation.

```
LOCAL_POLICY_EVAL: {policy_id: "P-0x1A4",
timestamp: "T-NOW",
risk_level: "LOW"}
```

Sovereign Shield

Multi-tenant ecosystem

```
ADMIN_LAYER: unified_control;
BUSINESS_LOGIC: untuched;
ENFORCEMENT: decentralized
```

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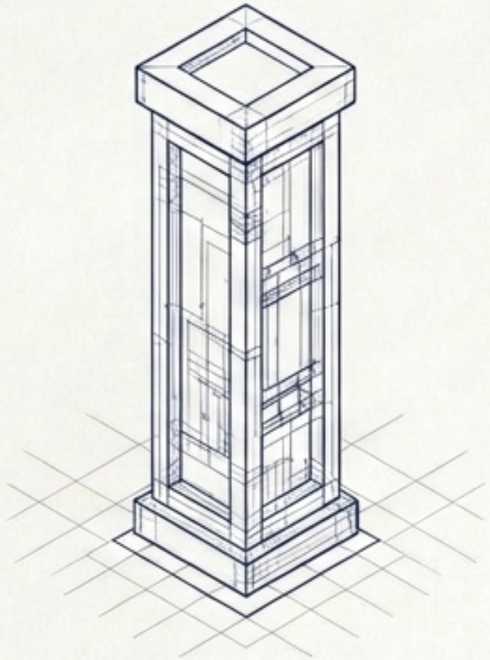
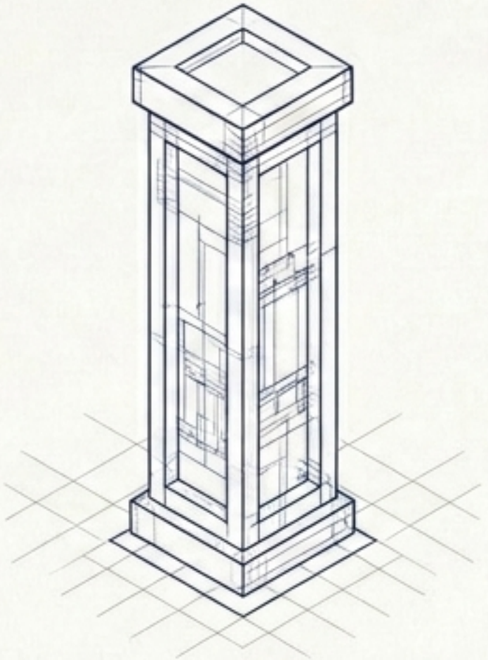
Decoupling Access: The Zero Trust Triad



Authentication (Identity)

Question: Who are you?

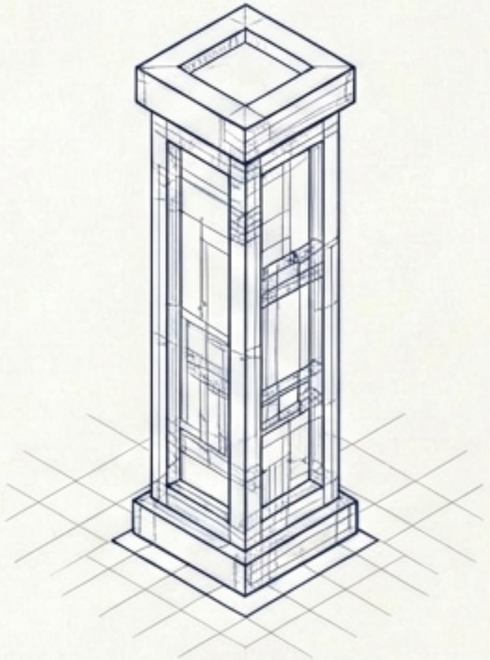
Mechanism: `Valid identity, credentials, OIDC.`



Cryptographic Trust (D02)

Question: Can we relate?

Mechanism: `RSA Signatures, JWKS, Trust Bundles, Engines.`



Authorization (D06)

Question: What can you do in this relationship?
Mechanism: `Explicit permissions, IAM, PIM, local validation.`

Cryptographic trust and authorization represent strictly distinct layers of the system.

