Whitepaper

Why Your AI Agents Need a First-Class Identity

The Developer's Guide to Securing Multi-Agent Workloads



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Introducing Agent as Principal

Traditional identity architecture was engineered around a static, two-actor paradigm: an explicit human user interacting with a deterministic application client. When you introduce multi-layered agent topologies, where orchestration layers and sub-agents dynamically execute downstream requests on behalf of users or autonomously, core protocols like OAuth 2.0 must be extended to properly track the execution path and secure new vulnerabilities. Because standard specs lack native semantics for agent delegation and security, engineering teams are forced to build hand-rolled security workarounds at the application layer. This introduces significant technical debt, dragging teams into repetitive security review loops that heavily delay production. Worse, a lack of assurance over agent access and auditing forces developers to scale back agentic capabilities, ultimately resulting in less useful AI.

To address these authorization and tracking bottlenecks, Auth0 has introduced **Agent as Principal**** in Developer Preview, our solution for treating agent workloads as distinct, first-class identity primitives alongside users and services. Provisioning independent, policy-governed identity profiles tied directly to agents allows engineering teams to clear organizational security reviews on the first pass. But beyond the compliance checklist, it fundamentally changes how people interact with AI:

- For the builder, it replaces the dread and constraints of the security review with the joy of shipping. They get to build useful, cutting-edge agents that can be trusted to remain secure despite nondeterministic runtime behavior.
- For the user, agentic identity can eliminate manual developer-managed provisioning, replacing it with secure, out-of-the-box profiles for AI agents so users can instantly delegate work to AI.
- For the admin, it provides peace of mind. It turns a potentially catastrophic security blindspot into a tractable, auditable system so they can finally sleep at night.

This architecture provides complete execution-path telemetry and allows developers to safely deploy autonomous workloads while maintaining isolated, granular access control.

Why Legacy OAuth Fails in Agentic Architectures

OAuth 2.0 was designed around a strict two-actor paradigm: an explicit **User** (Resource Owner) and a static App (Client). When you introduce dynamic, multi-layered agent topologies into this model, the protocol architecture breaks down in three specific areas:

1. **Loss of the Delegation Chain**

   When a downstream agent invokes a resource on a user's behalf, standard OAuth flows only propagate the identity of the immediate caller. The resource server loses visibility into the upstream execution path. Because the full acting chain is obscured, downstream authorization components must make access decisions without complete context, creating structural security vulnerabilities. An agent, for example, could then access something that the end user is not authorized to access.

2. **The OAuth Entity Model Collapse**

   Without a native identity primitive for agents, teams are forced to either register every specialized sub-agent as generic clients or as end users. At scale, hundreds of distinct workloads become completely indistinguishable at the identity layer. This makes it impossible to enforce agent-specific access policies, strips out fine-grained audit logging, and disconnects the execution context from the underlying workload identity.

3. **Coarse-Grained Blast Radius during Revocation**

   Traditional OAuth wasn't built for AI agents. To authorize agentic workloads within this framework, developers are forced to map multiple agents to a single user session or issue independent, fragmented tokens across dozens of microservices. This setup creates a massive identity sprawl, which makes incident response a nightmare.



When a security alert flags a compromised agent workload, the on-call team faces a massive tracking problem. Because thousands of detached tokens are floating around the system, tracing exactly which token belongs to the malicious agent instance is incredibly difficult. It is way too easy to miss the actual threat.

This visibility gap forces a brutal choice during a breach. Because you cannot pinpoint the single malicious actor among thousands of entities, granular revocation is impossible. You are forced to either try revoking tokens piecemeal and risk leaving the attacker active, or pull the plug and shut down the entire multi-service environment just to guarantee safety, knocking healthy workflows offline and causing massive, unnecessary downtime.

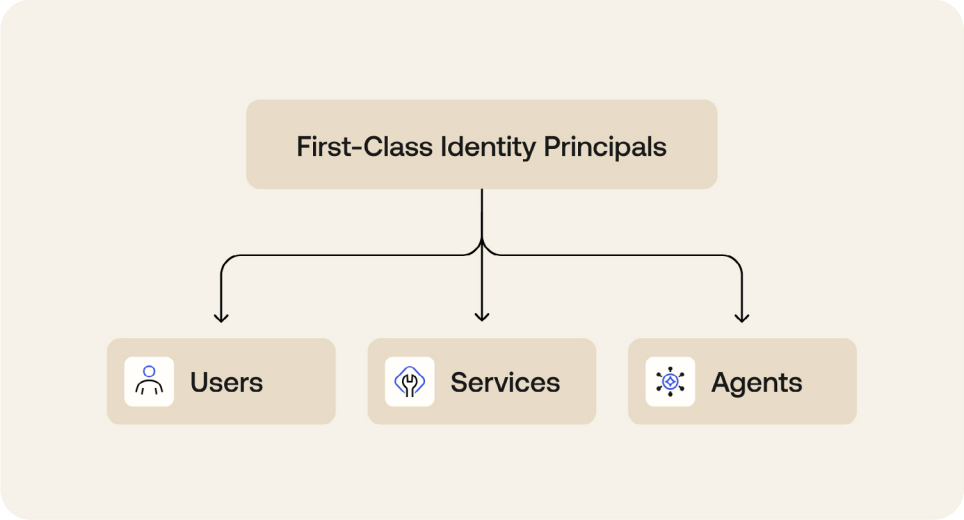
Without a way to treat agents as distinct, trackable identities, developers are stuck choosing between blind, incomplete revocation and crashing the whole system.

```
[ Legacy OAuth Model ] -> Only recognizes:
User <----> App/Client

[ Agentic Reality ] -> Creates structural gaps
in Auditing, Delegation, & Revocation
```

