Virto's Commerce Innovation Platform:
Architectural Guidelines

Updated Q1 2026

VC VIRTO COMMERCE

Who These Guidelines Are For

The Virto Commerce team prepared these guidelines to provide a technical audience, i.e., Chief Technical Officers and Solutions architects, with a comprehensive overview of Virto's Commerce Innovation Platform and the products, modules, and capabilities that can be built on it.

Contents

Virto's Commerce Innovation Platform: Architectural Principles

Virto's Commerce Innovation Platform (or CIP) is a .NET-based foundation that enables the development, deployment, and effective management of a wide range of digital commerce products and solutions.

Explore Virto's Capabilities

Commerce Innovation Platform: Tech Stack

The Virto Commerce team picked these technologies for CIP as a result of our extensive experience in working with Microsoft products.

.NET and ASP.NET Core
as a solid foundation for building high-performance applications

EF Core
as primary ORM for efficient data management

ASP.NET Core Identity
for secure authentication & authorization

OpenIddict
for OAuth authentication to enable seamless user access

WebPack
as the primary design & runtime bundler and minified

Swashbuckle.AspNetCore.SwaggerGen
for auto-generated API Swagger docs & UI

SignalR Core
for real-time push notifications

AngularJS
as a primary dynamic SPA framework

HangFire
for efficient background task management

Virto Commerce follows a Long-Term Support (LTS) product lifecycle management policy, keeping our tech stack up to date with the latest stable releases to ensure performance, security, and longevity.

Virto's CIP is premised on seven core architectural principles.

Principle 1: Platform-as-a-Service

CIP leverages the power of the Platform-as-a-Service (PaaS) cloud computing service model. PaaS offers unmatched flexibility and customization, allowing teams to build and scale ecommerce solutions beyond the limits of traditional Software-as-a-Service (SaaS).

At the core of this principle is Virto Cloud, an extensible PaaS cloud-native infrastructure built on Kubernetes. Virto Cloud provides everything needed to build, launch, and grow an ecommerce project: hosting, DevOps, maintenance, and developer tools. Designed for scalability and continuous updates, Virto Cloud allows businesses to focus on innovation while Virto Commerce handles the complexity of hosting and deployment. An ecommerce solution built on CIP can be easily scaled to support peak demand and long-term business growth.

Virto Cloud is natively optimized for Microsoft Azure, Google Cloud, AWS, and private cloud.

Principle 2: Composability

Virto's Commerce Innovation Platform has composability at every layer, including platform and deployment composability. Virto's unique deployment composability means that solution architects can break their solution into independently hosted and deployed components (i.e., backend, business logic, frontend) based on regions, expected load, or usage, for performance optimization.

Virto's platform composability implies modular architecture with over 80 pre-configured, de-composable, ready-to-use ecommerce modules or PBCs (Packaged Business Capabilities). PBCs function independently but communicate in a loosely coupled manner. Keeping inter-module communication to a minimum helps prevent dependency issues, making development, testing, and maintenance more efficient.

A modular approach facilitates an agile development process in multi-developer teams and accelerates feature development and delivery while reducing system complexity. This, in turn, lowers the total cost of ownership of an ecommerce solution built on CIP.

Principle 3: API-First

Virto's CIP adheres to an API-first approach. This means that every piece of business data and function is accessible via API. The platform can be integrated with any third-party solution, service, or functionality via API, ensuring smooth data transfer. API connect backend and middleware to digital channels to support unique business scenarios––all within a true headless ecommerce architecture.

Virto Commerce uses lightweight APIs based on protocols such as REST API and GraphQL.

Principle 4: Headless

Virto's CIP embraces a headless architecture, where the frontend is completely decoupled from the backend logic. The communication between backend and frontend is facilitated through APIs with a dedicated GraphQL-based API layer simplifying channel connections and RESTful APIs exposing platform functionality in line with Service-Oriented Architecture (SOA) principles.

The headless design enables true omnichannel commerce under a unified platform. Businesses can expand their digital presence across multiple channels and devices while maintaining consistent product presentation and user experience. With Virto's headless architecture, adding new sales channels no longer requires extensive rearchitecting. Instead, businesses can easily customize channel-specific logic from a central location, scaling their digital commerce operations with ease.

