Magento
Digital
Commerce
Architecture

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Executive Summary

Magento, the leading eCommerce platform built for growing merchants of all sizes, has been designed from the ground up to be open and extensible, offering limitless flexibility for merchants and developers to create unique and engaging shopping experiences. With a modular architecture built on advanced technologies and extended by modern web APIs and technology extensions, it supports rapid development and easy integration with third-party solutions, so you can cost-effectively innovate on your own timeline and keep pace with changing technologies and customer needs.

This paper will take you through the inner workings of the Magento Digital Commerce platform so you can see how it has been architected for speed, extensibility and scalability. The paper starts with a review of Magento's robust core functionality, followed by an in-depth look at its software architecture and frontend theming capabilities. It then shows how the platform can be easily extended and customized, and reviews Magento development tools and standards. The paper concludes with a summary of Magento's powerful underlying technologies, security practices, and scalable, high performance design, and provides a quick guide on how to get started with Magento.

Let's get started and see how the Magento platform can transform your business.

Functional Overview

The functional schematic below displays the components of the Magento Digital Commerce framework, which houses robust out-of-the-box business functionality and advanced capabilities to extend and integrate the platform with third-party solutions. The following section highlights these components and the functionality available with Magento:
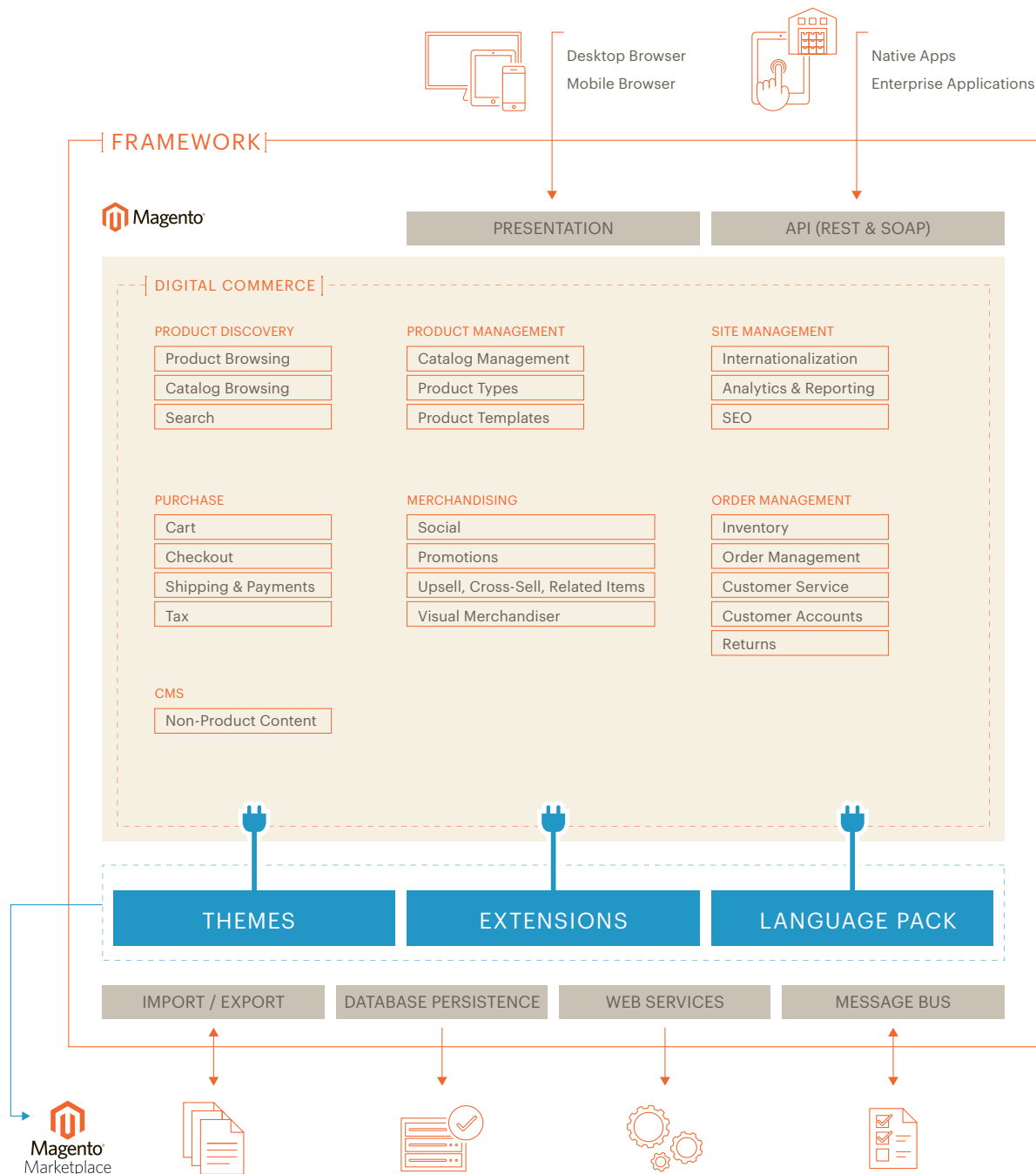

FIGURE 1: MAGENTO FUNCTIONAL OVERVIEW

Out-of-Box Functionality

Creating a unique and engaging site is essential to eCommerce success and Magento's core features let you craft powerful shopping and checkout experiences – personalized to a shopper's onsite behavior, purchase history and buying patterns. You can do this with a rich set of product discovery features, including search and layered navigation, detailed product pages with multiple images and image zoom capabilities, integrated product reviews and comparisons, and automated cross-sell and upsell features. You can also encourage sales by using customer segmentation tools to target content, coupons, and special offers to specific customer groups. And you can build loyalty and encourage more frequent purchases with reward points, store credits, gift registries, and private sales.
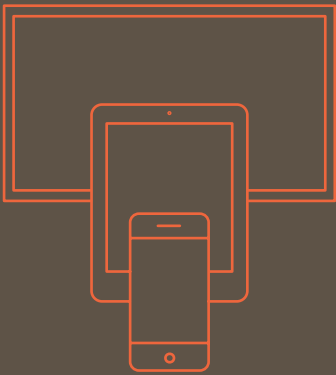
Magento ensures shoppers have a consistent experience no matter how they access your site by providing a responsive design reference theme you can leverage to quickly create a seamless experience across all devices and channels. And you can be sure to convert shoppers to purchasers using Magento's streamlined checkout process, with multiple shipping and payment options and support for different currencies, exchange rates and tax rates.

A range of management tools give you and your team full control over products, merchandising, and site content. Magento's product management tools make it easy to add configurable products with support for different sizes, colors and other attributes to your store, as well as track inventory levels to make sure you are never out of stock. Merchandising tools make it fast and efficient to organize product category pages to maximize sales, and you can use Magento's content management tool to enrich your shopping experience with original content.

Magento also lets you efficiently track and process orders, and includes support for return merchandise authorization. A customer service interface lets you help shoppers with their purchases, and customer account management gives you an in-depth understanding of your most loyal patrons, while also enabling faster reordering and checkouts using saved profile information. Finally, you can keep tabs on how your business is performing with detailed reports and integrated support for Google Analytics.

With such a rich set of features available out of the box, combined with an easy-to-use administrative user interface, Magento truly empowers you to create compelling shopping experiences and efficiently manage operations.

Extending the Platform

On top of the robust core Magento feature set, you can easily and cost-effectively make customizations and plug in additional capabilities by adding or replacing extensions with functional modules described above, themes that help give your site a unique look and feel, and language packs to localize the site to specific regions.

You can also seamlessly integrate Magento with other third-party solutions such as enterprise resource planning (ERP), product information management (PIM), order management (OMS), and content management (CMS) software using Magento's extensive and efficient APIs and web services. Full data import/export capabilities also make it fast and easy to share product, customer and order information with other systems.
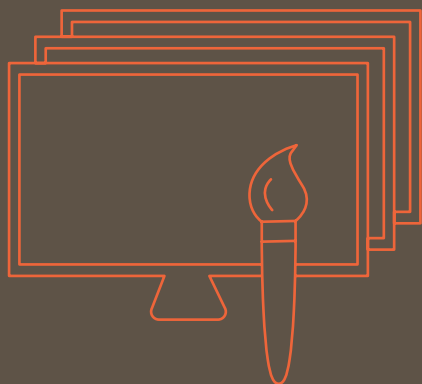
Magento's theming inheritance allows you to leverage your theming and design customizations, making it simple and fast to carry over your design to multiple websites, stores, and brands. You can reuse customizations while quickly and easily distinguishing separate brands, languages, and locales.