Treating Agents as a First-Class Identity Principal

To resolve these architectural limitations, the identity layer must treat an AI agent as a distinct primitive—a first-class identity principal that sits natively alongside users and services.



An architecture based on **Agent as Principal** establishes three core capabilities at the system level:

- **Granular Audit Trails:** Audit logs track the specific agent identifier (`agent_id`) executing the transaction, rather than logging a broad, shared client ID or a masked service account.
- **Targeted Revocation:** Access tokens and authorizations can be invalidated at the individual agent boundary without killing the parent user session or breaking parallel workloads.
- **Isolated Policy Enforcement:** Access control policies (RBAC/ABAC) are bound directly to the agent's unique identity profile, evaluated independently of the client application or user context it currently operates under.

To operationalize these capabilities, the architecture must solve for runtime authentication, specifically, how agents prove their identity without static secrets.

Eliminating Static Secrets with Workload Federation

Once Agent as Principal establishes who the agent is, the next step is proving that identity securely at runtime. The common workaround today is to hardcode a static `client_secret` into every agent, which just triggers the exact same secret sprawl and leak risks developers are trying to avoid.

Workload Identity Federation fixes this. Instead of baking in secrets, agents authenticate using identity tokens natively issued by the platform they already run on, whether that's AWS, GCP, GitHub Actions, Vercel, or a SPIFFE-compliant runtime. Auth0 simply verifies that platform token and exchanges it for a short-lived, scoped access token. This isn't experimental, either; major cloud hosts and developer platforms have been running this exact RFC 8693 Token Exchange pattern in production for years.

The real win for your developers? Every agent is secret-less by default. Credential rotation is completely wiped from the backlog, meaning teams can ship from prototype to production without building a custom secrets-management pipeline first.

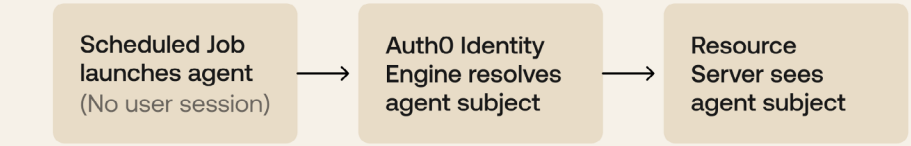


Core Enterprise Use Cases & Implementation Workflows

USE CASE #1

Autonomous Agent Acting as Itself (Autonomous Client Credentials)

A completely automated system job, such as an isolated `metrics-collector`, runs on a schedule with no active user session in the loop, authenticating natively to query internal APIs.



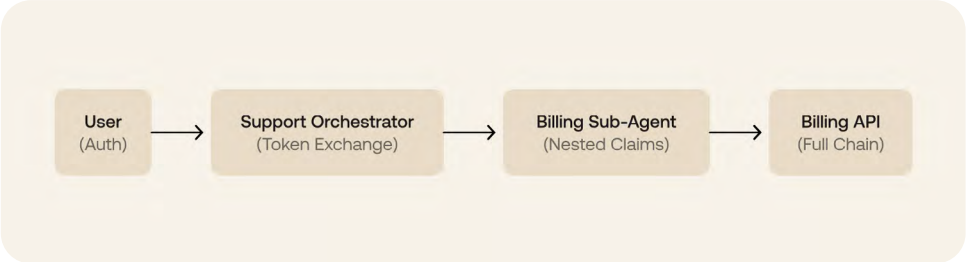
End-to-End Execution Flow:

1. **Scheduled Job Launches:** The automated `metrics-collector` initializes. Because there is no active user session, the agent stands as the sole principal in the operational flow.
2. **Native Authentication:** The agent presents its unique client credentials, authenticating via a standard OAuth 2.0 client credentials grant at the token endpoint.
3. **Identity Resolution:** Auth0 resolves the agent as the explicit subject. The generated token's sub claim contains the specific `agent_id`, while a `sub_profile:ai_agent` claim explicitly communicates the entity type to the resource server.
4. **Policy Bounding:** Application access policies explicitly restrict and bound what the specific agent is authorized to request. API access is strictly managed through the clients associated directly with that agent.
5. **Token Issuance:** The system issues the final access token, injecting the explicit `agent_id` alongside the standard client information inside the system logs for robust auditing.
6. **API Execution:** The `metrics-collector` calls the target `metrics-api`. The receiving resource server processes the token and recognizes a distinct agent as the subject, completely differentiating it from a generic M2M client.