Principle 5: Scalability & Extensibility

As your business scales, the complexity of operations increases. With CIP, the solution grows and scales alongside the business. The growing number of users, sessions, transactions, and operations can be accommodated by the platform without sacrificing performance. Real-life business scenarios supporting this notion can include high demand periods or peak loads, multiplied growth in orders or catalog size, and multi-regional deployment.

Principle 6: Integration Middleware

Virto's CIP leverages the integration middleware approach. Integration middleware acts as a flexible orchestration layer, enabling connectivity between ecommerce systems and enterprise applications like ERP, PIM, CRM, and WMS. Unlike rigid point-to-point integrations, Virto's middleware approach follows an API-first, event-driven architecture, ensuring real-time data synchronization and eliminating data silos.

For CTOs and solution architects, this means greater scalability, faster deployment, and reduced maintenance overhead. With built-in extensibility, the middleware simplifies complex workflows and allows businesses to integrate new services and automate processes without disrupting the system.

Principle 7: Adaptability

Virto's Commerce Innovation Platform is built for continuous change, significantly reducing the cost of innovation for digital channels. CIP is designed to extend and adapt to unique business requirements and evolving market dynamics, from circular marketplaces to B2B stores with complex contract-based pricing.

Virto's adaptable platform allows small teams of two to three developers to add new features every sprint or two for at least 5-7 years. With low dependency between modules, changes can be implemented and tested within weeks.

Plus, Virto Commerce provides extensive framework and architectural guidance that empowers developers on the client side to make changes independently.

Guide to Adaptability & TCO

Virto Atomic Architecture™ Diagram

Inspired by Brad Frost's Atomic Design principles, Virto Atomic Architecture™ or VAA consists of de-composable elements: from smallest atoms to bigger molecules, then larger cells, and fully functional ecommerce solutions or organisms, all existing in the Virto Cloud environment and working together to create an effective ecommerce solution architecture.

The architecture of Virto's Commerce Innovation Platform can be described as a set of the following composable elements.

Atoms

A building block representing core capabilities and design patterns.

Examples: Modularity, API-first, Security, Caching, Events.

Molecules

A group of two or more atoms built with a single responsibility principle to handle a specific job. Molecules communicate between each other via API.

Examples: Catalog, Pricing, Inventory, Search, Event Bus.

Cells

A set of molecules combined into a high-performance functional unit of an ecommerce ecosystem to solve a complete business scenario.

Examples: Digital Catalog, Order Management, Vendor Management.

Organisms

A combination of cells representing a custom ecommerce solution as end-users see it.

Example: Composable eCommerce Solution.

Virto's Packaged Business Capabilities

Virto Atomic Architecture™ is a methodology for building PBCs (modular features) and PBC bundles. PBC bundles are pre-configured, high-performance functional units that solve a complete ecommerce business scenario and come with a curated set of modules that work together to deliver the desired functionality. PBC bundles can be adopted as is to facilitate quick setup and management of product catalogs, product information, and more, or extended with any functionality added on top if necessary.

As of Q1 2026, Virto Commerce offers six bundles of ready-to-use packaged business capabilities that together make up PBC Max.

Kickstart Your eCommerce with PBC Max

PBC Max is a solution bundle of pre-configured, out-of-the-box Packaged Business Capabilities perfect for the initial setup of your ecommerce project.

PBC Bundle	Business Benefits
Virto Start	A foundational package to kickstart your ecommerce B2B or B2C store with pre-built tools and templates. Easily add new functionalities on top of it for smooth and cost-effective scaling.
Identity Provider	Enables quick customer authorization and centralized authentication with secure customer login and role-based access control.
Customer and Organizations	A package aimed to ease customer and organization record management, including complex business account hierarchies, account properties, employee and organization relationships, and account tagging.
Digital Catalog	Facilitates creating and managing a digital product catalog, supporting real-time product data and accurate, fast search.
Product Information Manager	Allows setting up and customizing of product catalogs, simplifying product management, and ensuring data accuracy across all channels.
Purchase and Checkout	Provides an essential shopping cart and checkout functionality integrated with customer and order management.

Virto Atomic Architecture™ Advantages

Guide to Atomic Architecture™

01

Simplified Complex Commerce Solutions

VAA provides a structured approach to building scalable and maintainable commerce solutions. By breaking down complex features into modular, reusable components, teams can develop, update, and manage functionality independently.

