brijpandeyji

# REST API Authentication Methods

## Unlock the Power of REST APIs with Secure and Reliable Authentication Methods

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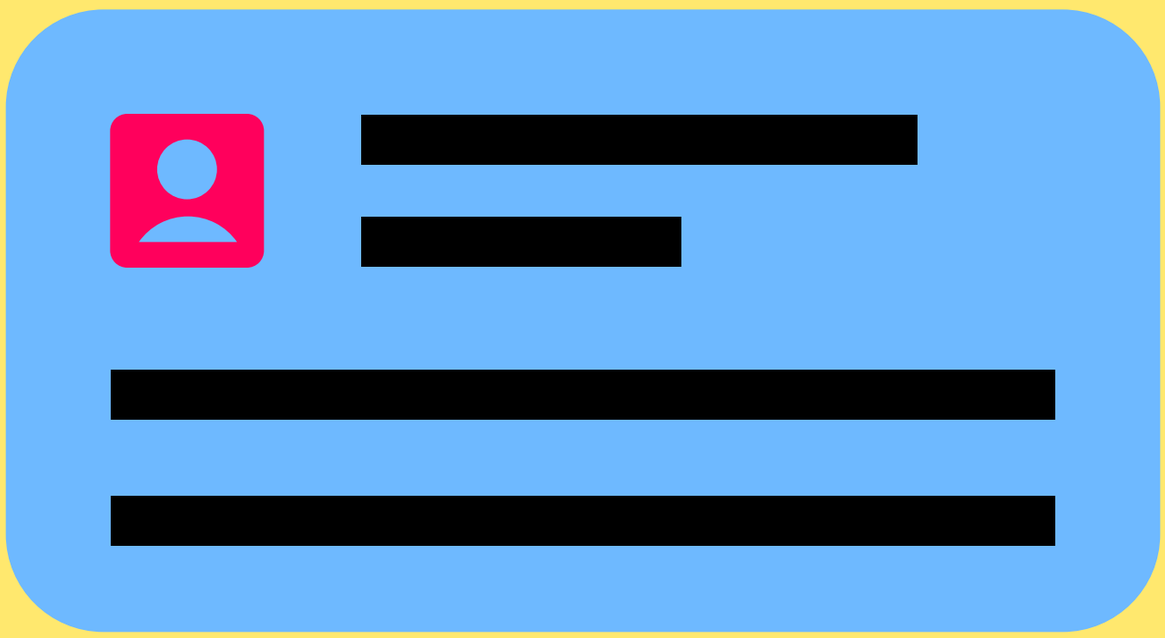
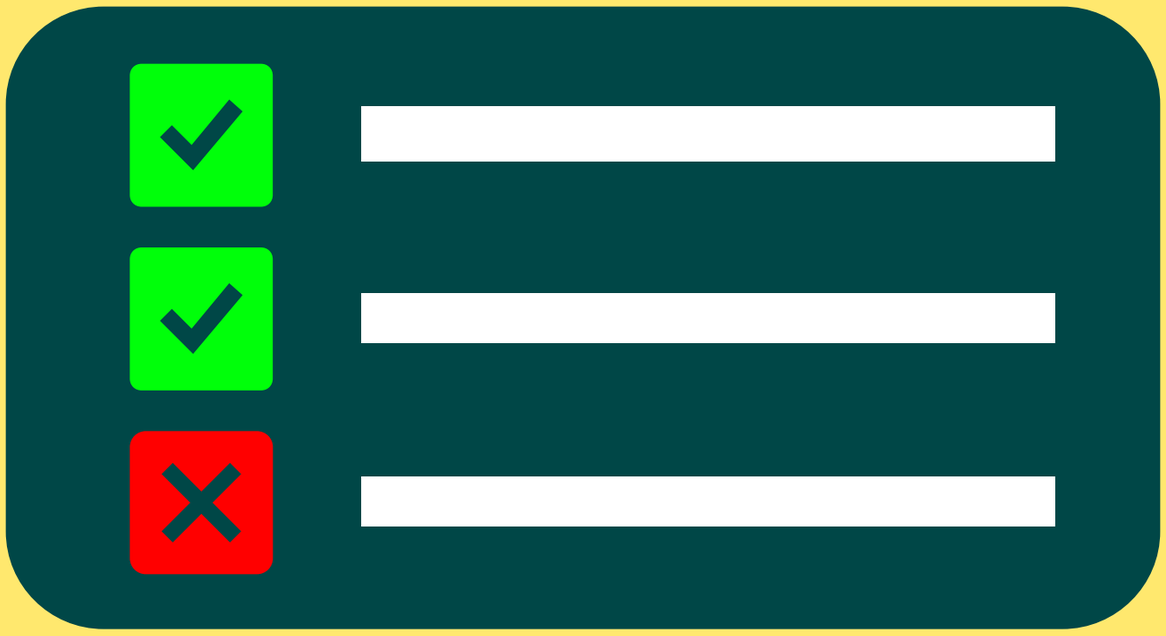
# Diagram