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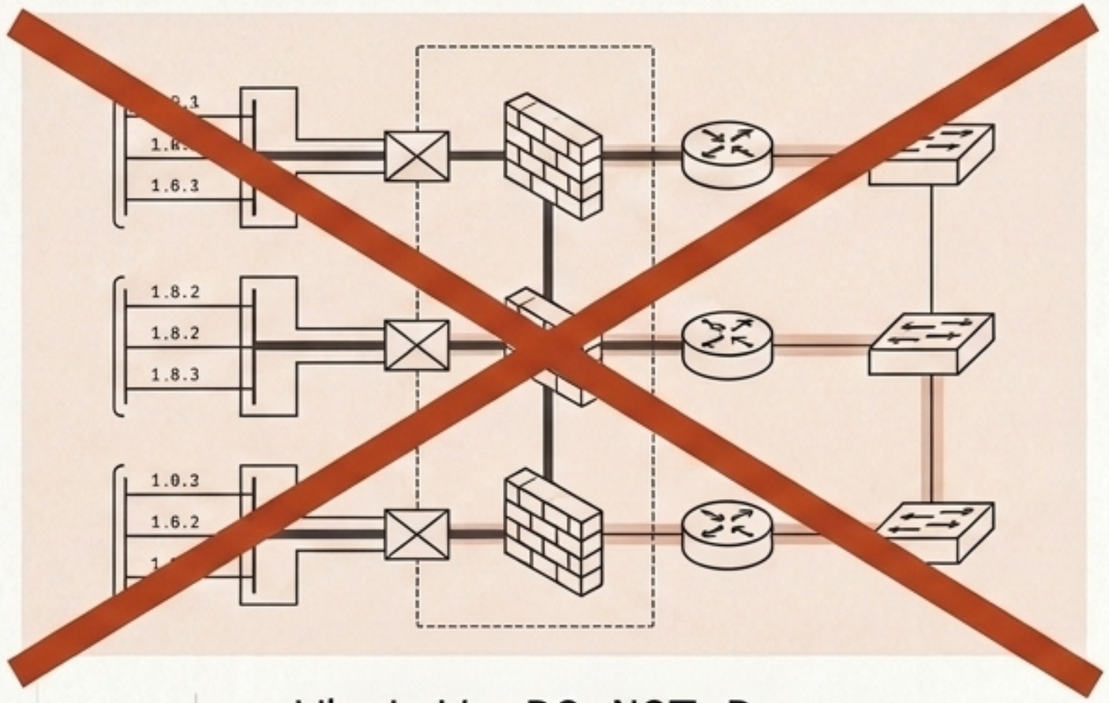
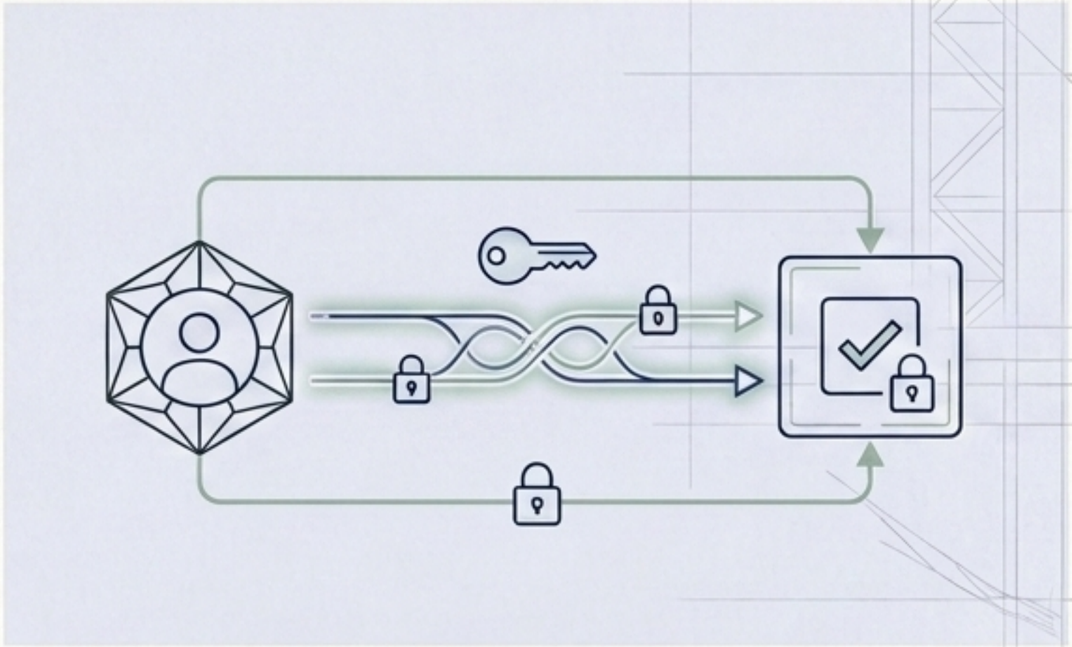
Zero Trust Principles: Decision Vectors



What We DO NOT Do

SkyDefended InfraApp does NOT base authorization on:

- Network or subnets.
- Cluster or shared infrastructure.
- Topological proximity.
- IP or physical location.



What We DO

Authorization always derives from:

- Explicit identity.
- Declared authorizative capacity.
- Context.
- Cryptographically authorized relationships.
- Local validation.