02

Future-Proof by Design

VAA ensures that every component can be replaced, modified, or enhanced without disrupting other functionalities or hindering future upgrades. This flexibility safeguards long-term adaptability and minimizes technical debt.

03

Boosts Team Productivity

A unified architectural framework streamlines collaboration across frontend, backend, DevOps, and feature teams. Standardized principles accelerate onboarding, simplify architectural decision-making, and enhance cross-team efficiency, enabling faster development cycles.

04

Maximizes Reusability

VAA enables businesses to compose solutions using pre-packaged PBCs, reducing redundant development. This approach supports multi-regional deployments, industry-specific solutions, and unique business models, allowing teams to innovate faster with proven components.

05

Accelerates Time-to-Market

Businesses can quickly build and scale solutions by selecting only the necessary capabilities and components—from prototype to MVP to full-scale deployment. This modular approach ensures a faster, more cost-efficient time-to-market.

06

Reduces Total Cost of Ownership

By leveraging modular development, reusability, and independent scalability, VAA helps avoid unpredictable costs associated with platform post-implementation customizations. With VAA, businesses can easily predict development costs and streamline upgrades independently from a vendor.

Solution Development with Virto's Commerce Innovation Platform

At Virto Commerce, we go beyond traditional vendor-client relationships. Our key principle is a long-term partnership. We support businesses throughout the entire lifecycle of their ecommerce solution, not just during initial implementation and deployment. Unlike many vendors, we don't just provide a product; we actively contribute to your success by ensuring flexibility, continuous updates, and shared innovation.

Solution Development Process

These four core solution development practices differentiate Virto Commerce from other platform vendors.

Extensibility Framework

With Atomic Architecture™ at its core, Virto's CIP has a unique extensibility framework. It allows developers of any technical level to contribute and extend Virto's Commerce Innovation Platform—from quick prototyping to advanced-composed solutions. This layered extensibility model is described further on pages 10-12.

Continuous Platform Updates

Unlike other platforms that require heavy lifting for upgrades, Virto's architecture ensures seamless updates. Customers can immediately leverage new features and centralized improvements without worrying about compatibility issues, allowing their ecommerce operations to stay ahead of the curve.

Vendor-Funded Feature Development

Virto Commerce doesn't just deliver software —we actively invest in platform innovation and feature development at our own expense. If a customer needs a feature that could benefit others, we're ready to take on its development and fund it at the platform level. This means the feature gets built and tested without affecting the client's implementation budget.

Open Contribution & Vendor Maintenance

Virto Commerce embraces an open development model, allowing customer developer teams to independently build and contribute new features to Virto's CIP. After internal review and approval, we integrate these contributions into the platform, taking full responsibility for their maintenance and support. This ensures that custom-built features and solutions become sustainable, backed by a platform vendor, without additional maintenance costs for the client.

CIP Level 1 Extensibility: Citizen Development

Level 1 extensibility of Virto's CIP is designed for business users, business analysts, or QA specialists (citizen low-code or no-code development).

Most tasks at this level require no development and can be handled directly through the platform's built-in tools. Business users can configure promotions, landing pages, A/B tests, and search settings, allowing marketing and ecommerce teams to make quick adjustments without developer involvement.
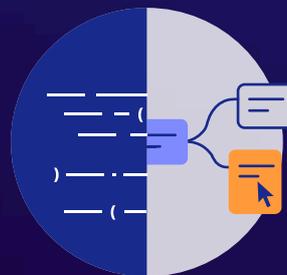
01

A key "no-code" example is the Expression Builder, a visual tool that enables users to create business rules directly in the browser. It's commonly used for promotions, pricing, publishing, and contract management.
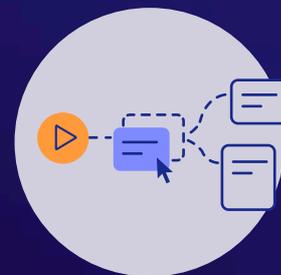
02

Another "no-code" example is the Page Builder, which allows users to design and customize storefronts using an intuitive drag-and-drop editor, which requires zero technical knowledge.

03

For "low-code" customization, business analysts and QA specialists can modify email templates, workflows, taxonomy structures, catalog organization, and testing scenarios with minimal development effort.

low-code   no-code

CIP Level 2 Extensibility: API-Level Integration

Level 2 extensibility of Virto's CIP is designed for integration developers working with standard APIs.