## Authentication

Who you are



## Authorization

What you can do

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# Authentication

Authentication is the process of proving that you are who you say you are. It is the process of proving your identity.

Example

An employee can enter the office if their identity is verified using an ID card.

# Authorization

Authorization  is the process of determining what actions you are allowed to take based on your identity and permissions.

Example

An employee may be allowed into the office but may not be allowed into the server room.

In summary, authentication refers to proving correct identity and authorization refers to allowing a certain action. An API might authenticate you but not authorize you to make a certain request.

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# Authentication Methods

- Basic and Bearer
- API Keys
- OAuth (2.0)
- OpenID Connect

These are the four most common Authentication Methods

Let us now take a closer look at them

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# Basic Authentication

HTTP Basic Authentication is rarely recommended due to its inherent security vulnerabilities.

This is the most straightforward method and the easiest. With this method, the sender places a username:password into the request header.

Example of a Basic Auth in a request header

Authorization: Basic bG9sOnNlY3VyZQ==

The username and password are encoded with Base64, which is an encoding technique that converts the username and password into a set of 64 characters to ensure safe transmission.

This method does not require cookies, session IDs, login pages, and other such specialty solutions, and because it uses the HTTP header itself, there's no need to handshakes or other complex response systems.

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# Bearer Authentication

Bearer authentication (also called token authentication) is an HTTP authentication scheme that involves security tokens called bearer tokens.

Bearer authentication refers to a method of granting access to a specific resource or URL by presenting a bearer token. This token, often a complex string generated by a server upon receiving a login request, serves as authorization for the bearer to access the specified resource. In other words, the name "bearer authentication" can be interpreted as granting access to whoever possesses the designated token.

The client must send this token in the Authorization header when making requests to protected resources:

Authorization: Bearer <token>

Bearer authentication was first introduced in OAuth 2.0 through the RFC-6750. It can also be used independently from OAuth. Like Basic authentication, Bearer authentication should only be utilized with HTTPS (SSL) for secure communication.

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# API Keys

A unique value is created and assigned to each first-time user in this method as a way of identifying them. This value serves as a marker that indicates the user is known.

API keys were introduced as a solution to the authentication problems that were present in earlier systems such as HTTP Basic Authentication.

When a user tries to access the system again, they must provide a unique key to prove their identity. This key may be generated based on the user's hardware and IP data, or it may be randomly generated by the server that recognizes the user. The purpose of this key is to confirm that the user is the same individual who was previously granted access to the system.

API keys are a common standard in the industry, but they should not be considered a strong security measure. Despite their widespread use, it is important to consider alternative measures to ensure the security of sensitive information.

