ISC2 Spotlight

A Comprehensive Guide to API Authorization

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Agenda

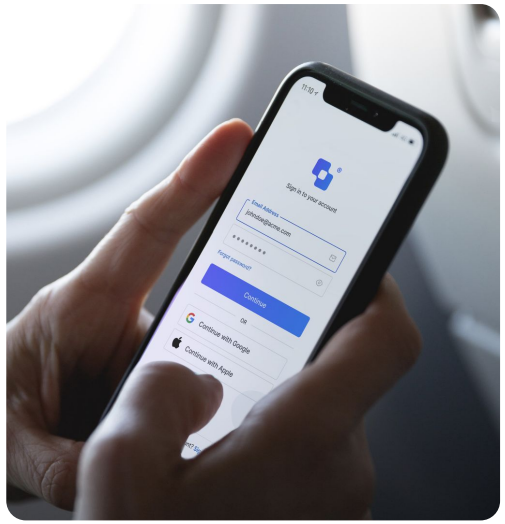
- Authorization - What is it?
- API Authorization Types
- RBAC, ABAC, ReBAC
- API Vulnerabilities

Authorization

Authentication vs Authorization

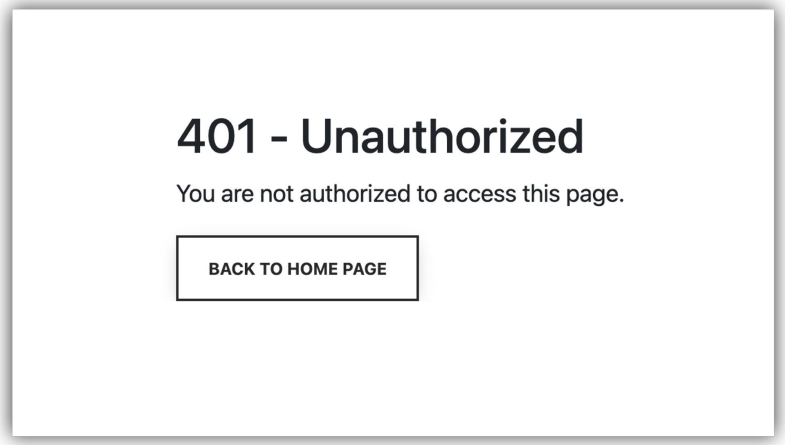
Authentication

- Process of verifying someone's identity
  - E.g. Username, Password



Authorization

- Process of evaluating if a user can perform certain action on a resource
  - Can Anna access this folder?



Authorization Types

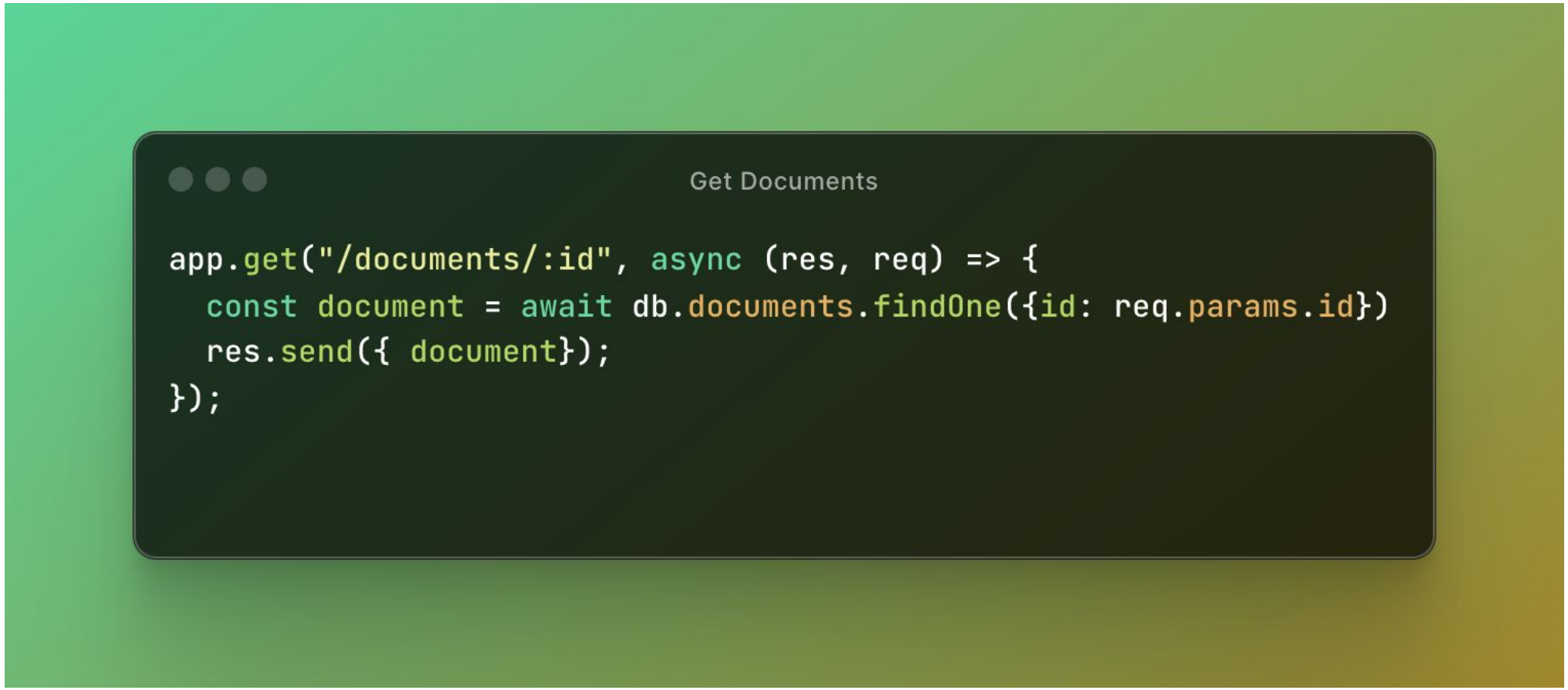
- API Key
  - Generic secret, No user level information
  - Simple level of Authorization
- OAuth 2.0 - JSON Web Token (JWT)
  - Token body contains user information, called claims
  - Support multiple types of Access Control
- Bearer Token
  - Authorization : Bearer <Token>
  - Often used along with OAuth 2.0