At this level, all platform functionality is accessible via APIs, allowing seamless integration with external systems. Developers can build cloud extensions using API calls and event-driven Webhooks, enabling flexible and scalable integrations.

Virto's API-level extensibility supports any programming language or framework, making it easy to adapt the platform to specific business needs through integrations and reactive programming.

Virto's Commerce Innovation Platform API options:

REST API

Provides access to all CRUD operations and business logic, enabling full control over module functionality.

GraphQL API

A modern, flexible API designed for client applications, allowing optimized data queries and improved performance.

Event providers for extensibility:

Webhooks

Enable real-time, no-code integrations, triggering actions based on system events.

EventBus

Designed for reactive programming and enterprise-grade integrations, supporting scalable event-driven architectures.
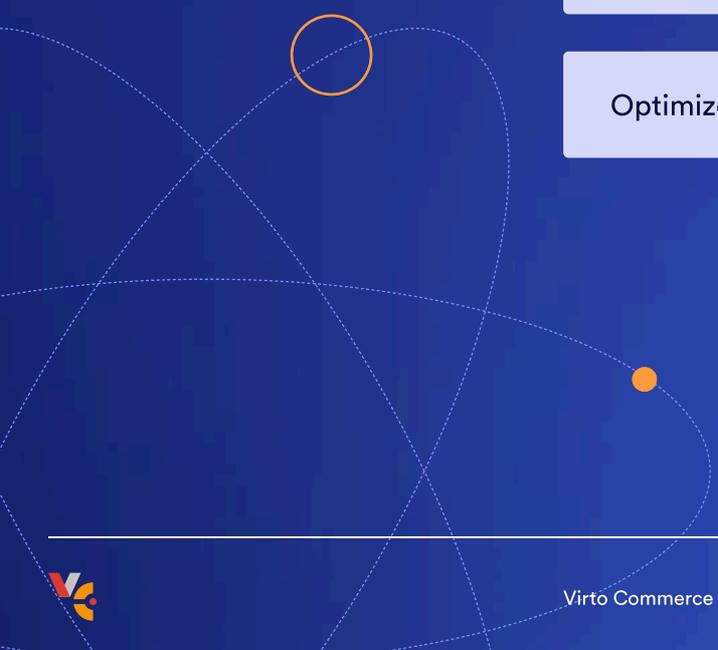
CIP Level 3 Extensibility: Virto's Native Modularity

Level 3 extensibility of Virto's CIP is a native modularity framework designed for developers to extend, compose, and reuse functionality across multiple solutions.

Virto's Commerce Innovation Platform is designed from the ground up with modularity at its core. Powered by Virto Atomic Architecture™, the platform enables seamless extension and customization based on specific business needs. Developers can selectively add, modify, or repurpose existing modules, ensuring flexibility while maintaining system integrity.

This modular structure also enhances DevOps efficiency and optimizes performance, making deployment and updates more manageable. With 80+ ready-to-use modules or PBCs, Virto Commerce provides a robust foundation for scalable, adaptable ecommerce solutions.

Key Features	Description
Composable Design	Virto CIP is built with composability at its core.
80+ Pre-Built PBCs	Ready-to-use solutions for faster deployment.
Seamless Customization	Modify and extend functionalities easily.
Optimized DevOps	Efficient deployment and updates.

Virto Frontend: Integrated App for Top-Notch CX

Virto Frontend isn't a core component of the Commerce Innovation Platform but is designed as a fully integrated application to enhance customer experience with a user-friendly, B2B-standard interface that is both adaptable and scalable. Virto Frontend can be used as-is within CIP or can be modified by a client to implement any desired components, pages, and shared logic to correspond with your project goals.

Built as a Single-Page Application (SPA), Virto Frontend combines modern ecommerce capabilities with cutting-edge technologies to deliver fast, fully functional B2B and B2C scenarios.

Designed using VAA principles, it offers a structured approach to UI development, ensuring consistency and reusability.

Customizable UI

The full design system is available in Figma, with layouts developed in Storybook and projected onto the Vue B2B theme, making UI modifications straightforward.

Enterprise-Grade Security

Advanced role-based access control (RBAC) ensures secure and granular permissions for employees.

Mobile-Responsive & SEO-Optimized

Built for higher mobile conversion rates and an enhanced digital experience.

Virto Frontend is powered by modern development frameworks and supports custom B2B theme development for implementation partners.