With Magento, merchants get a complete suite of eCommerce functionality to build, customize and promote their site, manage and merchandise product inventory, process orders, track performance, and improve customer engagement and loyalty.

Principles of Magento Architecture

Underpinning the rich Magento feature set is a powerful and highly scalable platform architecture built on the principles introduced below. Each concept is further detailed in the sections of the paper that follow this overview.

Layered Product Architecture

A strongly layered product architecture supports the separation of visual presentation from business logic. This compartmentalization simplifies customization of store appearance and behavior. Architectural layers also provide programmers with a high-level model for understanding the optimal placement of features and code in a complex system. Magento implements the Model-View-Controller (MVC) architectural model.

Modularity

Built to offer limitless flexibility, the Magento platform is built in modules that can be easily added or replaced. Modules form the basic functional unit and contain the logic to execute required actions and functions. Modules interconnect with each other to deliver a full range of functionality, and you can extend the core feature set of Magento by writing and incorporating new modules into your installation.

Customizable Store Branding

You can use Magento themes and language packages to create your store's visual design and language capabilities. You can extend and customize the core components of language packages and default themes (using HTML5 and CSS3) to precisely control your site's behavior and look-and-feel. Unlike templated SaaS solutions, Magento offers the highest level of flexibility in customizing your site to your unique needs. Further, Magento's native theme inheritance capabilities allow you to efficiently reuse theming and design customizations to differentiate separate brands, stores and locales without spending additional time or budget.

External Integrations

Service contracts in the Magento framework provide a way to access public API endpoints to support the extensibility of Magento and its integration with third-party systems. These PHP interfaces to modules streamline the use of APIs.

Open Source Technologies

The Magento tech stack includes popular open source technologies such as Linux OS, Apache/Nginx server, MySQL, Zend, and Composer, offering a robust toolset for deploying large, distributed storefronts and for customizing the product for your particular needs.

Software Architecture

At its highest level, Magento's product architecture consists of the core product code plus optional modules that can be added to enhance or replace the basic product code. Both the optional modules and the core Magento product code are organized into layers.

The Magento software architecture follows standard application layering, with the separation of visual presentation code from business logic (within the domain layer) through the service layer. The service layer defines standard APIs and interfaces for visual presentation code to access business logic. This improves code extensibility and maintainability, while also simplifying backwards compatibility after upgrades.

OOP Architecture and Programming Principles

Object-Oriented Programming (OOP) principles are inherent in Magento's design, which allow for maximum flexibility and extensibility of software components, permitting you to design and implement highly customized websites. The advantages of OOP principles include incorporation of industry-standard programming design patterns and the strict separation of business logic from the presentation layer.

The following diagram illustrates the main components of Magento. It shows the internal layers and enclosing Magento framework, plus primary external interaction points.
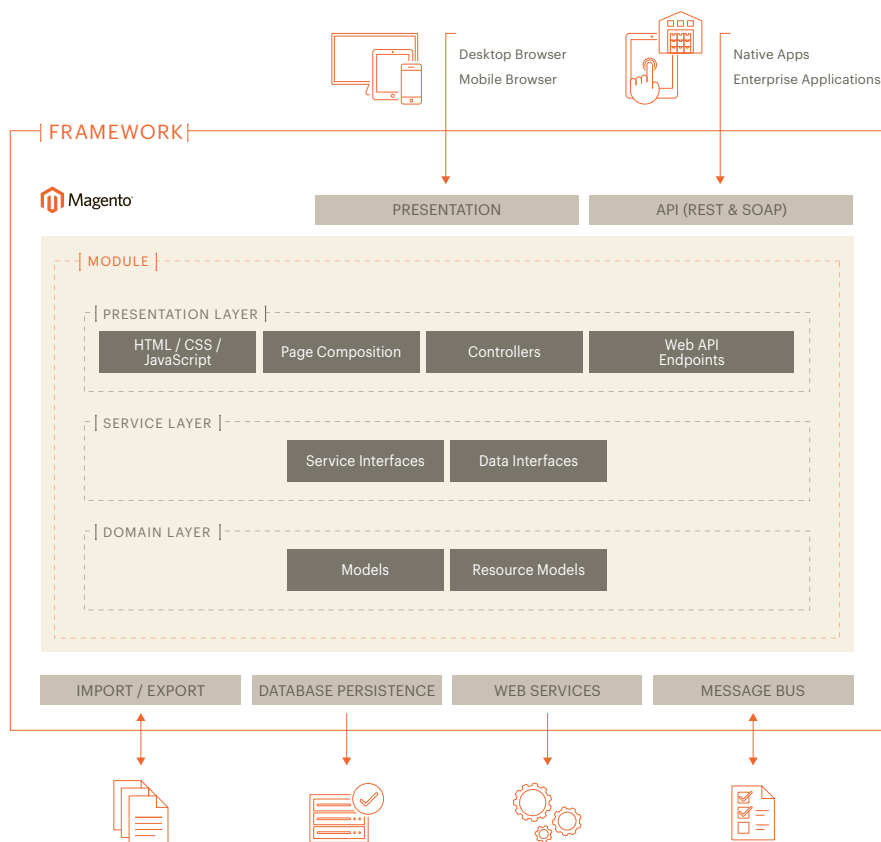

FIGURE 2: MAGENTO SOFTWARE ARCHITECTURE & APPLICATION LAYERING

Presentation Layer

When you interact with the Magento web interface, you are working directly with presentation layer code. The presentation layer contains both:

- **View elements,** which include HTML/CSS/JavaScript web page assets, and the page composition concepts of layouts, blocks, and templates; and

- **Controllers,** which process commands to and from the user interface.

You can extensively customize the user interface by using themes to modify the CSS and HTML template files of the presentation layer.

Magento separates presentation layer concepts from business logic, simplifying the customization of a Magento installation's appearance. Separation also simplifies the job of extension developers, as no business logic concepts are buried in presentation files.

HTML / CSS / JavaScript
Magento is HTML5 and CSS3 compliant out of the box. All base themes are responsive by default, enabling your site to be optimized for mobile, tablet, and desktop browser access. All HTML, CSS, and JavaScript web page assets are stored separately, allowing easier customization of a site. Magento also supplies tools for automatic optimization strategies such as CSS and JavaScript minification for faster page load times and improved site performance.

Page Composition
Page composition (the "View" in MVC) is controlled by layout files that assemble blocks, containers, and UI components into a page for display by a web browser. Blocks are backed by PHP code to generate dynamic page content. They are typically paired with easily customizable PHTML template files to generate fragments of HTML that are assembled into the page.

Controllers
Controllers (again from MVC) control page flows and the orchestration of form submission. Magento follows the standard MVC pattern, providing good separation of concerns to achieve enhanced modularity.

Web API Endpoints

Magento also exposes core eCommerce functionality via web services as both RESTful and SOAP services. This ensures that all core functionality available to end users is equally available to external systems such as ERP, PIM, and OMS systems. In today's highly interconnected world, this is increasingly essential and ensures that Magento is ready to support current trends such as "buy buttons" integrated to social platforms (like Facebook, Twitter, Pinterest etc.) for in-app purchases, and in the future, Internet of Things (IoT) devices with automatic reordering.

Enhanced integrations to external systems also require support of additional authentication schemes. The Magento framework supports multiple Web API authentication schemes for different use cases, such as AJAX requests directly from a user's browser (where an external user is already authenticated) or from native mobile applications (where the user can be asked for credentials), and for system integration with other backend systems such as ERP systems (where there is no user present to provide credentials).

