

Spaces365 – Catalog3D

Executive Summary

Purpose

Catalog3D powers the delivery of high-performance, interactive 3D product content by seamlessly integrating with Spaces365 to provide fast, secure, and immersive product exploration.

Core Objectives

Centralize and manage all product, category, and 3D asset data in a unified, consistent backend.

Deliver high-performance product experiences by optimizing how dynamic data and static 3D assets are served.

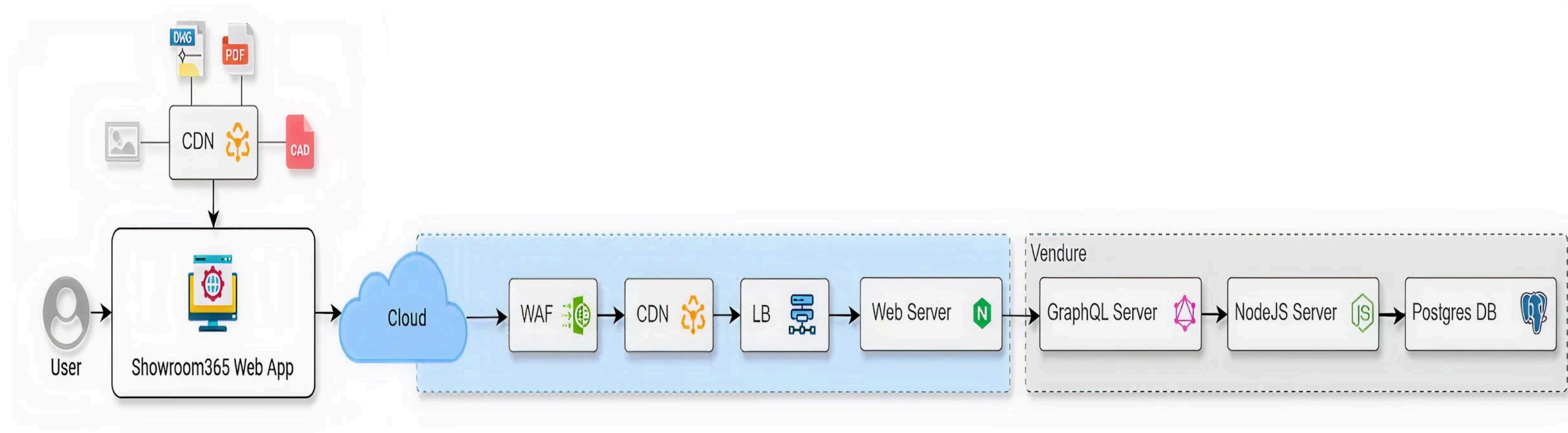
Ensure reliability and integrity through a secure, stable, and scalable service layer.

Enable seamless integration with Spaces365 and other downstream systems to support an end-to-end product visualization workflow.

Strategic Fit

Catalog3D is a foundational component of the organization’s digital commerce ecosystem, strengthening its ability to deliver rich product experiences at scale while aligning with long-term goals of performance, security, and platform extensibility.

Overview



The **Catalog3D** service powers product catalog, taxonomy, and metadata management. It operates on the Vendure1 (a headless ecommerce framework trusted by IBM) and runs on cloud, consisting of the following layers:

GraphQL2 Server – Provides APIs for querying and mutating catalog data such as products, categories, and metadata.

Node.js3 Server – Implements business logic, authentication, and integration with Vendure’s plugin system.

PostgreSQL4 Database – Stores catalog entities, relationships, and metadata for retrieval and updates.

Data flow within the backend follows this chain:

GraphQL Server ↔ **Node.js Server** ↔ **PostgreSQL Database**

CDN (Content Delivery Network)

The **CDN** delivers static assets — including images, textures, and 3D files — directly to users. This approach minimizes backend load, enhances scalability, and ensures low-latency global access.

Data Flow Between Components

- Spaces365 → WAF** All frontend requests pass through the **Web Application Firewall** for security filtering.
- WAF → CDN → Load Balancer → Reverse Proxy** Requests are optimized by the **CDN**, distributed via the **Load Balancer**, and finally routed by the Reverse Proxy to backend endpoints.
- Web Server → Catalog3D Backend** Valid API requests are forwarded to the Vendure backend, where the GraphQL and Node.js layers handle catalog queries or mutations.
- Catalog3D Backend ↔ PostgreSQL** The backend performs SQL operations to fetch, insert, or update catalog records before returning structured results to the frontend.

Business Benefits

Enhanced Customer Experience Fast global delivery of images and 3D content through the CDN reduces wait times and improves engagement on product pages.

Efficient Operations Offloading static content to the CDN reduces backend load, allowing Catalog3D to focus on core catalog operations and minimizing infrastructure costs.

Flexible and Extensible Backend Powered by Vendure and Node.js, the backend is designed to integrate new catalog features, plugins, and metadata types without disrupting existing workflows.

Data Accuracy and Consistency PostgreSQL ensures structured, reliable storage of catalog entities and relationships, giving businesses a dependable foundation for product management.

Security and Compliance

Keycloak5 IAM6 provides centralized authentication and authorization using industry-standard protocols like OAuth 2.07 and **OpenID Connect8**. It enables secure user management, role-based access control, and single sign on9 across services. This ensures consistent identity enforcement and reduced security overhead.

References

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6. Identity and Access Management (IAM) — <https://www.cloudflare.com/learning/access-management/what-is-identity-and-access-management/>
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