Design Approaches to Access Control

- RBAC: Role-Based Access Control
- ABAC: Attribute-Based Access Control
- ReBAC: Relationship-Based Access Control

Let’s Build an API

API Returning a Document



Role-Based Access Control

RBAC

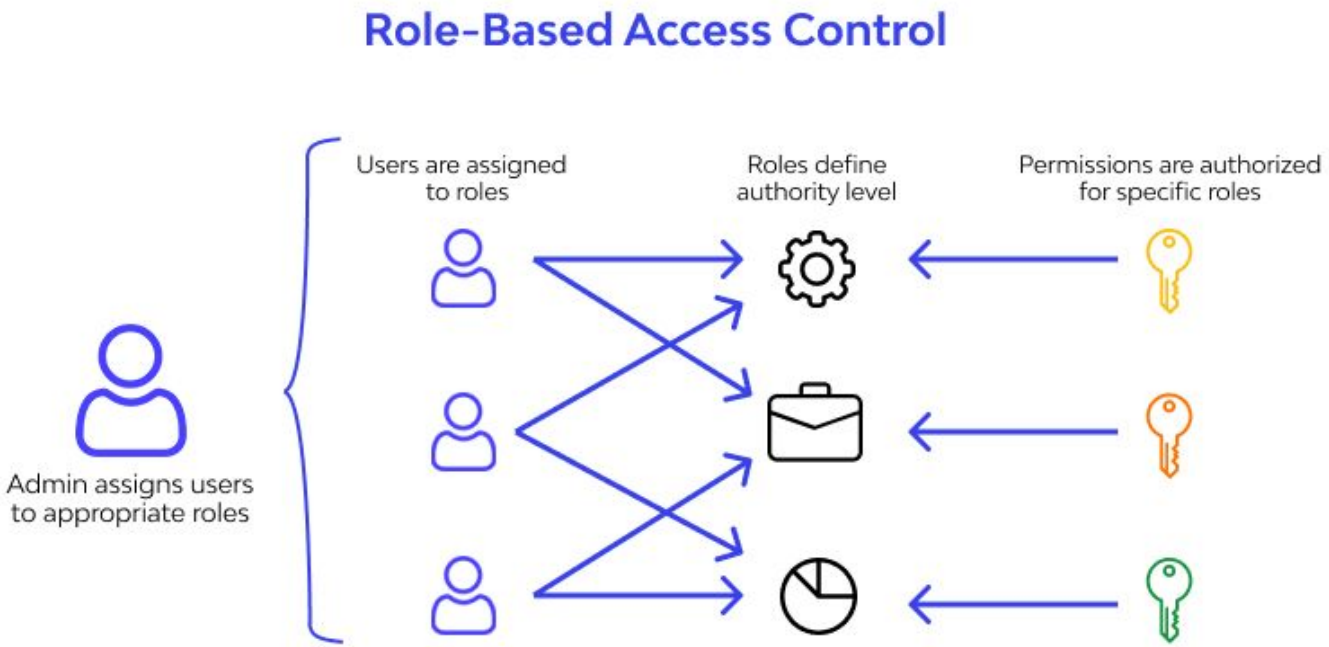