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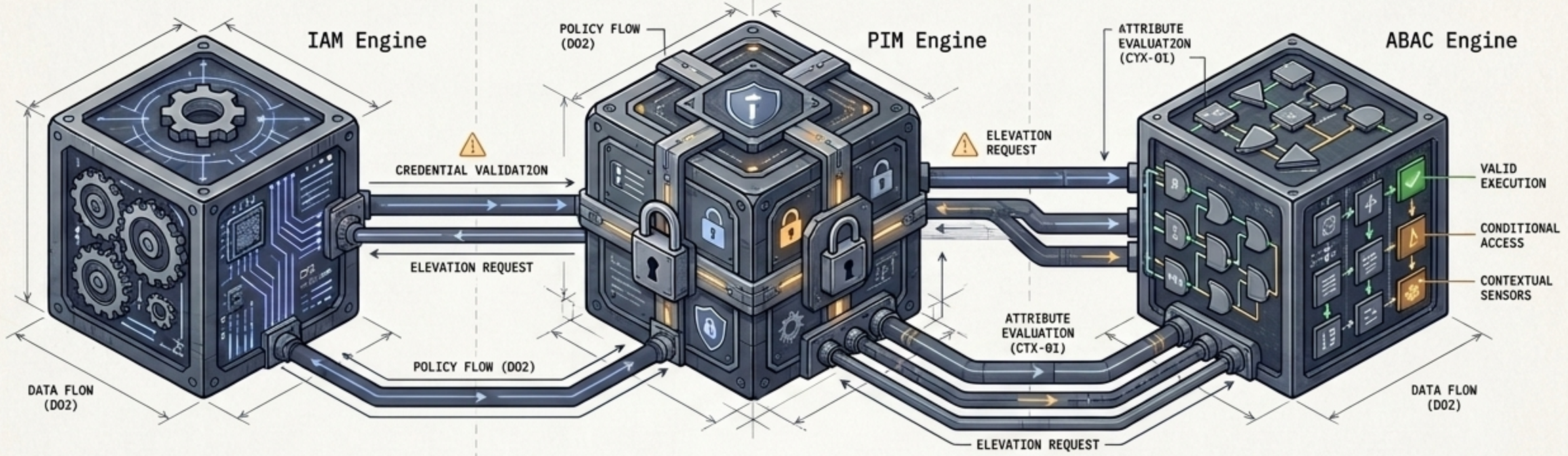
Governance Engines: IAM, PIM and ABAC



IAM (Identity & Access Management)	PIM (Privileged Identity Management)	ABAC (Attribute-Based Access Control)
Nature: Persistent structural capacity.	**Nature:** Contextual temporary elevation.	**Nature:** Contextual restriction.
Purpose: Daily operation, automation, base roles.	**Purpose:** Critical operations, destructive changes, auditing.	**Purpose:** Define under what conditions an already authorized capacity operates.
Duration: Permanent.	**Duration:** Limited (with automatic expiration).	**Mechanism:** Rules on bindings and roles.

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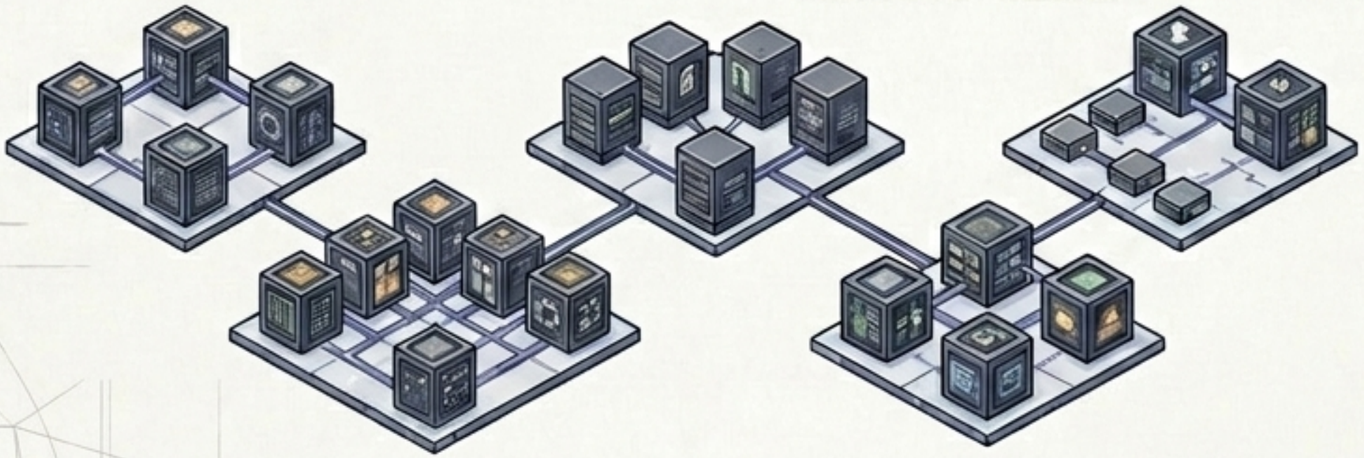
Isolation Topology: Control vs. Access

Control Plane

Key Characteristics
▪ **Governs:** Platform Root of Trust, operators, authoritative synchronization.
▪ **Excludes:** Tenants, functional business logic.
▪ **Model:** PIM-First (Temporary elevation priority).