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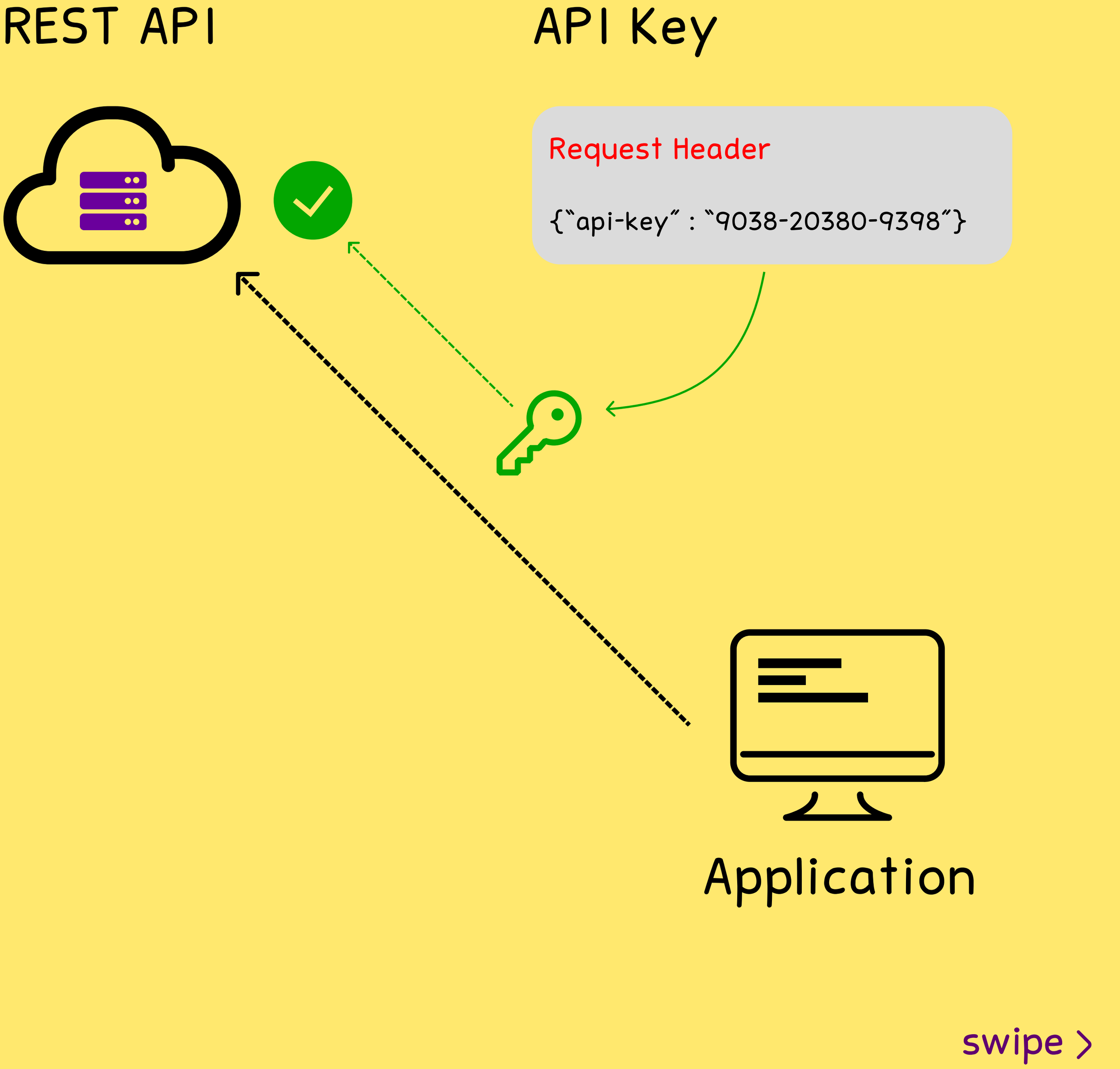
# API Keys - Diagram

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# API Keys

API keys are often included in the query string of URLs, making it easier for unauthorized individuals to discover and access them.

Avoid including API keys or other sensitive information in query string parameters. Instead, consider placing the API key in the Authorization header for greater security.

Example

Authorization: Apikey 1234567890abcdef

API keys often appear in various locations such as :

- Authorization Header
- Basic Auth
- Body Data
- Custom Header
- Query String

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# API Keys

API Keys are a useful tool because they are easy to use. One identifier is all that is needed, making them a practical choice for certain situations. Additionally, API Keys are a valid option for a variety of reasons.

For instance, if an API is limited specifically in functionality where "read" is the only possible command, an API Key can be an adequate solution. Without the need to edit, modify, or delete, security is a lower concern.

The problem, however, is that anyone who makes a request to a service, transmits their key and in theory, this key can be picked up just as easy as any network transmission, and if any point in the entire network is insecure, the entire network is exposed.

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# OAuth (2.0)

OAuth 2.0 is an effective way to identify individual user accounts and provide the appropriate permissions. When using this method, a user logs into a system, which prompts the request for authentication. This request is typically in the form of a token, which the user then sends to an authentication server. The server then either denies or grants the authentication request.