As well as supporting standard services, Magento simplifies the development of your own services. If the service you need is not available, just create a new one. Simply write your own "service contract" as PHP interfaces and define binding rules from URLs to your PHP code, and your new web service is available for use.
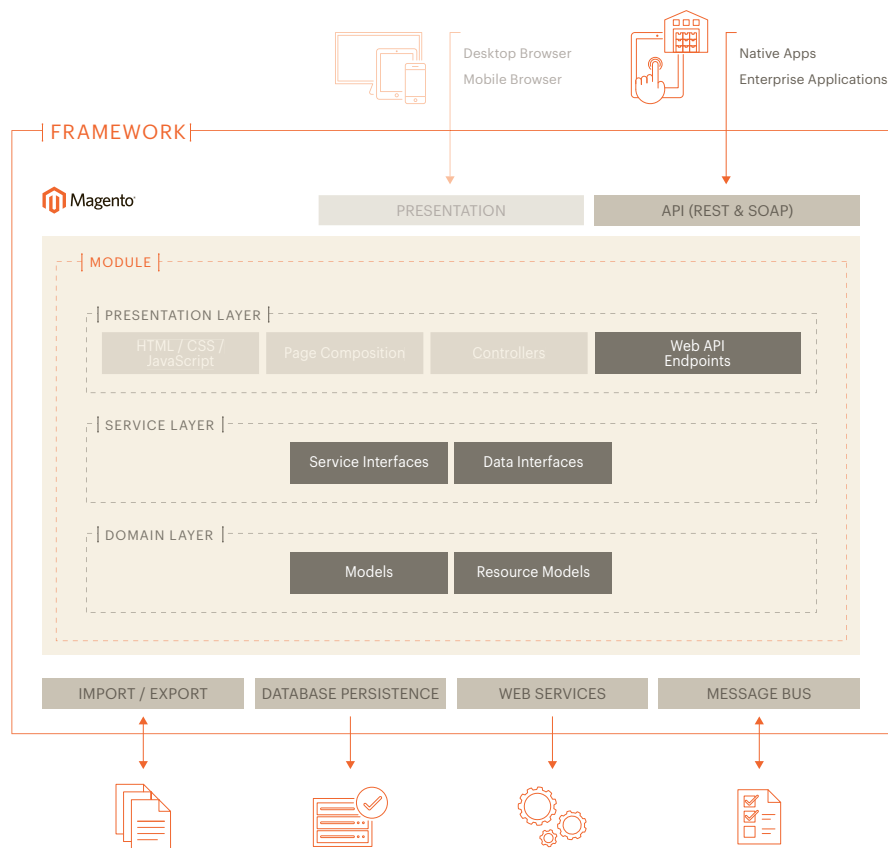

FIGURE 3: WEB API ENDPOINTS

Service Layer

The service layer is a thin architectural layer that provides a bridge between the presentation layer and the domain layer of business logic and resource-specific data. It holds the definition of "service contracts" (stable PHP APIs defined using PHP interfaces) for use by presentation code, Web API endpoints, and other modules. By using interfaces, different implementations of a service contract can be swapped by a module (perhaps from an extension purchased on the Magento Marketplace) without impacting other parts of the system. Service contracts result in great API stability and isolation of code, further improving extensibility and simplifying the upgrade process.

Service contracts are defined as a set of:

- **Service Interfaces** that provide the main entry point functions, and

- **Data Interfaces** that provide access.

A set of related service interfaces and data interfaces form a single service contract.

Domain Layer

The domain layer holds the business logic that powers a site and adds a significant advantage in simplifying the customization of a Magento installation's appearance. This layer includes service contract implementations for eCommerce functionality (also easily exposed as Web APIs), domain models containing business logic, and database persistence.

- **Models** (from the MVC pattern) hold the business logic.

- **Resource Models** are responsible for database interaction, such as for persisting product data or customer data.

Database Persistence

As described in the previous section, the domain layer deals with business logic, including – crucially – merchant business data that represents products and related attributes, customers, orders, tax and shipping rates, and basically all the stored information on which your store's transactions are based. Thus, how efficiently and securely your data is stored and then accessed determines your store's ability to convert orders and process sales.

And true to its open source roots, Magento leverages the popular open source MySQL database system for storing and accessing your business data.

For flexibility, the Magento database schema heavily utilizes an Entity-Attribute-Value (EAV) data model. Compared to traditional relational tables, EAV tables give the flexibility of adding unlimited attributes for products, categories, customers, and so on, at any point of the project, without requiring database schema changes.

Magento also supports separate database instances to be spun out for product information, orders, and checkout. This delivers great checkout performance, critical to improving sales and conversions, even if the rest of the system is more heavily loaded. With the proper configuration and hardware, Magento can scale to support customers with 3.5 million page views/hour for catalog and 250,000 orders/hour on orders.

For larger merchants, there are a number of MySQL drop-in replacement database technologies, such as MySQL Cluster for high throughput or high availability sites.
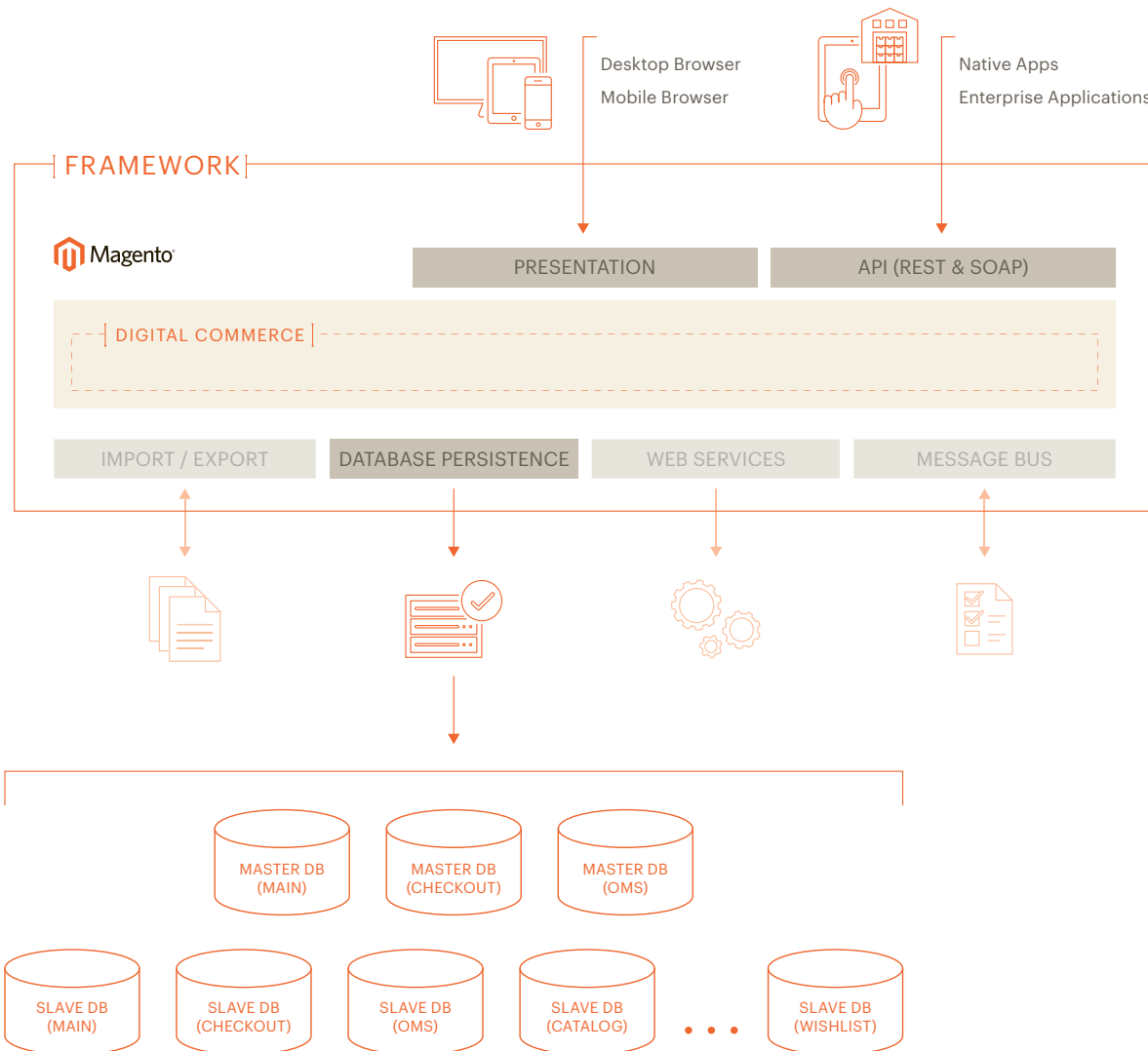

FIGURE 4: MAGENTO DATABASE TECHNOLOGY

Modularity & Extensions

Magento is a highly modular platform, constructing sites from a series of interlocking components. Maximizing extensibility has been the goal through all aspects of Magento development. Merchants can expand their storefront features by adding new or replacing existing modules with third-party or custom-created modules. For example, core tasks such as shipping are packaged as discrete modules, which means you can easily add or delete shipping providers by simply adding or deleting modules. The product framework provides common logic to control routing and other core application functions.

The Magento framework also provides a set of core logic: PHP code, libraries, and the base concepts leveraged by modules and other components.

Components

Within Magento there are three types of modular components: **modules**, which provide business logic; **themes**, which change the look and feel of a site; and **language packages**, which are needed to translate a site for internationalization. **Modules and themes** are the core units of customization in Magento and both have a lifecycle allowing them to be installed, deleted, and disabled. Theme inheritance with Magento improves reuse of code, thus increasing speed, making it easier to maintain while reducing cost of customization. **Extensions** available on Magento Marketplace are groups of modules sold as a single bundle.