TRUST BOUNDARY

Access Plane



Key Characteristics
▪ **Governs:** Tenants, functional users, application administration.
▪ **Model:** Hybrid (Persistent operational IAM + PIM for sensitive ops.).

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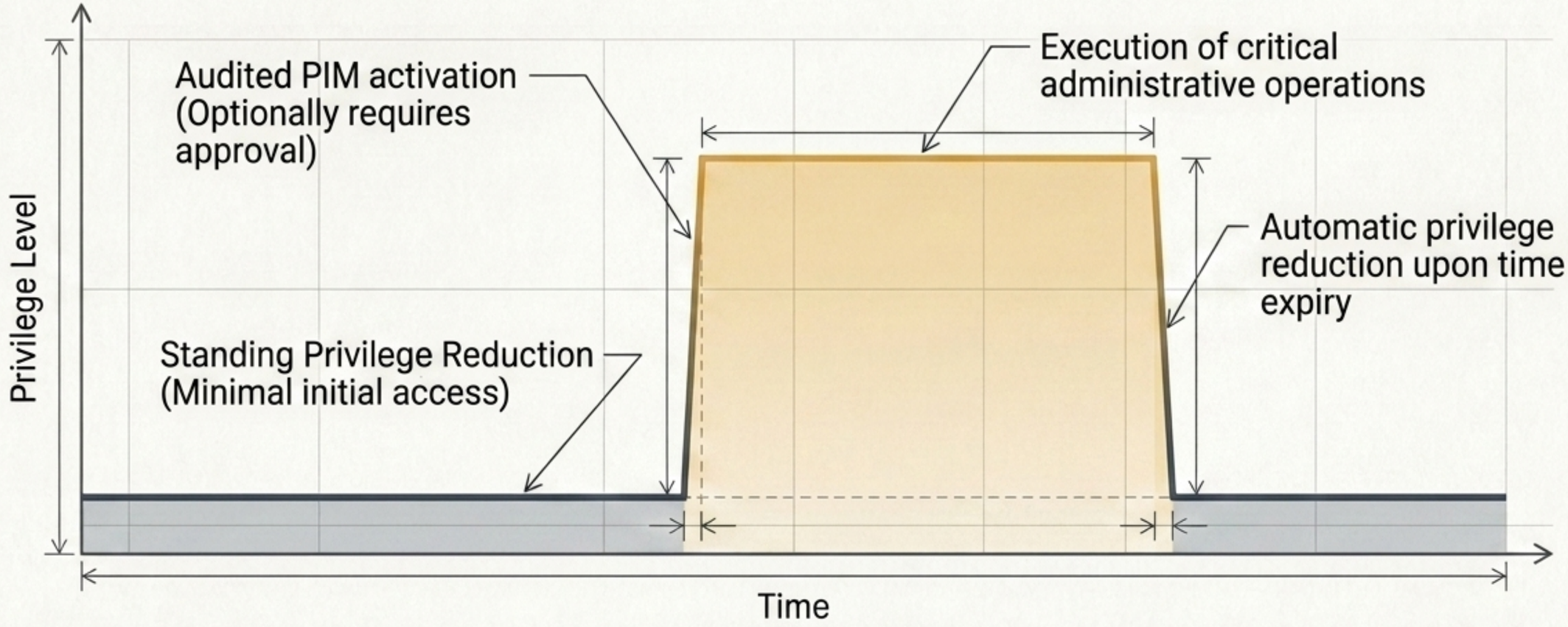
Control Plane: PIM-First Architecture



Permanent IAM roles are reserved for automation and machine identities. Human administrative operation occurs exclusively through temporary PIM elevation.