The token is given to the user and then passed on to the requester. The requester can use the token to validate its authenticity at any time and can use it within a specific time frame and scope. The token's age of validity is also restricted.

This is fundamentally a much more secure and powerful system than the other approaches, mainly because it allows for the establishment of scopes which can provide access to different parts of the API service and since the token is revoked after a certain time - makes it much harder to re-use by attackers.

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# OAuth (2.0)

OAuth 2.0 is significantly simpler compared to its predecessors, OAuth 1.0 and 1.0a. One of the main improvements in OAuth 2.0 is the removal of the requirement to sign every call with a keyed hash. This simplifies the process significantly compared to the previous versions.

One or both of the following tokens are often used in the implementation of OAuth:

## Access Token

An access token is a type of key that is sent to an application through an API. This key allows the application to access a user's data. In some cases, access tokens can have an expiration date.

## Refresh Token

If an access token has expired, refresh tokens can be used to retrieve a new one as part of an OAuth flow. OAuth2 combines both authentication and authorization, allowing for more precise control over the scope and validity of the token. This allows for more sophisticated security measures to be implemented in the authorization process.

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# OAuth 2.0 Popular Flows

The flows (also called grant types) are scenarios an API client performs to get an access token from the authorization server. OAuth 2.0 provides several popular flows suitable for different types of API clients.

Some of the widely used flows are:

- Authorization Code
- Implicit
- Resource Owner Password
- Client Credentials

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# Authorization Code

The most common flow, mostly used for server-side and mobile web applications. This flow is similar to how users sign up into a web application using their Facebook or Google account.

# Implicit

The client must obtain an access token on their own in this flow. It is useful in situations where the user's credentials cannot be stored in the client code as they may be accessible to external parties. This prevents the risk of the user's credentials being compromised.

It is suitable for web, desktop, and mobile applications that do not include any server component.

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# Resource Owner Password

To access this API, a user must provide their login credentials (username and password) as part of the request. This method is only suitable for trusted clients, such as official applications released by the API provider.

# Client Credentials

This flow is designed for server-to-server authentication and involves the client application acting on its own behalf, rather than representing an individual user. It is used for authenticating communication between servers.

This flow typically enables users to enter their login information in the client app, allowing it to access resources that are under the user's control.

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# OpenID Connect

OpenID Connect is a protocol that allows clients to verify the identity of an end-user by utilizing OAuth 2.0 as a base and adding an additional identity layer. This process is completed through the use of an authorization server, which performs the necessary authentication.

It is also used to obtain basic profile information about the end-user in an interoperable and REST-like manner.

OpenID Connect allows a range of clients, including Web-based, mobile, and JavaScript clients, to request and receive information about authenticated sessions and end-users.

In technical terms, OpenID Connect specifies a RESTful HTTP API, using JSON as a data format.

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# OpenID Connect

The specification suite is extensible, supporting optional features such as encryption of identity data, the discovery of OpenID Providers, and session management.

OpenID Connect defines a sign-in flow that enables a client application to authenticate a user, and to obtain information (or "claims") about that user, such as the user name, email, and so on.

User identity information is encoded in a secure JSON Web Token (JWT), called ID token.

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# JWT

JSON Web Tokens are an open, industry-standard RFC 7519 method for representing claims securely between two parties.

JWT allows you to decode, verify and generate JWT. While JWT is a standard it was developed by Auth0, an API driven identity, and authentication management company.

OpenID Connect defines a discovery mechanism, called OpenID Connect Discovery, where an OpenID server publishes its metadata at a well-known URL.

https://server.com/openid-configuration

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# JWT

This URL returns a JSON listing of the OpenID/OAuth endpoints, supported scopes and claims, public keys used to sign the tokens, and other details.

The clients can use this information to construct a request to the OpenID server. The field names and values are defined in the OpenID Connect Discovery Specification.

These are the 4 most used Authentication methods. Hope you understood their working mechanism and use cases.

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# Summary

OAuth 2.0 is the best choice for most situations because it is easy to use and provides strong security. It also allows for scalability, meaning it can be used by many different providers at once.

Additionally, OpenID Connect, which is based on OAuth 2.0, is becoming more popular. While API keys and HTTP Authentication may be appropriate in some cases, OAuth 2.0 offers more benefits and is a good long-term investment due to its built-in authorization capabilities.

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