Going deeper, modules encapsulate a particular business feature or set of features and function as a package of code. They include both the business logic that implements new features and the default user interface for those features, which can be customized by themes. They also contain a set of blocks, controllers, models, and more. Modules can relate to and depend on each other in a variety of ways, but should be as independent as possible to maximize flexibility when customizing a site.

The Magento architecture ensures that many modules and extensions can plug together seamlessly to build a single unified site experience, where one or more modules work together to add functionality to a site.
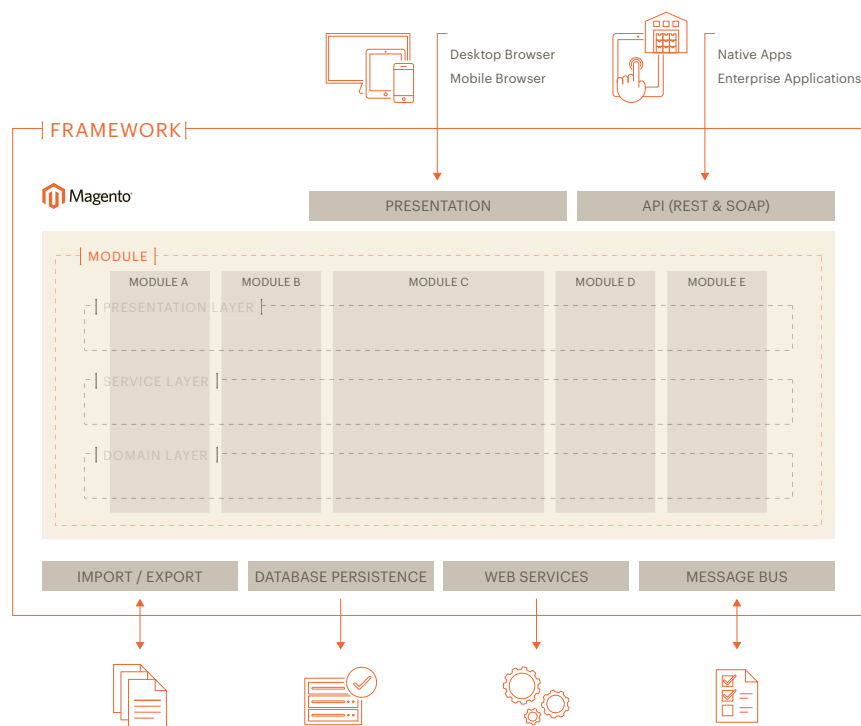

FIGURE 5: MAGENTO MODULARITY

Extension Points

To maximize flexibility so merchants can meet their unique business needs, the Magento framework enables modules to extend a site in multiple ways. The key extension points are as follows:
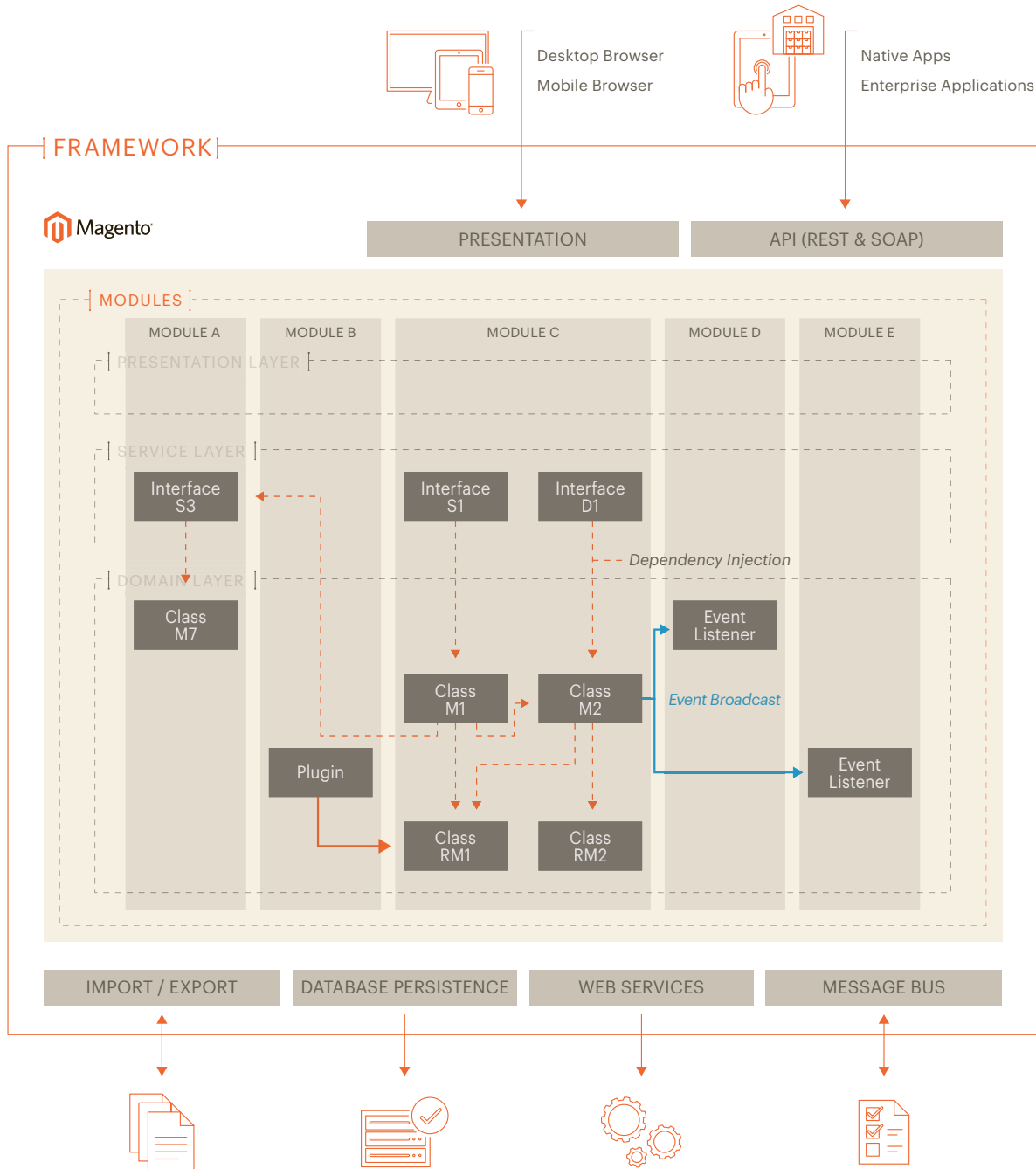

FIGURE 6: EXTENSION POINTS

Events

Modules can declare events, for which other modules can then register handlers. This provides a controlled way for modules to react when predefined circumstances occur, such as when a new customer record is created.

Plugins

Plugins allow one module to tap into function calls of another module, enabling interception of function calls where events have not been declared. These plugins give extension developers additional ways to develop and deploy new and innovative extensions that do not already have standard extension points defined in the platform.

Service Contracts

Services are defined by "service contracts" and can be replaced by any extension. For example, an extension developer can replace the default Product service backed by MySQL with other supported database engines.

Dependency Injection

Dependency injection controls the wiring together of a site via configuration files. Dependency injection is the mechanism to replace service contract implementations and define plugins, and it allows, for example, the default search engine to be replaced throughout Magento via a simple configuration change. Dependency injection also simplifies automation of unit tests by encouraging looser coupling between different areas of the code. Dependency injection is one of the core technologies enabling extensibility and interconnection between modules.

Themes & Internationalization

Magento includes sophisticated theming and layout capabilities that allow merchants to create shopping experiences that are true to their brand. Merchants can explore the included Luma theme, start with the default "blank" theme to create a custom design, or purchase a theme from the Magento Marketplace. Once implemented, themes can be further customized and adjusted with ease to support a new spring collection, holiday sale, or to expand into a new market that uses another language or currency.

Key theming features and benefits include:

Blank Responsive Theme

Magento ships with a default responsive blank theme out of the box. This is a great starting point for merchants to build their own custom site experience. It doesn't include specific customizations, so merchants can choose how much branding they want to add, knowing they are building upon a solid foundation that supports desktop, tablet, and mobile devices.

Multilevel Theme Inheritance

Theme inheritance reduces the effort required to develop new themes because you don't need to build them from scratch. You only need to specify changes to the base theme. This greatly simplifies tweaks to your theme for similar yet distinct brands, or specific campaigns, and reduces the amount of copying and pasting of common elements between themes. All themes can inherit from other themes, including the provided responsive "blank" theme, ensuring that all new themes are responsive by default.