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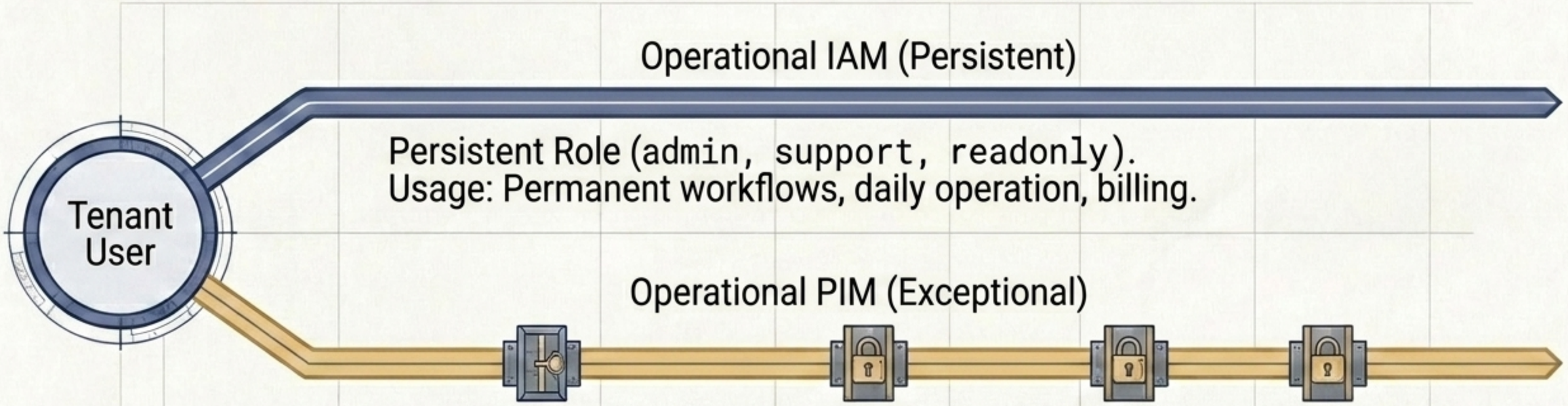
Access Plane: Hybrid Operational Governance



Users maintain one or several persistent IAM roles, with zero or several temporarily assignable PIM roles.

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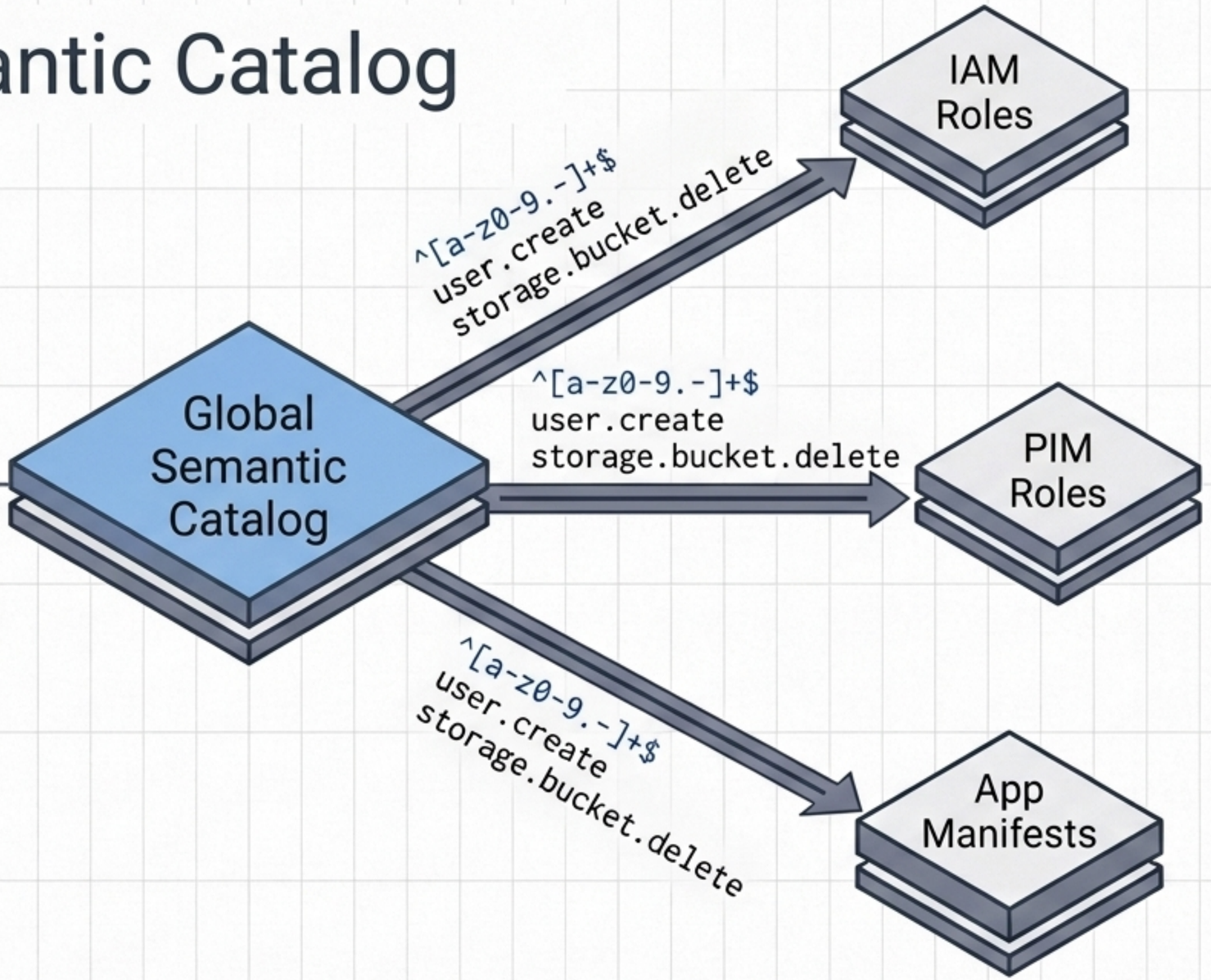
The Global Semantic Catalog