Virto's Commerce Innovation Platform

The backend provider with a fully customizable workflow.

Vue 3

A lightweight, progressive frontend framework with a low learning curve.

TypeScript

Enhances code quality and maintainability with type safety.

GraphQL

Enables flexible and efficient data queries via the Virto Commerce xAPI layer.
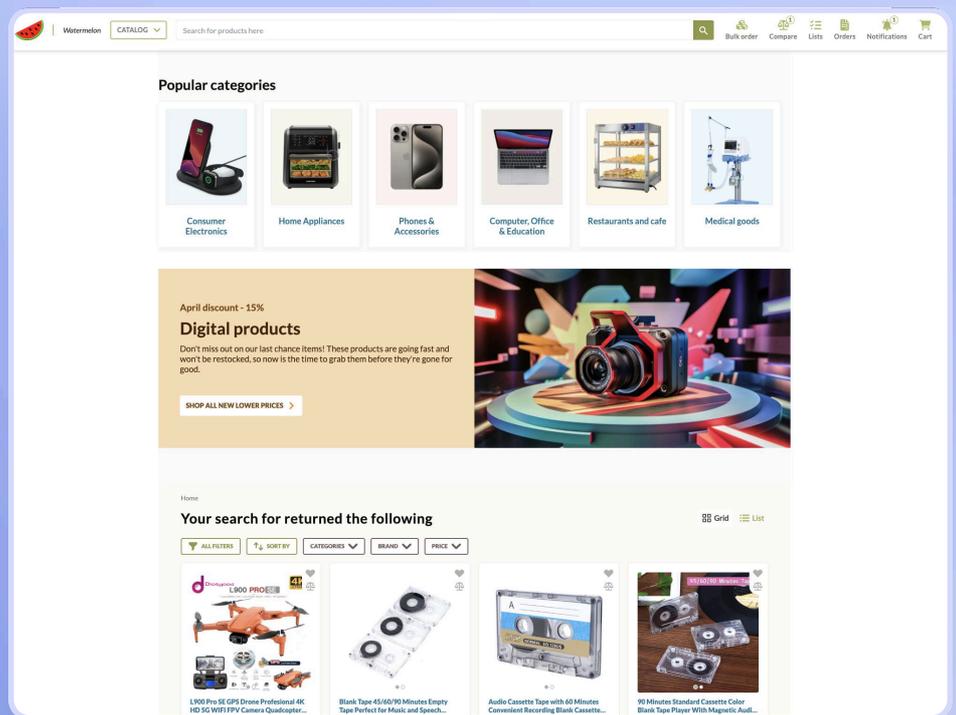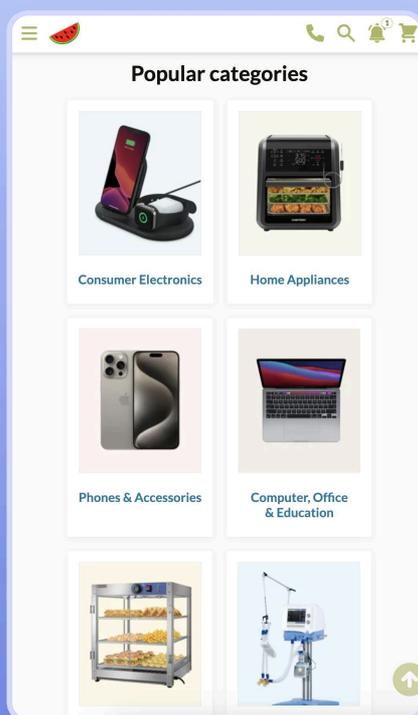
Tailwind CSS

A powerful CSS framework for faster development and enhanced styling.

Husky + ESLint + Prettier

Ensures clean, consistent code formatting by automatically checking and fixing code style within the repository.

Vite

A next-gen build tool (faster than Webpack) that features Hot Module Replacement (HMR) for an improved developer experience and optimized production builds.

Seamless eCommerce Integrations

Virto's Commerce Innovation Platform is built for seamless integrations, ensuring compatibility with any modern business software. As an API-first enterprise-grade ecommerce platform, CIP easily connects with any ERP, PIM, CRM, payment providers, tax services, and more—whether through out-of-the-box connectors or custom integrations.

Virto Commerce supports multiple flexible integration options to fit diverse business needs.