Magento's native multisite functionality, along with theme inheritance and out-of-the-box internationalization support, deliver quick and easy coherent branding across multiple sites and stores, based on your unique needs.
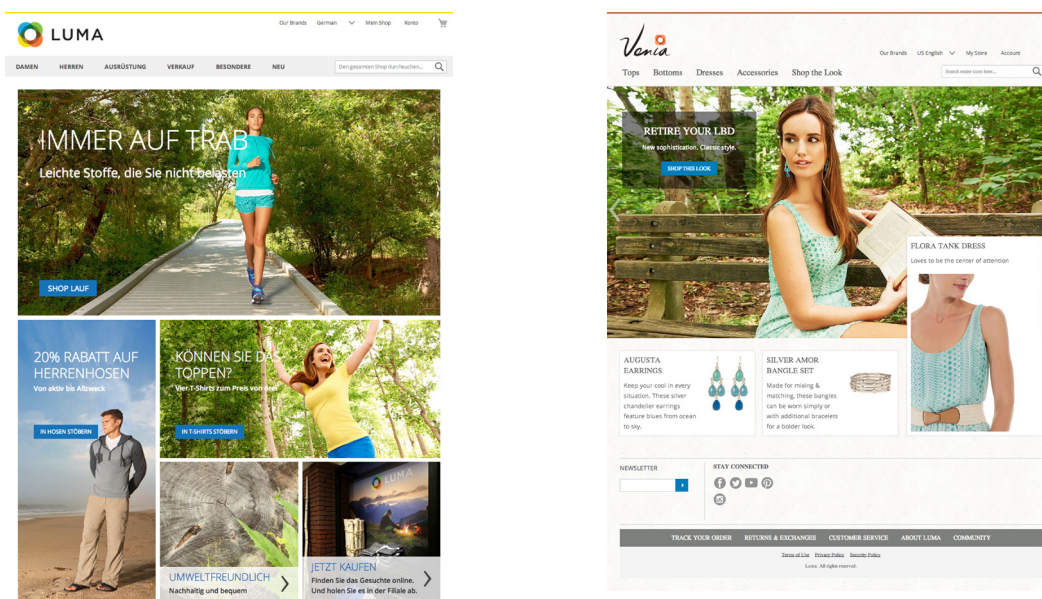

FIGURE 7: MULTILEVEL THEME INHERITANCE

Declarative Layouts

Layout files control the positioning of blocks relative to each other on a page. To simplify customization, XML schema support is used so that developers know exactly how to edit layout definitions. Good IDEs (integrated development environments) will then auto-suggest elements to support, based on the XML schema declaration. A variety of other integrity checks in layout XML files are also performed to identify errors more easily.

UI Library

The Magento UI library provides standardization across the presentation of UI components provided by Magento and extension developers. It represents an extensive list of reusable UI components with styling and design best practices from the Magento UI team. It also provides one central point of configuration to apply consistent customized styling of your site.

Internationalization

Magento supports internationalization out of the box. One installation (with one product catalog and set of inventory) can support multiple languages. All strings are translatable via language packages, and Magento supports multiple currencies and currency exchange rates.

Integration

Magento supports a range of options to integrate with external services. While Magento is a completely standalone solution, it is also equally usable with external systems that hold master product data, order data, or similar business data.
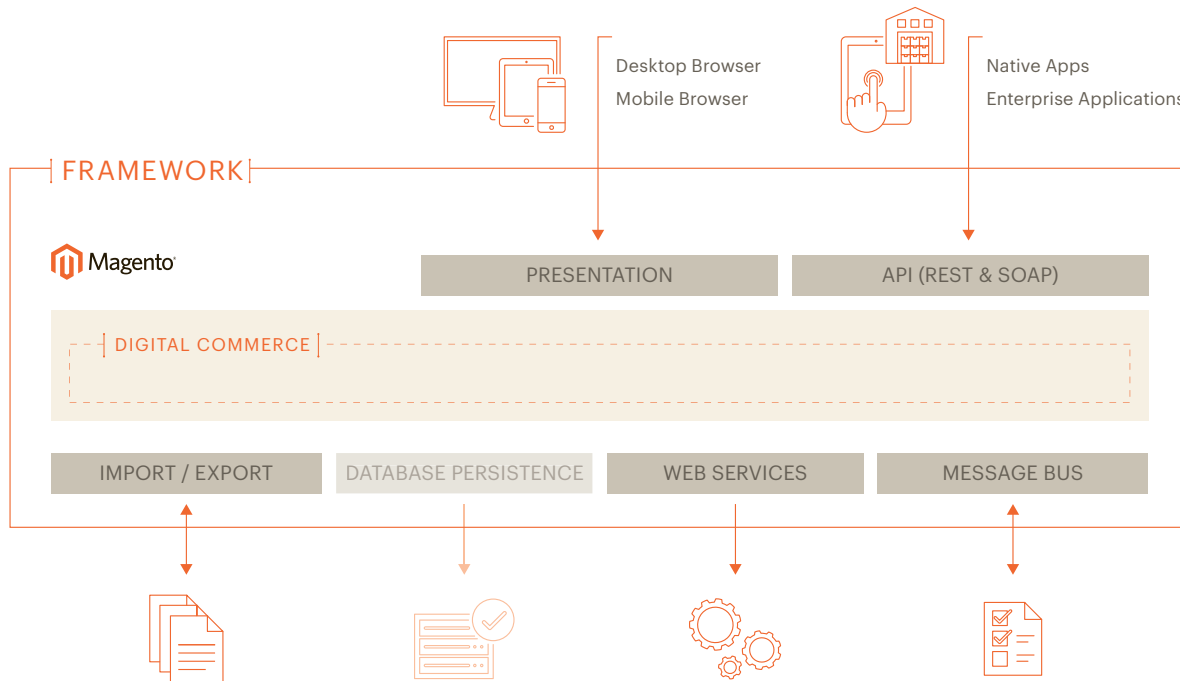

FIGURE 8: EXTERNAL INTEGRATIONS

Import/Export

Bulk data can be imported and exported with Magento via delimited files such as CSV. This includes product data, pricing data, and customer data. Magento can load multiple hundreds of thousands of records per hour via the import facility.

Web Services

Magento supports easy integration with external systems through out-of-the-box web services (REST and SOAP). External systems can be allocated an authentication token to provide unattended authorized access. Magento also supports session-based authentication (for AJAX requests in an existing user's session) and username/password authentication (for native mobile applications).

Message Bus

Message buses are a useful technology for queuing asynchronous requests at high throughput rates. Magento includes integration support for message buses, with default out-of-the-box support for RabbitMQ. Inbound messages bind to service contract methods just like REST and SOAP calls. A standard API is provided for sending outbound messages to other services on the bus.

Extensible Service Model

All Magento web services can be easily extended to support site-specific functionality. This means any extension can easily add support for additional services to be used by external applications. Extensions can also add new properties to data structures returned by existing services. For example, a new product attribute can be added by an extension, and it will seamlessly be returned via the web services.

Development

Easy to Install

Magento sites are assembled using Composer, the de facto package management system for PHP. Developers can develop on their desktop or laptop and then easily publish code to the cloud. Technologies such as Docker and Vagrant make virtualized environments easier, providing an environment with all required development tools pre-installed.

Magento also comes with a fully functional demo site called "Luma." With the demo site, you can just add a dependency on the sample data package and you are ready to launch.

In addition, a standalone installer makes it straightforward and faster to install Magento. Tools included with the installer highlight potential code conflicts before you upgrade to the next version or add a new extension. This installer has both a web and command-line interface.

Magento installation is completely documented and available online at devdocs.magento.com.

Magento®

Backward Compatibility

Magento ensures that the process of upgrading between versions is easy and cost-effective, and that extensions are forward-compatible as long as possible.

Composer natively supports "Semantic Versioning," which allows packages to declare dependencies on other packages, with compatibility constraints based on version number ranges. This ensures that adding new extensions or applying upgrades to existing modules will only ever be attempted using compatible versions of the code base. This effectively eliminates the risk of compatibility issues with upgrades.

Semantic versioning indicates whether changes in a release break backward compatibility. Version numbers are in the format MAJOR.MINOR.PATCH, where:

- MAJOR indicates incompatible API changes
- MINOR indicates that backward-compatible functionality has been added
- PATCH indicates backward-compatible bug fixes

Open Development

Magento is written in PHP, the most popular web programming language. It enables coding with a fast edit, save, and test cycle, as no compilation phase is required. Combined with PHP 7, Magento can potentially cut in half the average request processing time.

Magento is one of the world's largest open source projects. With access to the full Magento code base, there are no hidden secrets, and you can gain confidence from seeing exactly how Magento operates. You never need to be stuck wondering what some precompiled library without source code does.