- **Global Semantic Identity:** Permissions are identified by unique slugs (e.g., `user.create`, `storage.bucket.delete`).

- **Single Source of Truth:** Permissions exist only once. PIM and IAM Roles instantiate the same semantic permissions without duplicating them.



Exclusions

The catalog does NOT store state: it does not contain sessions, bindings, tenants, or active elevations. Only reusable definitions.

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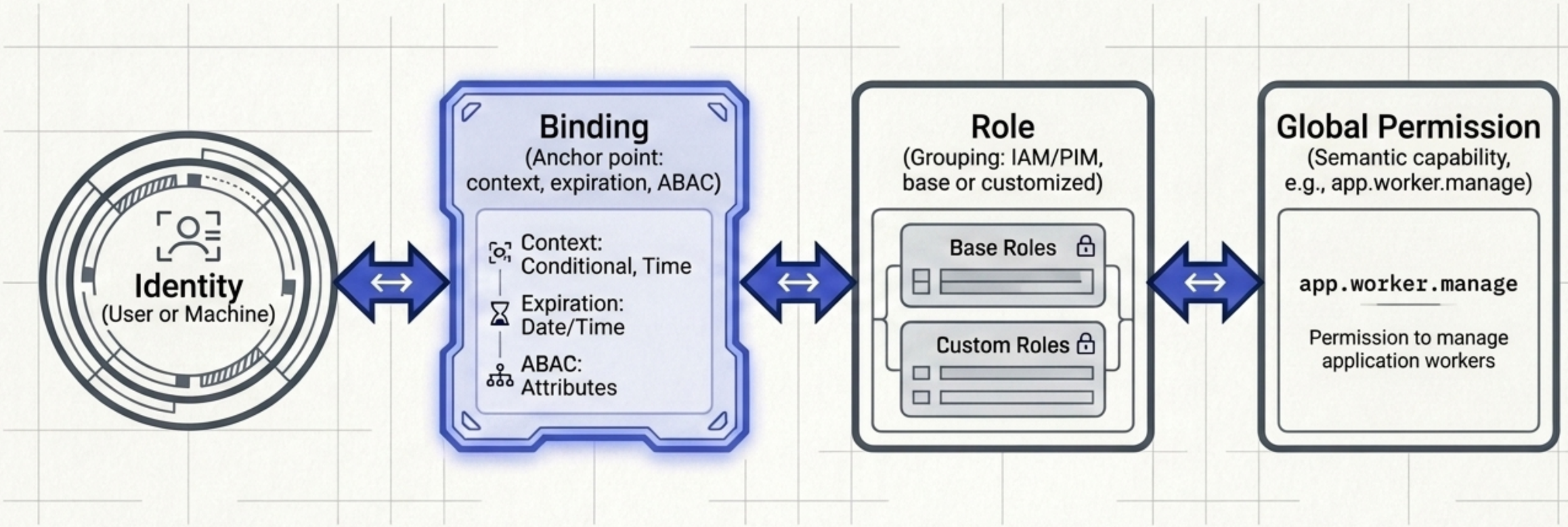
Anatomy of Assignment: Authoritative Bindings



Insight

The binding is the effective assignment. It dynamically relates identities to groupings of semantic capabilities.