USE CASE #2

Multi-Hop Agent-to-Agent Delegation

Alice, a support engineer, invokes an orchestrator agent to resolve a multi-faceted request. The orchestrator subsequently hands a portion of the workload over to a specialized sub-agent.



End-to-End Execution Flow:

1. **User Invocation:** Alice authenticates successfully and establishes an active session. Next, she invokes the primary `support-orchestrator` agent. The orchestrator successfully obtains an access token on her behalf.
2. **Delegation Request:** The orchestrator determines it requires downstream data from a specialized `billing-agent`. It securely requests a delegated token via the RFC 8693 Token Exchange pattern.
3. **Nesting the Chain:** Auth0 dynamically nests the delegation chain. Using a nested "actor" or `act` claim, the token creates a chronological paper trail of every agent that handled the request, supporting up to 5 individual delegation hops. This lets downstream services see exactly which agent called which, while still preserving Alice as the primary subject who kicked off the entire process.
4. **Downstream Execution:** The `billing-agent` executes a call to the underlying `billing-api`. The resource server reads the nested `act` chain, instantly validating the full contextual visibility of Alice, the orchestrator, and the billing sub-agent.

USE CASE #3

Surgical Revocation with Zero Collateral Damage

A single agent is making anomalous scope requests at 2:00 AM and is flagged by an anomaly detection system for suspicious behavior. Security teams must neutralize the threat instantly. This requires isolating the compromised agent without disrupting the experience for Alice, the user the agent was acting on behalf of.



End-to-End Execution Flow:

1. **Anomaly Detection:** A log monitoring tool flags anomalies like sudden spikes in scope requests coming from a specific agent workload.
2. **Targeted Administrative Action:** Security administrators use pinpointed logs to identify the exact `agent_id`. This allows them to revoke access for that specific agent ID without disrupting Alice's active user session.
3. **Targeted Audit Logs:** The system generates logs stamped with a unique `agent_id`. This gives security teams immediate visibility to see exactly which users delegated authority to the agent, allowing them to pinpoint the malicious actor without any guesswork.
4. **Isolated Agent Revocation:** Because the agent exists as its own distinct entity, administrators can instantly delete or revoke that specific agent's access across the entire network.
5. **Zero Collateral Damage:** Alice's direct user session remains completely untouched and active. Simultaneously, separate healthy agents acting on behalf of Alice stay up and continue running normally. The system blast radius matches the exact scope of the security intervention.

Conclusion

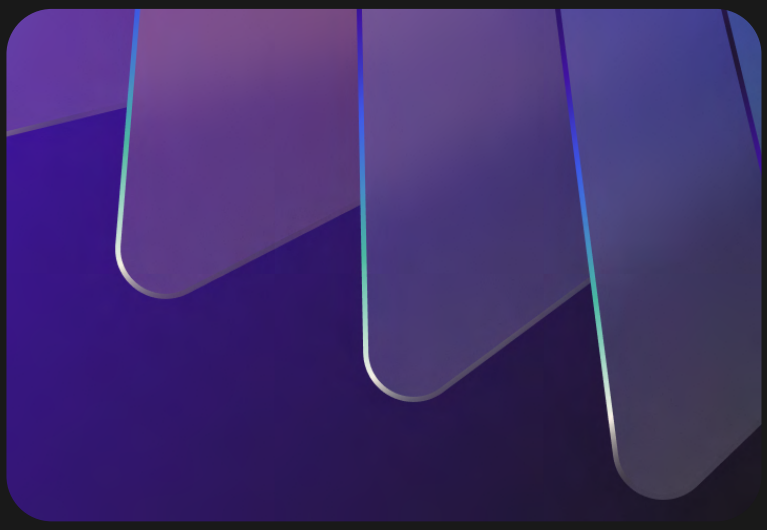
Treating autonomous multi-agent workloads as generic M2M clients can introduce severe operational friction that directly stalls shipping velocity and degrades system reliability. When identity frameworks lack native semantics for agent topologies, development teams are forced to build and maintain custom, brittle security logic at the application layer, driving up technical debt and engineering churn.

Transitioning to our **Agent as Principal** architecture via Auth0 solves this by offloading token translation and multi-hop delegation mechanics directly to the identity tier. Eliminating this security boilerplate dramatically accelerates time to market for engineering teams, allowing them to pull standard SDKs and focus entirely on core business logic.

Furthermore, by baking isolated agent identities (`agent_id`) into the platform fabric by default, organizations help ensure that newly deployed agents are architecturally production-ready, highly auditable, and capable of being selectively revoked without causing downstream downtime or service instability.

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Why Your AI Agents Need a First-Class Identity

okta
The World's Identity Company™

Okta Inc.
100 First Street
San Francisco, CA 94105
info@okta.com
1-888-722-7871