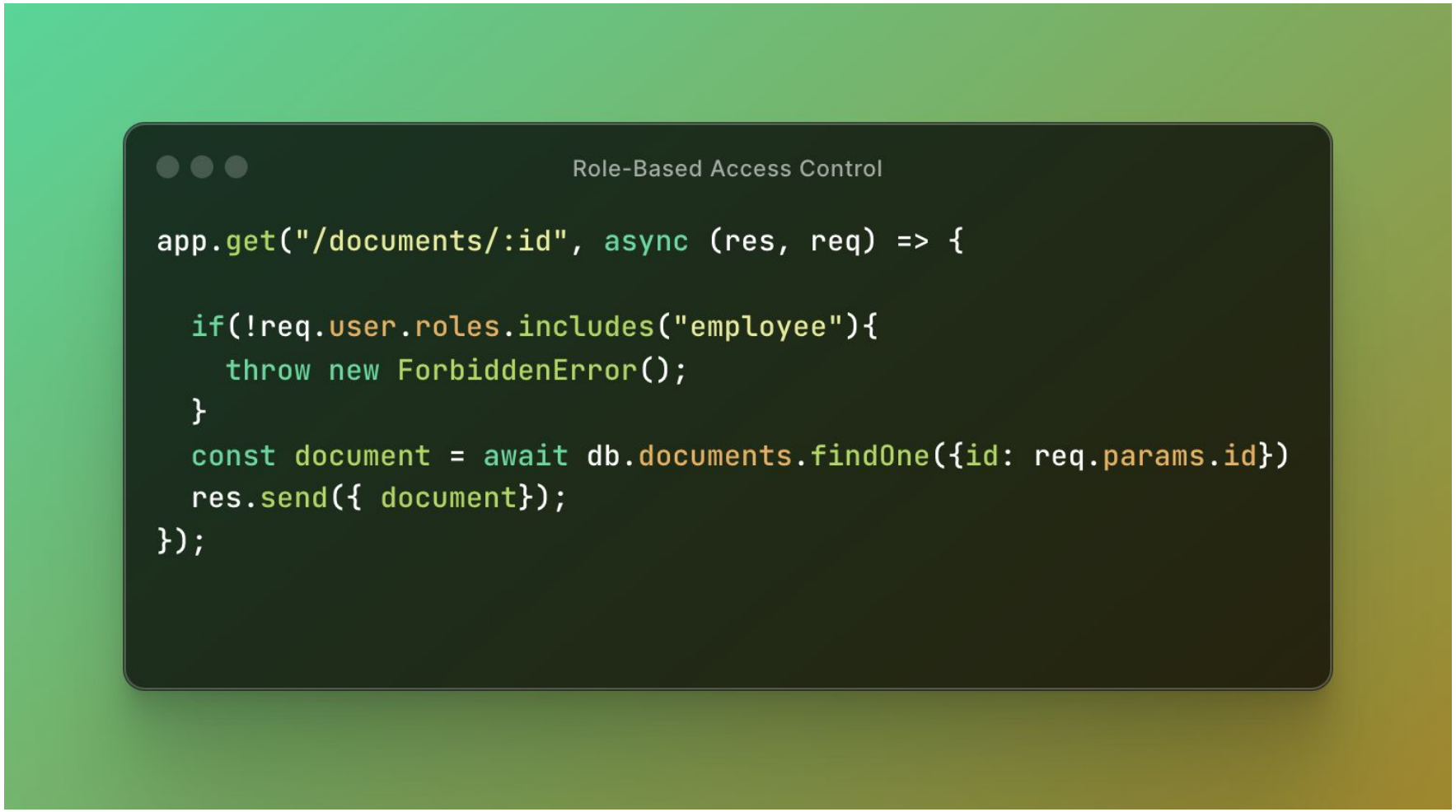


Image Source: https://www.wallarm.com/

Authorization with RBAC



RBAC - Pros & Cons

Pros

- Simple and Easy to use
- Good for applications where there are defined roles for all the personas