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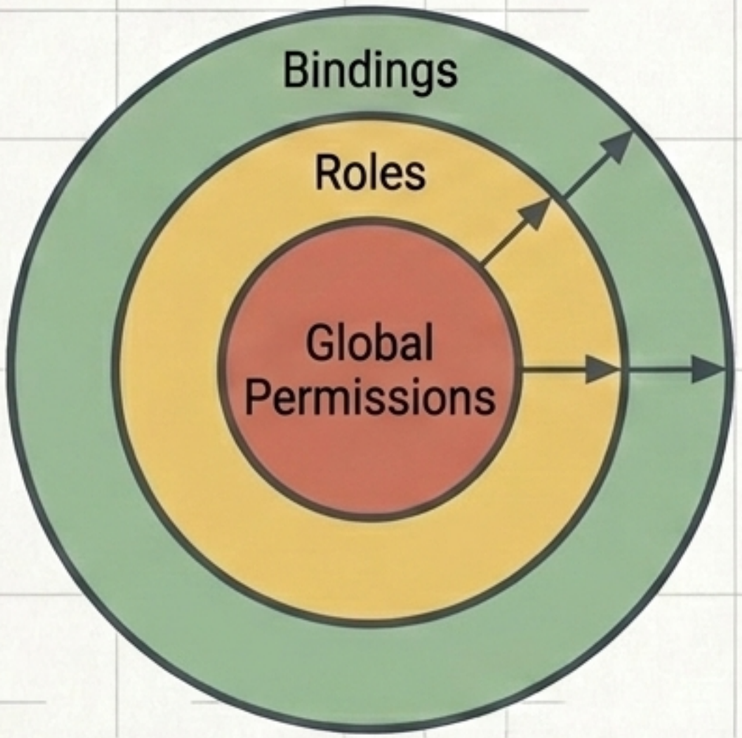
“Blast Radius” Control: Contextual ABAC Strategy



- **(Red) NEVER on Permissions (Access):** Applying ABAC to global permissions causes contextual pollution, blocking system operations by propagating restrictions to all roles that use that permission.
- **(Green) YES on Bindings and Roles:** The ABAC contextual restriction is applied in the outer layers of assignment.

In the Access Plane, permissions remain as pure authoritative semantics. Contextualization occurs locally in the Binding.

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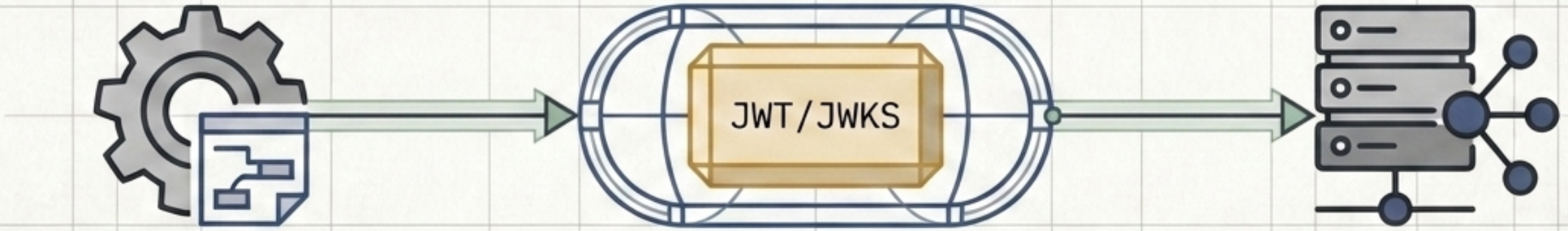
Machine Identity and Service Principals Governance



Non-Human Subjects

Workers, internal processes, pipelines, App <-> App integration.

Control Mechanism

- Machine identities operate mainly under persistent IAM roles.
- They are governed by the same global permissions, bindings, and ABAC restrictions as human identities.
- Inter-application communication requires cryptographically signed workloads (D02).