If you do find a bug while working through the Magento code base, you are not dependent on the core Magento development team to fix the issue. The ecosystem, including the partner network, is considered an extension of the Magento team and is available to suggest fixes as well. This can greatly accelerate the turn-around time from detection to repair.

Development Tools

Tapping into the PHP development sphere also has the advantage of leveraging from the suite of PHP development tools. This includes integrated development environments (IDEs) such as PHP Storm for more efficient development practices, development tools such as Zend Server and the Z-Ray debugging tool, and analytics such as New Relic for monitoring site performance.

XML Configuration and Validation

Most configuration files (such as page layout files) are encoded in XML, with XML schemas for validation. This means in most IDEs, error identification with auto-suggestion is available as you type, speeding up development and reducing bug counts. Files are also validated in development mode, and turned off in production mode for better performance.

Test Automation

Magento also supports the new world of devops. Not only is the source code open sourced, but all the test cases used by the Magento development team are similarly available. This test framework can be leveraged by developers to test their own modules, or ensure that their modules have not affected the base site.

The Magento framework includes a range of different types of tests, including unit tests (individual classes), integration tests (groups of related classes), Selenium-driven functional tests (complete system end-to-end tests), performance tests, and more.

Tests are automatically run for public contributions to the GitHub master source code repository using the Travis Continuous Integration service.

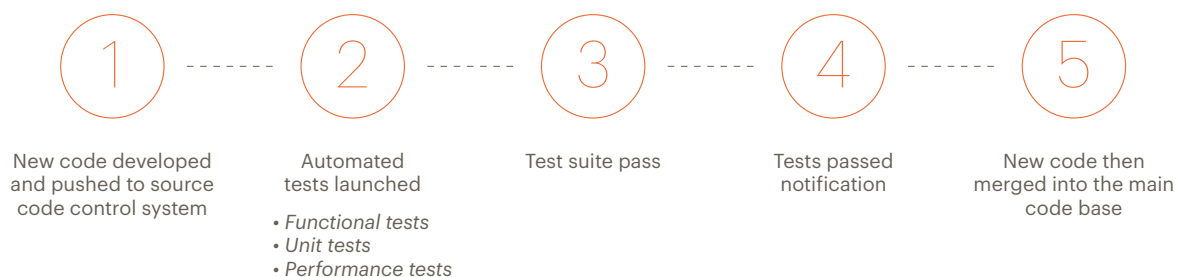| ①	②	③	④	⑤
New code developed and pushed to source code control system	Automated tests launched	Test suite pass	Tests passed notification	New code then merged into the main code base
	• *Functional tests* • *Unit tests* • *Performance tests*			

FIGURE 9: TEST AUTOMATION IN MAGENTO

Frontend Development with Grunt

For frontend developers, Magento includes support for tools such as Grunt. Using Grunt, whenever a source file is saved to disk, the LESS CSS compilation process kicks in automatically, updating the current page without developer interaction. This greatly speeds up the development process.

Magento Ecosystem

Magento is backed by a vibrant and supportive community of merchants, extension developers, system integrators, and hosting partners. These specialists can offer merchants quality implementations, expertise in extending and customizing sites, and stable deployments for growth and scale.

Community

The Magento community ensures that innovation is not limited by the core development team. The open nature of Magento encourages new ideas to be explored, with community members frequently sharing their ideas as technology extensions to the platform, via GitHub pull requests or other online collaborations, or at the many Magento conferences or meet-ups.

You are encouraged to connect with others in this community by using the Magento forums at community.magento.com. There is a good chance there's a partner, user group, or meet-up near you. If not, there are also numerous online forums and special interest groups. The Magento Stack Exchange forum is completely community-driven and one of the most active Stack Exchange forums in existence.

Magento Marketplace

Magento Marketplace is a destination where merchants can find quality off-the-shelf extensions to enrich Magento websites and expand their base capabilities. The Magento Marketplace is where all parties come together.

MERCHANTS

SYSTEM INTEGRATORS

EXTENSION DEVELOPERS

MAGENTO

- Merchants come to the Marketplace to purchase extensions for a Magento site.

- System Integrators are also able to purchase extensions and merge them into sites on behalf of merchants.

- Extension developers identify unfulfilled business needs and develop new extensions, themes, or connectors to other third party software solutions to address those needs.

- The Magento development team continues to develop the core Magento platform, releasing new features, making them available to the community at large, and maintaining quality.

FIGURE 10: MAGENTO MARKETPLACE

Magento Partner Program

The Magento Partner Program is a highly structured program that enforces strict guidelines and certifications to qualify as a Magento partner. The program includes partners that specialize in numerous areas – in fashion, B2B, international, and more from across the globe.

Technology Partners

Technology Partners are extension developers or software firms that provide complementary solutions that are integrated with Magento. One of the main drivers of Magento innovation is the extension developer community. Hundreds of quality extensions and connectors to third party solutions have been developed, and more are only an idea away. If you can't find an extension for what you want, there is a community of partners and developers available to build that custom extension just for your site.

Solution Partners

In addition to Technology Partners who offer complementary software or build individual modules to add to your site, there is also a community of system integrators or solution partners available to design, code, deploy and manage your site. Solution Partners are Magento experts that have experience in efficient, quality Magento development and expertise in suggesting customizations, and are available as an external resource to help execute your commerce vision and plan – or they can serve as extensions of your internal technical teams.

Hosting and Performance Partners

Another expert group within the partner program is the hosting partners that are available to advise merchants on hardware deployments and hosting options. These partners have significant experience in optimizing the site for performance and scale to support merchant growth needs.

The extensive Magento ecosystem ensures that there is a partner to match your needs and budget.

Technology Stack

Magento is built on the open-source LAMP stack. LAMP stacks are easy to replicate so they can be quickly and easily spun up, without the cost overhead of some commercial products.

LAMP stack components include the Linux operating system, the Apache HTTP Server, the MySQL relational database management system (RDBMS), and the PHP programming language. These components are largely interchangeable and not limited to the original selection. As a solution stack, this model is suitable for building dynamic websites and web applications.

On the client side the platform incorporates modern and popular components so that the platform is stable and accessible for developers. For this reason, JQuery is the main JavaScript library for UI. The LESS CSS preprocessor offers tooling support that makes development faster and improves code maintainability and readability. The Admin UI and default themes use LESS.

Require.JS is used to support asynchronous JavaScript module loading. And, as with most websites today, Magento supports HTML5 and CSS3 standards.

Hardware Topologies

One of the keys to Magento's flexibility is that its required architecture ranges from very simple topologies for simpler stores to large, complex ones for advanced merchants.
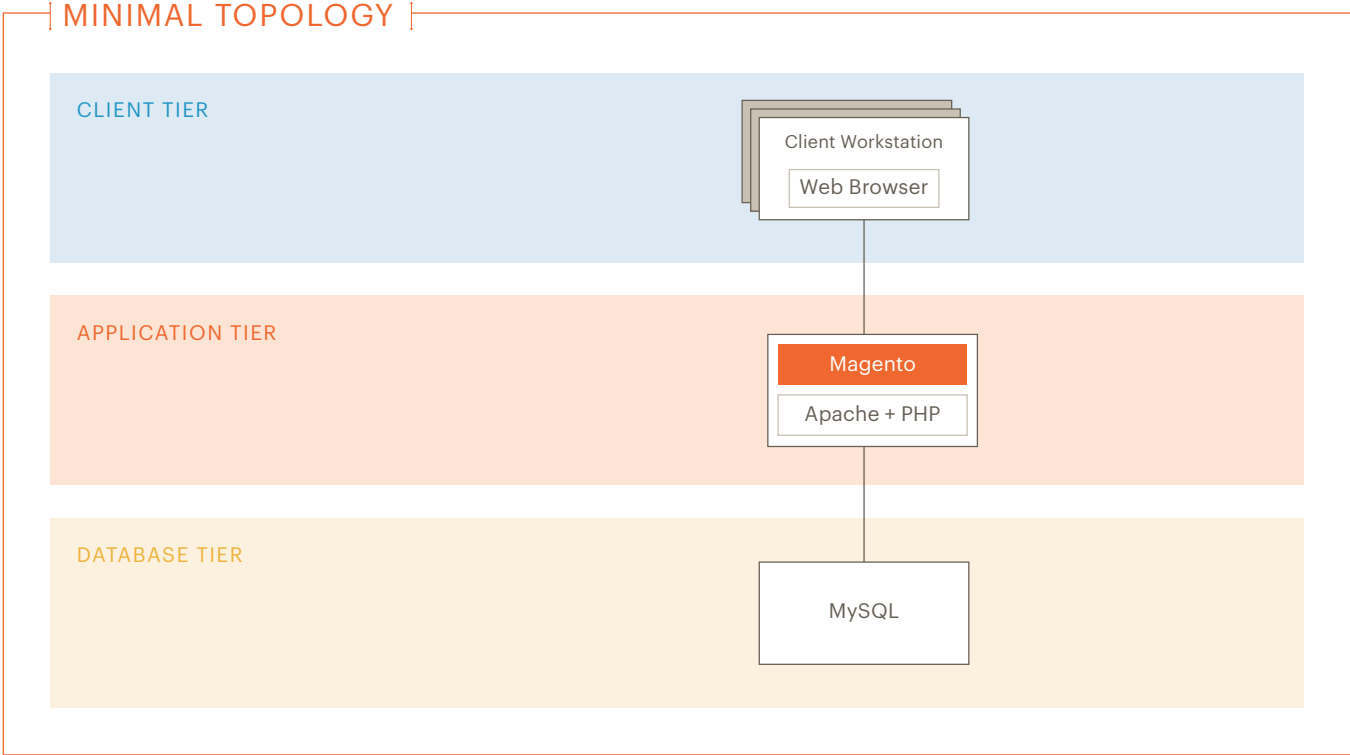

