anoBytes | TECHNOLOGY SOLUTIONS

Identity standards, demystified

How modern web apps authenticate users and access APIs

STANDARDS, IDPS, AND THE TYPICAL LOGIN FLOW

3 problems to solve
authN, authZ, provisioning

6 standards in active use
across modern IdPs , plus OAuth 2.1 on the way

01 Authentication, proving who the user is

"Are you the right person?" The IdP verifies identity and tells the app.

AUTHN · WHO YOU ARE

SAML 2.0

OASIS Standard, March 2005. XML-based assertions.

SAML is what enterprise IT teams configure when they want their employees to sign in to your app using their corporate identity. Common in regulated industries and large enterprises.

OpenID Connect (OIDC)

OpenID Foundation, 2014. ISO/IEC 26131:2024. JSON/JWT identity layer on OAuth 2.0.

Modern login. Adds an ID token (JWT) and an optional UserInfo endpoint to OAuth 2.0. The default choice for new web apps, mobile apps, and SPAs.

FIDO2 / WebAuthn (passkeys)

W3C Recommendation, WebAuthn Level 2 (2021), FIDO Alliance CTAP. Public-key cryptography.

Phishing-resistant credential. Replaces or strengthens passwords using a key pair bound to the device. The basis for passkeys across Apple, Google, and Microsoft ecosystems.

02 Authorization, granting access without sharing credentials

"What can this app do on the user's behalf?" Tokens scope the access.

AUTHZ · WHAT YOU CAN DO

OAuth 2.0

IETF RFC 6749, October 2012. Delegated access via access tokens.

Lets an app call an API on the user's behalf without seeing their password. Used by Microsoft Graph, Google APIs, and most modern API integrations. Authorization, not authentication.

OAuth 2.1 (in progress)

IETF Working Group draft. Consolidates OAuth 2.0 with security best practices.

Makes PKCE mandatory, removes the Implicit and Resource Owner Password Credentials flows, and forbids bearer tokens in URL query parameters. Intended to supersede OAuth 2.0 once finalized.

OAuth 2.0 Token Exchange

IETF RFC 8693, January 2020. Security token exchange.

Service-to-service identity propagation. Lets a service swap one token for another with narrower scope or different audience. Increasingly relevant for AI agents and microservices.

03 Provisioning, keeping the directory in sync

"Who exists, and what changed?" Automatic user lifecycle across systems.

SYNC · WHO EXISTS

SCIM 2.0

IETF RFC 7642/7643/7644, September 2015. REST/JSON user provisioning.

Creates, updates, and deactivates accounts across systems, where both sides support SCIM. When HR adds a hire to your IdP, SCIM pushes that user into Salesforce, Slack, and other connected apps.

04 The Identity Provider layer

An IdP is the system that authenticates users and issues tokens. The standards are the contract.

IDP · THE CONTRACT

Microsoft Entra ID

SAML 2.0, OIDC / OAuth 2.0, SCIM 2.0, FIDO2 passkeys (device-bound and synced).

Microsoft recommends OIDC for new apps. WS-Federation supported but not recommended.

Google Workspace

SAML 2.0, OIDC, OAuth 2.0, SCIM 2.0 (Cloud Identity auto-provisioning), FIDO2 / passkeys.

SSO profiles support custom OIDC IdPs and SAML. Pre-configured profile available for Entra ID.

Other major IdPs

Okta, Ping Identity, Auth0, OneLogin, and JumpCloud all support SAML 2.0, OIDC, OAuth 2.0, SCIM 2.0, and FIDO2/WebAuthn. Token Exchange support varies by vendor.

05 A typical web app authentication flow

User logs in once, app gets identity, then calls APIs on the user's behalf.

SCIM runs in the background, syncing user accounts between the IdP and connected apps.

PRACTICE

Identity standards in practice

Real integrations, common pitfalls, and a decision guide

06 Real-world integration examples

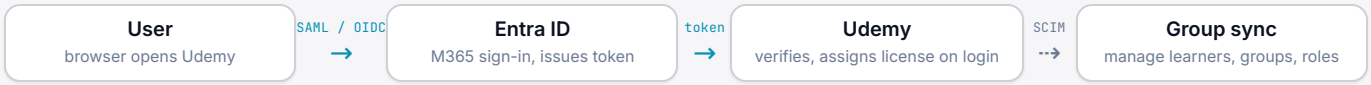
Four common patterns connecting external apps and pipelines to Microsoft Entra ID.

KnowBe4 + Microsoft Entra ID

SAML 2.0 SSO with SCIM 2.0 user provisioning.

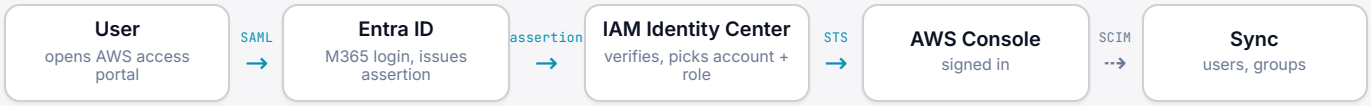
Udemy Business + Microsoft Entra ID

SAML 2.0 or OIDC for SSO and SCIM 2.0 (Enterprise Plan only).