01 No-Code & Middleware Integration

Use modern Integration Middleware such as Azure Logic Apps or Dell Boomi to connect CIP with third-party systems effortlessly. For specialized use cases, webhooks and Logic Apps modules enable real-time interactions without requiring development.

02 Advanced API Integration

When complex or highly customized integrations are required, CIP provides full REST and GraphQL APIs covering the platform's entire functionality.

GraphQL API
Ideal for real-time, multi-touchpoint applications (e.g., storefronts, mobile apps).

REST API
Optimized for backend and bulk data integrations.

Virto's Commerce Innovation Platform integrates with a wide range of third-party systems, including but not limited to:

- ERP systems
- CRM solutions
- PIM solutions
- Payment & Tax Providers
- Shipping & Logistics Services
- Contract Pricing Engines
- Loyalty & Rewards Systems

What Can Be Built on Virto's CIP?

Virto Commerce Engine

Virto Commerce Engine is the core backend of Virto's CIP. It's an extensible ecommerce engine designed to handle complex B2B and B2C commerce scenarios. Built on .NET and ASP.NET Core, it provides the foundational business logic, data management, and integration capabilities required for enterprise ecommerce solutions.

Virto Commerce Engine serves as the backbone of ecommerce projects, enabling businesses to build, customize, and scale their commerce solutions.

★ HEINEKEN

Virto Commerce Engine is a core part of HEINEKEN's digital B2B ambitions across 25+ countries.

[Explore a Case Study](#)

Virto Marketplace

Virto Marketplace is the ultimate marketplace software solution built on CIP. With Virto Marketplace, enterprises can create unique and highly efficient marketplaces. It supports the implementation of any marketplace business model, whether it's a B2C retail marketplace, service marketplace, B2B procurement platform, GPO marketplace, multi-vendor marketplace, circular marketplace, or others.

KW KLINTBERG & WAY

Cadillac & KW Parts leverage Virto Marketplace to drive B2B and B2C sales with a 4M-product catalog across Europe.

[Explore a Case Study](#)

Virto Portal

Virto Portal is a software solution built on CIP to facilitate the creation of ecommerce-enabled vendor and loyalty portals for any business model, with custom workflows and unique digital experiences, offering rich product content, role-based access to extensive documentation, and robust self-service capabilities.

BOSCH

Bosch builds a European loyalty portal for 50+ localized storefronts with Virto Portal

[Explore a Case Study](#)

Recommended Reading

Virto Commerce's Free Knowledge Hub: Guides, Whitepapers, and Videos

The Ultimate Guide to Choosing an eCommerce Platform

Guide: How to Know When It's Time to Re-Platform Your eCommerce Solution?

A Strategic Guide: The True Cost of eCommerce Platform Ownership

eCommerce Case Studies Powered by the Virto' Commerce Innovation Platform

How HEINEKEN Cut Platform Upgrade Time by 50% with Virto Commerce

Ready to Level Up Your eCommerce Game?

1,300+

GitHub Stars

850+

GitHub Forks

30 Days

Free Access to Virto's CIP

Enterprise-Grade

Cloud Framework

Virto Commerce can assist your business with ecommerce scenarios of any complexity. Join our thriving developer community on GitHub, where we've earned over 1,300 stars and 850+ forks—and where our senior managers actively engage to answer your questions about the Commerce Innovation Platform.

Ready to experience Virto's CIP? Get 30 days of free access to our platform and an enterprise-grade cloud framework. Set up your own environment, explore powerful backend and frontend development tools, and start building custom features tailored to your needs.

Start a Free Trial

About Virto Commerce

Virto Commerce, founded in 2011, is a global leader in B2B ecommerce and marketplace solutions, with offices in Los Angeles, Limassol, and Vilnius.

Virto Commerce specializes in innovative, highly customizable headless commerce platforms. Our mission is to empower businesses with cutting-edge ecommerce solutions through relentless innovation.

At the heart of our offerings is the Commerce Innovation Platform, which enables businesses to build commerce products that drive sustainable business transformation.

Powered by our proprietary Virto Atomic Architecture™ and Virto Cloud, our Commerce Innovation Platform offers unparalleled flexibility, seamless integration, and extensive customization, enabling businesses to create unique, high-performance digital experiences and to drive sustainable business transformation across various industries.

Book a Discovery Call

Get a Demo