FIGURE 11: MINIMUM HARDWARE TOPOLOGY

Sites can start simply, with a single Apache or Nginx web server talking to a local MySQL database, and then grow with demand to a fully clustered solution with load balancers, Varnish caching tiers, data and session caches, horizontal web tier scaling, and database scaling. The core Magento code base is the same, allowing your store to grow in capacity with minimal effort.
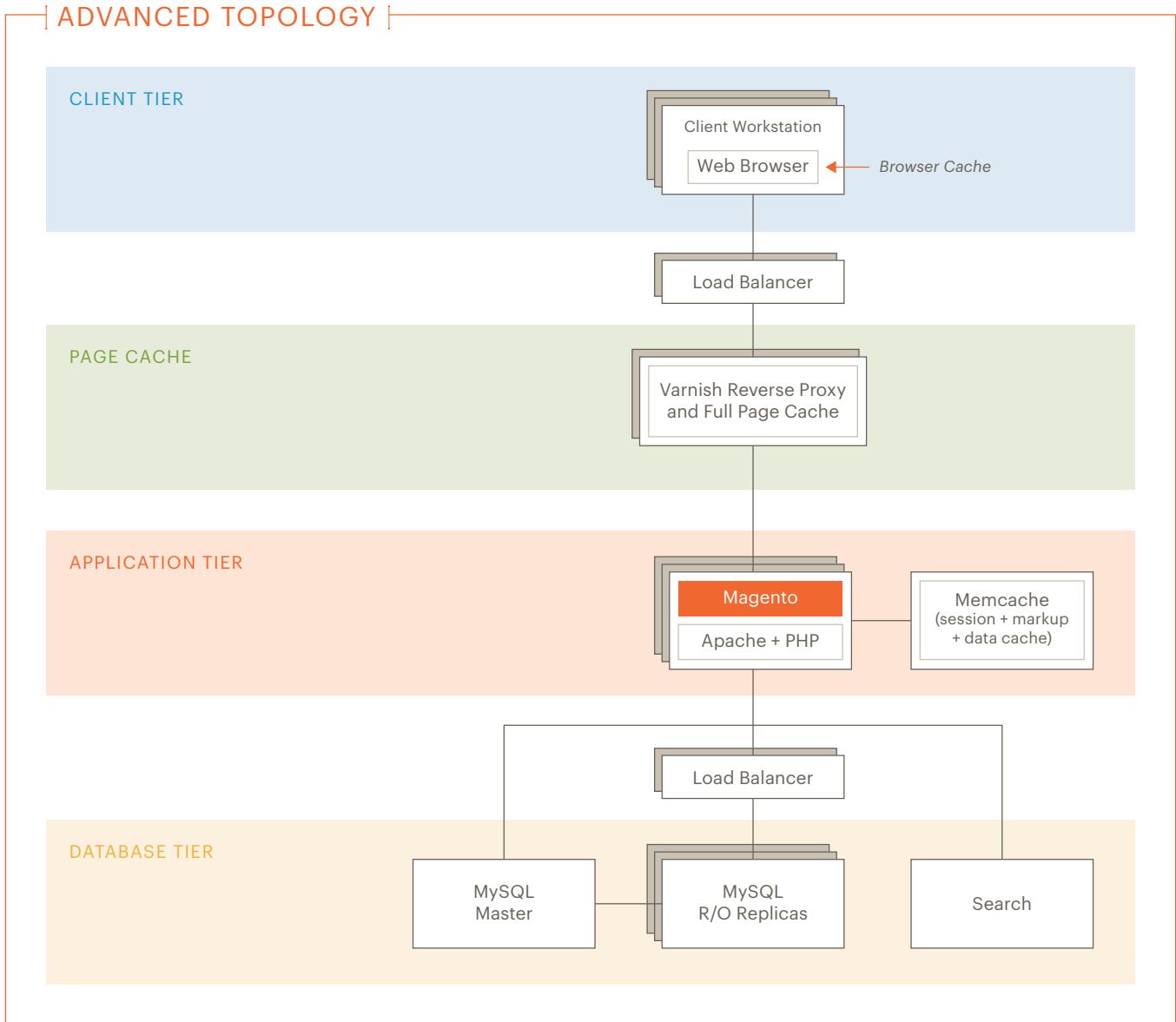

FIGURE 12: ADVANCED HARDWARE TOPOLOGY

Magento can be easily used with cloud technologies, including virtual machines and containerization. This relieves merchants of the responsibility of operating their own hardware, and can help merchants reduce and control costs with flexible, on-demand scale for periods of peak demand, outsource maintenance of their hosting environment, and take advantage of the general trend towards low-cost compute power.

Operations

Infrastructure Requirements

The minimal system infrastructure requirement is a single server upon which to run the Apache web server (or Nginx) plus MySQL. As a site grows, it is common to use more sophisticated topologies. A first step up may be to introduce a CDN for serving static assets and add Varnish page caches. The next step might be to move the database server to a separate host from the web server. Later changes may be to introduce data and session caches, and a separate search engine for full text search indexes.

High Availability

Magento supports high availability configurations with redundant servers. Using technologies such as Memcached for session caching allows a web server to go down without dropping sessions. Techniques such as database replication can be used to provide high availability at the database level as well.
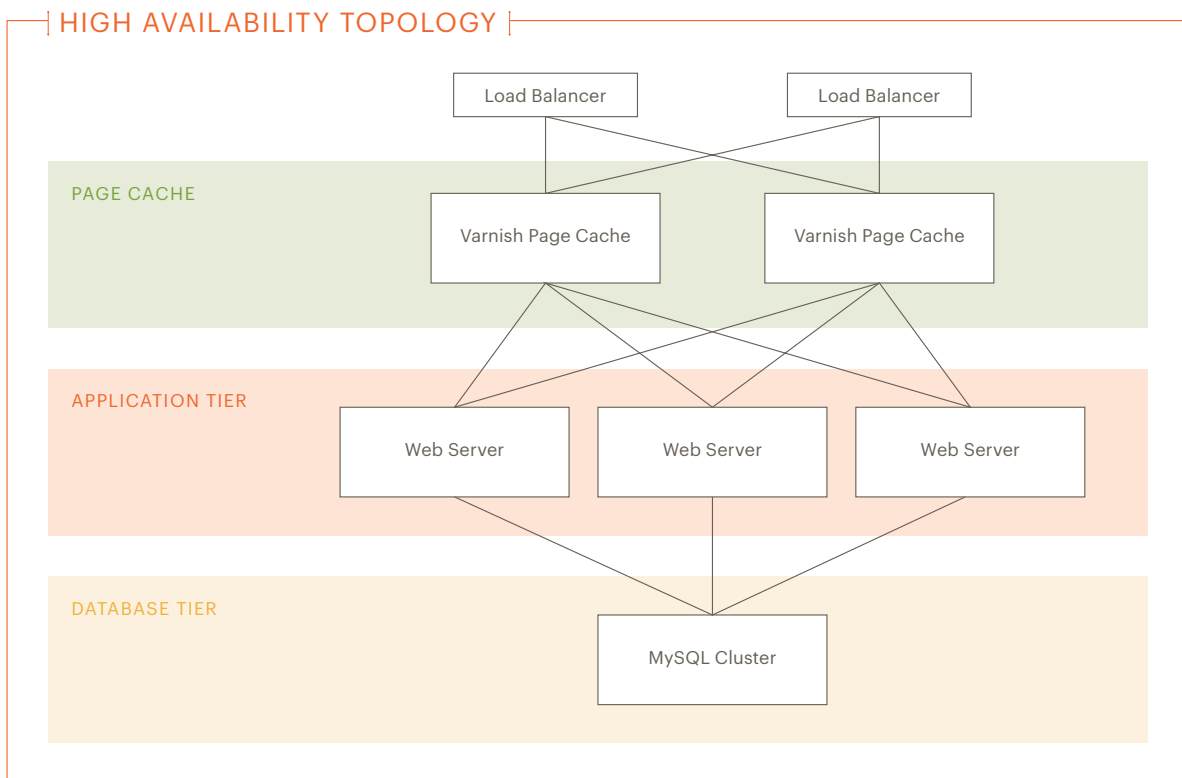