Cons

- Role Explosion
- Limited to express more complex or contextual access policies

Attribute-Based Access Control

ABAC

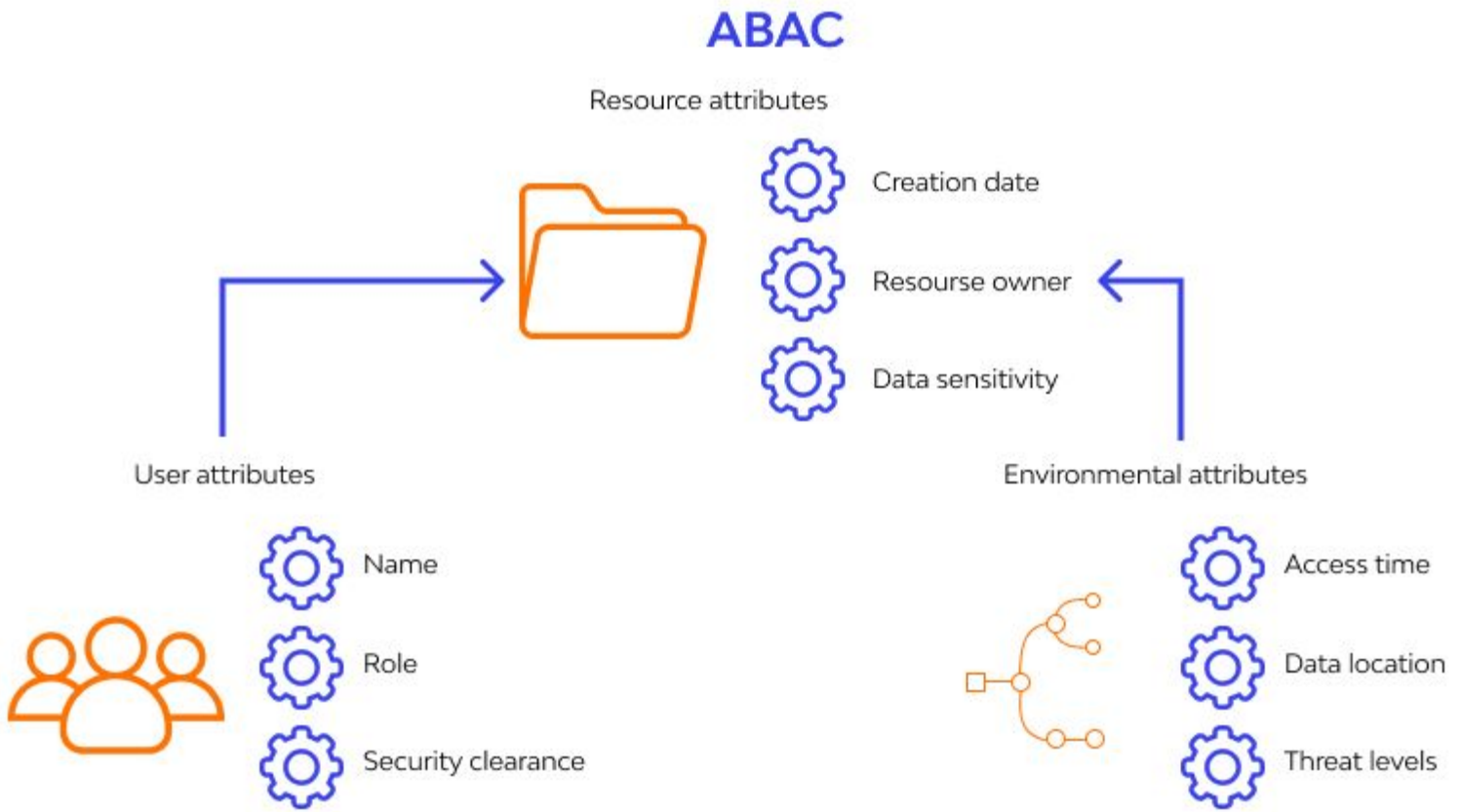


Image Source: https://www.wallarm.com/

Authorization with ABAC

ABAC - Pros & Cons

Pros

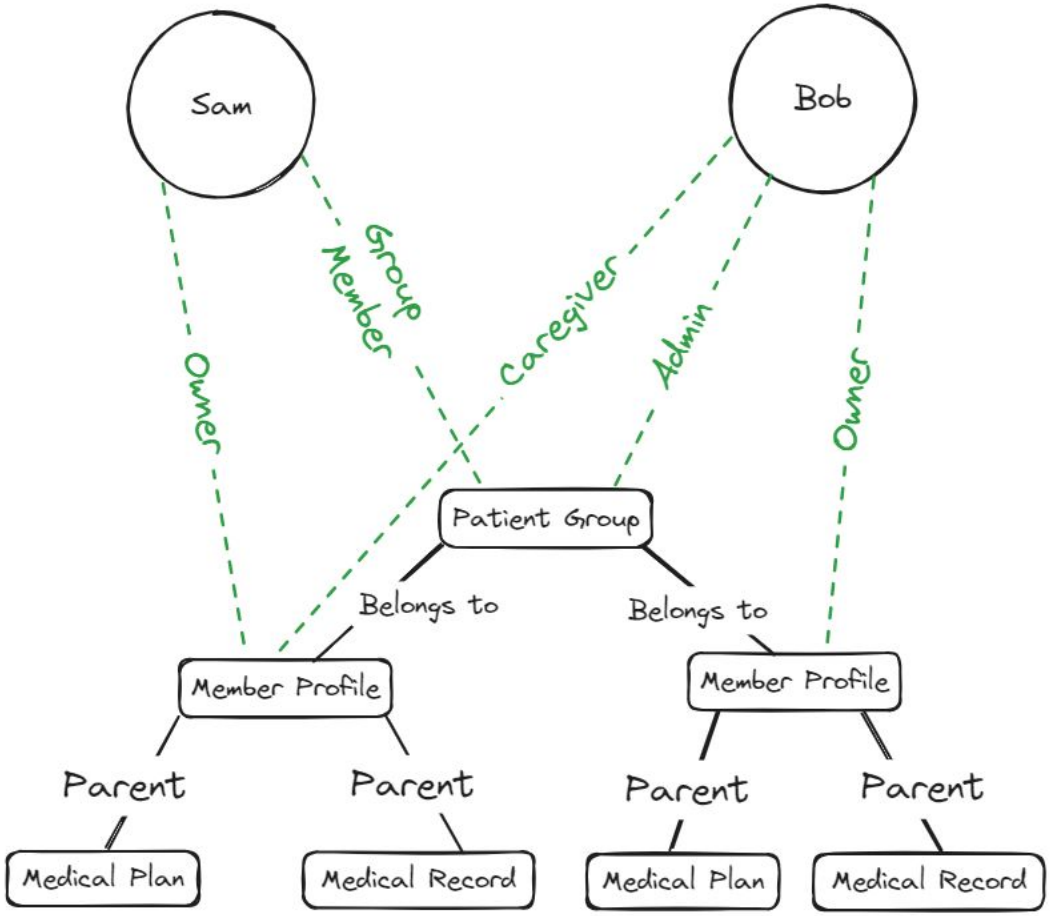
- Fine-Grained Access

Cons

- Need to collect all the data before verification.
- Data needs to be gathered from the product.

Relationship-Based Access Control

ReBAC



Relationships

- User
- Resource
- Relation

Image Source: https://www.permit.io

Relationships Definition

Authorization with ReBAC

ReBAC - Pros & Cons

Pros

- Fine-Grained Access like Google Drive
- Complex Hierarchy
- Reverse Hierarchy
- Centralized Repository

Cons

- Complexity
- Difficult to Audit
- Learning Curve to model the correct the relationship
- Should be highly available

Vulnerabilities

Authorization done wrong

OWASP Top 10 API Security Risks – 2023

Risk	Description
API1:2023 - Broken Object Level Authorization	APIs tend to expose endpoints that handle object identifiers, creating a wide attack surface of Object Level Access Control issues. Object level authorization checks should be considered in every function that accesses a data source using an ID from the user.
API2:2023 - Broken Authentication	Authentication mechanisms are often implemented incorrectly, allowing attackers to compromise authentication tokens or to exploit implementation flaws to assume other user's identities temporarily or permanently. Compromising a system's ability to identify the client/user, compromises API security overall.
API3:2023 - Broken Object Property Level Authorization	This category combines API3:2019 Excessive Data Exposure and API6:2019 - Mass Assignment, focusing on the root cause: the lack of or improper authorization validation at the object property level. This leads to information exposure or manipulation by unauthorized parties.
API4:2023 - Unrestricted Resource Consumption	Satisfying API requests requires resources such as network bandwidth, CPU, memory, and storage. Other resources such as emails/SMS/phone calls or biometrics validation are made available by service providers via API integrations, and paid for per request. Successful attacks can lead to Denial of Service or an increase of operational costs.
API5:2023 - Broken Function Level Authorization	Complex access control policies with different hierarchies, groups, and roles, and an unclear separation between administrative and regular functions, tend to lead to authorization flaws. By exploiting these issues, attackers can gain access to other users' resources and/or administrative functions.

Thank You!

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