AWS Management Console + Microsoft Entra ID

SAML 2.0 to AWS IAM Identity Center with SCIM 2.0.



GitHub Actions + Azure (CI/CD authentication)

OIDC with workload identity federation. No stored secrets.

Replaces long-lived service principal secrets. Subject is constrained to a specific repo, branch, tag, or environment.

Solid arrows are the live login or auth flow. Dashed arrows are SCIM provisioning, runs in the background.

07 Glossary, terms used everywhere, defined nowhere

Shared vocabulary for the protocols and roles above.

IdP, Identity Provider
The system that authenticates users and issues tokens. Entra ID, Okta, Google.

SP, Service Provider
The app the user is logging into. KnowBe4, Udemy, AWS. The receiver of the assertion.

RP, Relying Party
OIDC's name for the SP. Same role, different vocabulary.

Assertion, claim
A signed statement from the IdP about the user (email, name, group).

JWT, JSON Web Token
RFC 7519. The compact, signed JSON format used by OIDC and OAuth.

PKCE, Proof Key for Code Exchange
RFC 7636. Stops auth-code interception. Mandatory in OAuth 2.1.

08 These are not standards

Common terms that name an experience or pattern, not a wire protocol.

SSO, Single Sign-On
A user experience, not a protocol. Delivered by SAML or OIDC.

MFA, Multi-Factor Authentication
A security category, not a protocol. Implemented by FIDO2, TOTP, push, SMS.

Federation
A trust pattern between organizations or tenants, not a wire protocol.

Zero Trust
An architecture and philosophy. NIST SP 800-207 describes it. No single standard.

09 Quick comparison

The four dimensions that drive which standard to use.

STANDARD	PURPOSE	TOKEN FORMAT	BEST FOR
SAML 2.0 OASIS	**Authentication** Enterprise SSO	**XML assertion** Signed	Legacy enterprise apps, regulated industries
OpenID Connect OpenID Foundation	**Authentication** Modern login	**JWT (ID token)** JSON	New web apps, mobile, single-page apps
FIDO2 / WebAuthn W3C, FIDO Alliance	**Authentication** Phishing-resistant	**Public key pair** Device-bound or synced	Passwordless MFA, passkey rollouts
OAuth 2.0 IETF RFC 6749	**Authorization** Delegated API access	**Access token** Opaque or JWT	API integrations (Graph, Drive, etc.)
Token Exchange IETF RFC 8693	**Authorization** Identity propagation	**Token swap** JWT or opaque	Service-to-service, microservices, agents
SCIM 2.0 IETF RFC 7642/7643/7644	**Provisioning** User lifecycle	**REST + JSON** CRUD on /Users	Auto-provisioning users into SaaS apps

10 Common pitfalls

Mistakes that pass review but fail in production.

- **Using OAuth 2.0 alone for authentication**
  An access token proves authorization, not identity. Use OIDC for login.
- **Assuming SAML is dead**
  Regulated industries and large enterprises still standardize on it.
- **Building a B2B app with only OIDC**
  Many enterprise customers require SAML for SSO. Implement both protocols.
- **Treating synced passkeys as single-factor**
  When user verification (biometric or PIN) is required, they satisfy MFA in enterprise policy engines such as Entra ID Conditional Access and Google Workspace.
  These meet NIST's AAL2; AAL3, the highest tier, still requires a hardware-bound key (SP 800-63B-4).
- **Skipping SCIM and relying on JIT provisioning**
  JIT creates accounts on login but never deactivates them on offboarding.
- **Confusing "SCIM" without specifying a version**
  SCIM 1.1 and 2.0 are not interoperable. Always verify the version.

11 Use this when...

Pick the standard that matches the situation.

New SaaS or web app needing user login
→ OpenID Connect (OIDC). The modern default for new apps.

Enterprise customer mandates SSO with their IdP
→ SAML 2.0, the default for legacy IdPs and regulated industries, though OIDC is increasingly accepted.

App needs to call Microsoft Graph or Google APIs
→ OAuth 2.0 for the API call (OAuth 2.1 once finalized); use OIDC to sign the user in.

Replacing passwords with phishing-resistant MFA
→ FIDO2 / WebAuthn passkeys.

CI/CD pipeline deploying to a cloud
→ OIDC with workload identity federation. No stored secrets, scoped to repo or branch.

Auto-provision and deprovision users in SaaS
→ SCIM 2.0.

Sign in to AWS Console with M365 credentials
→ SAML 2.0 to AWS IAM Identity Center, plus SCIM 2.0 to keep users in sync.

Roll out training apps like KnowBe4 or Udemy
→ SAML 2.0 (or OIDC if supported) plus SCIM 2.0 for HR-driven user lifecycle.

Wiring AI agents or microservices to call APIs as the user
→ OAuth 2.0 with Token Exchange (RFC 8693) where identity must propagate across service hops.