FIGURE 13: HIGH AVAILABILITY TOPOLOGY

Virtualization

Magento is completely compatible with all popular virtualization technologies. A common pattern is to use a database-as-a-service combined with Apache and other servers running on virtualized hardware. The database holds the most critical persistent data, and other servers can be restarted on a new virtual host if the underlying server goes down.
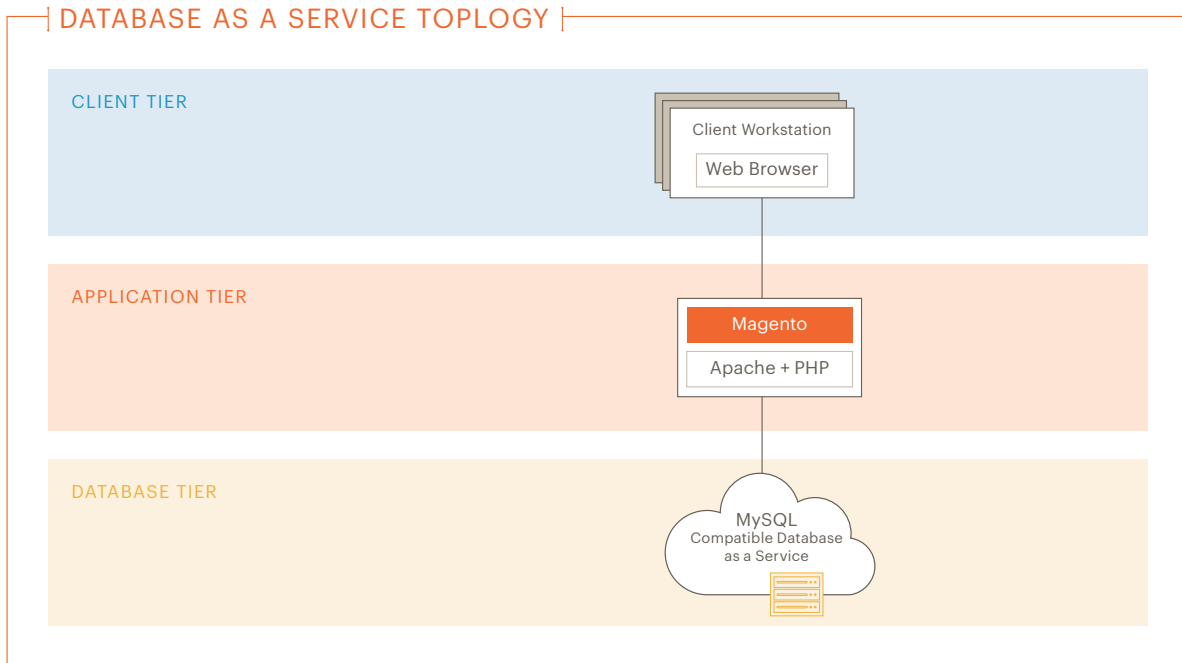

FIGURE 14: DATABASE-AS-A-SERVICE TOPOLOGY

Page Caching

Magento has been designed for out-of-the-box integration with page caches such as Varnish. Page caches reduce the average time to return a page by saving a copy of it, so that the next time the same page is requested, the cached copy can be returned instead, for faster performance.

The challenge then is how to make sure only up-to-date content is served from cache. Magento does this by associating tags (such as a product number) with every returned page. Varnish (or similar) page caches store the page and tags. When an item is updated in the database, the corresponding tag can be used to delete the pages with that item from the cache, triggering new pages to be formed. This is referred to as "partial cache invalidation."

Performance

Magento has been highly tuned to deliver the best possible performance. Not only has the code base been profiled and tuned, the whole page caching architecture (including strategies such as partial cache invalidation, discussed in the previous section) has been designed to optimize the number of requests that can be served directly from cache.

Magento also supports PHP 7, which frequently delivers a doubling in performance over previous PHP releases. Numerous other performance related features are also available, such as optimized index refreshes when data is updated.

Performance Monitoring

Magento provides a free New Relic extension on the Magento Marketplace. Once installed, merchants can sign up for a New Relic account and obtain detailed performance monitoring data for their site. Faster sites make more sales, so monitoring a site's performance is a must.

Performance Benchmarking

To assist merchants even further, Magento provides performance testing tools, allowing a merchant to compare the performance characteristics of different hardware configurations. The tool comes supplied with several standard traffic mixes, but also includes the ability to generate synthetic data for performance runs with other profiles.

Security

Securing Your Application

Magento supports development of secure websites via various mechanisms. The fact that Magento is open source can help ensure that problems are spotted and solved quickly through many eyes viewing the code. If a problem is identified, solutions can be developed by the core team or submitted immediately by the community for incorporation into the code base. The latter supports the common security industry practice of not advertising a security issue widely until a solution is identified. The researcher who identifies an issue is often best equipped (having just investigated the problem) to also propose a solution.

Magento undergoes regular third-party security scans to identify potential vulnerabilities in the code base. In addition, Magento has programs such as bug bounties to encourage and reward those reporting potential security threats.

Securing Your Data

Securing your data is more than just ensuring that only authorized users have access to your data. It also includes making data backups for recovery from catastrophic system failures. Your data *is* your business – it should be suitably protected at all times. Magento supports backups of all critical business data.

Audit Trails

Magento natively supports logging of audit trails. Magento leverages the Symfony "Monolog" logging library, providing a flexible logging infrastructure. For larger sites, it is common to configure Monolog to send all collected log messages to a central log collector such as Logstash or Splunk.

In addition to the default logging, Magento also provides hundreds of event handler integration points. This allows custom log messages to be created via event observers, giving sites greater control over which audit log details to collect.

PCI Conformance

All Magento payment integrations that are supported out of the box transmit customers' credit card data directly to the payment gateway. The Magento servers are not directly involved in the transmission of credit card data. By leveraging gateways with direct post APIs, iframe, or hosted payment pages, Magento allows for the easiest level of PCI compliance – SAQ-A or SAQ A-EP – depending on the selected payment method.

Conclusion

In a world where the new normal is winning with differentiated customer experiences, and where the technology required to do so is increasingly complex and changing at a breakneck pace, merchants need a commerce platform that offers unlimited flexibility, that is designed to be cost-effectively customized, and that enables them to keep pace with and get ahead of technology change.

With an open source foundation that can be easily tailored and extended and a vibrant ecosystem of experts continually augmenting the core solution, Magento is uniquely designed to empower you to keep pace with changes in technology and consumer expectations, as well as with the imaginations of innovative merchants. Its high-performance and scalable architecture ensures that merchants can confidently grow on the platform, and quarterly functional updates, coupled with unlimited access to enhancements via the Marketplace, ensure that Magento will continue to revolutionize and redefine the boundaries of commerce.

Getting Started

Following are useful resources to get started on the platform and transform your eCommerce business.

To learn more about Magento Digital Commerce, visit our website at magento.com/products/enterprise-edition.

To find out more about how Magento can transform your eCommerce, contact a Magento sales representative who can help you to determine the solution for your business needs. Call us at 1-877-574-5093 (US, Canada and Mexico) or +353 1 7759 599 (rest of the world).

About Magento Commerce

Trusted by more than 250,000 businesses worldwide, Magento Commerce is the leading provider of open omnicommerce innovation to retailers, brands and branded manufacturers across retail B2C and B2B industries. In addition to its flagship open source eCommerce platform, Magento Commerce boasts a strong portfolio of cloud-based omnicommerce solutions empowering merchants to successfully integrate digital and physical shopping experiences . With over $50B in gross merchandise volume transacted on the platform, Magento Commerce is the dominant provider to the Internet Retailer Top 1000, counting more than double the clients to the next closest competitor, and to the Internet Retailer Hot 100. Magento Commerce is supported by a vast global network of solution and technology partners, a highly active global developer community and the largest eCommerce marketplace for extensions available for download on the Magento Marketplace. More information can be found at www.magento.com.