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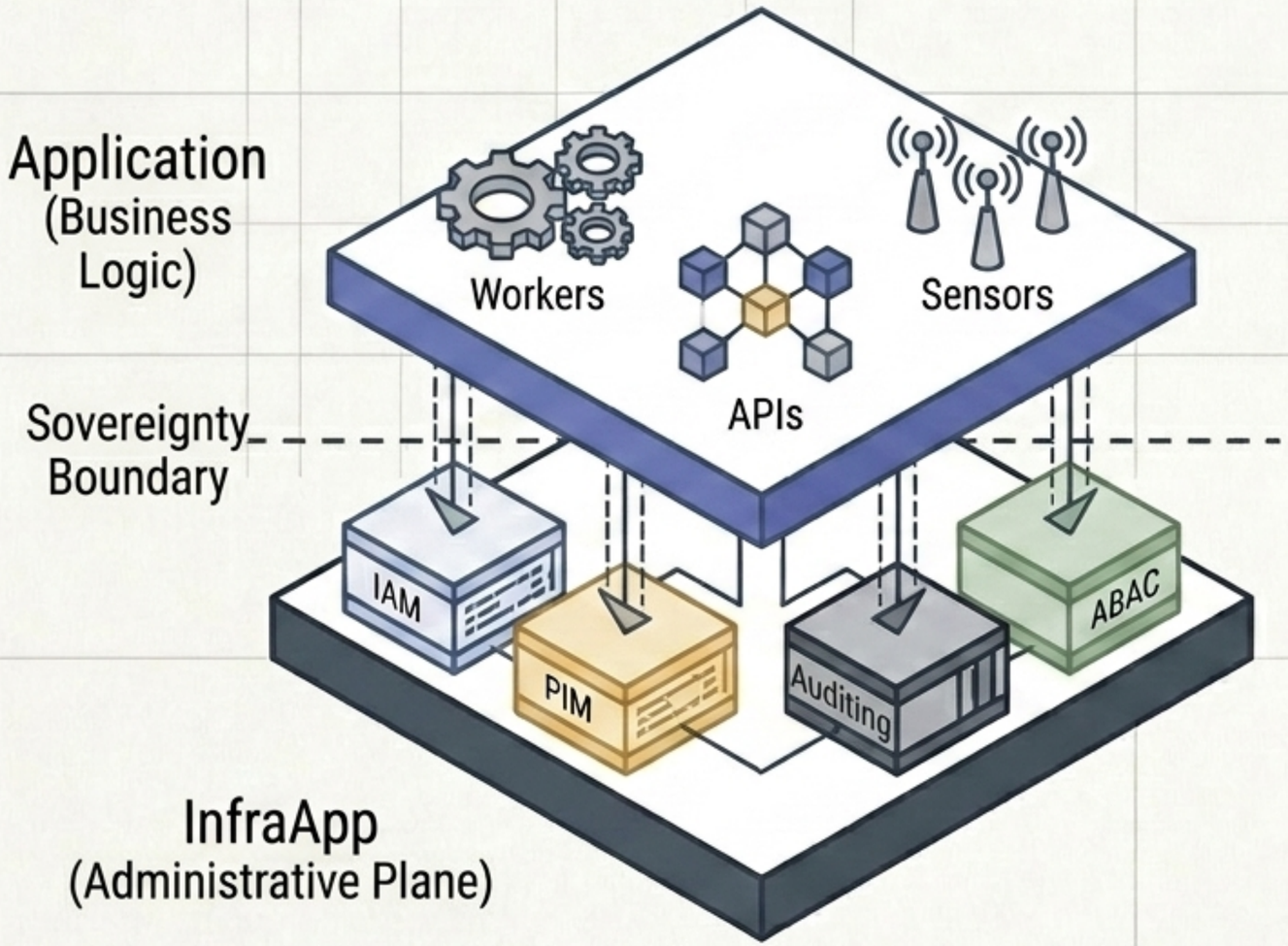
Application Integration: The Unified Administrative Plane



- **Functional Autonomy**: The app mainteins 100% control over its business logic, public APIs, and internal processes.
- **Delegated Administrative Layer:** The app synchronizes its permissions (manifests) with InfraApp, consuming the platform to govern administrative users, privilege elevation, and auditing.

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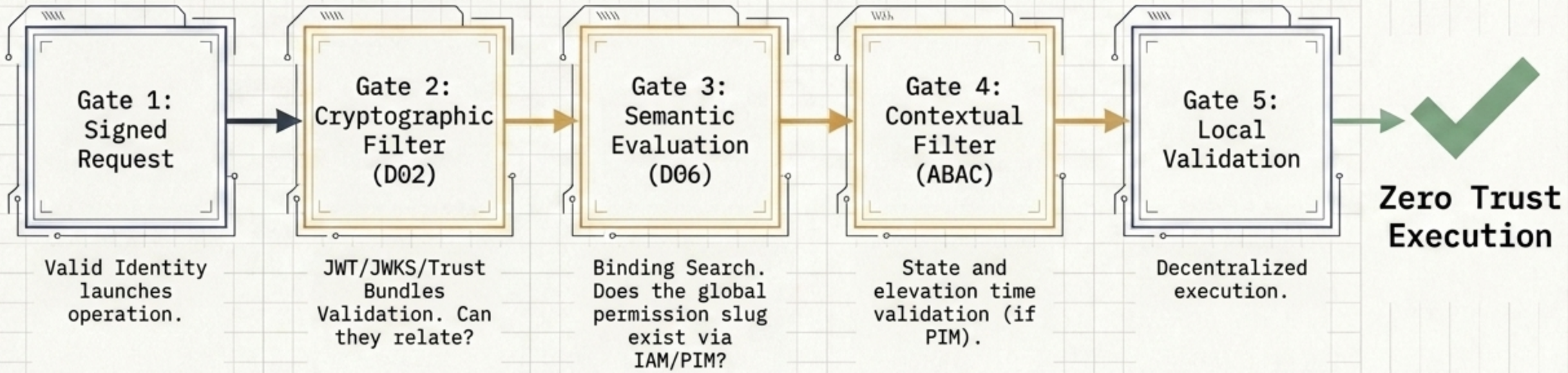
Distributed Authorization Flow (Synthesis)



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Architectural Conclusions

SkyDefended InfraApp implements a sovereign layer of distributed authorization governance built on explicit cryptographic trust.

Control

Maintains global semantic authority.

Access

Materializes the operational and contextual authorization.

Applications

Consume IAM/PIM/ABAC while retaining absolute functional autonomy.

Architecture complete. End of D06 specification.

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