Percussion CM System

Web Content Management With A Focus On Results

Decoupled Delivery Architecture:

Powering Dynamic Web Properties

percussion®

Table of Contents

Introduction ..... - 3 -
Background ..... - 3 -
Static Sites and Decoupled Delivery Architecture ..... - 4 -
Dynamic Sites and Coupled Delivery Architecture ..... - 4 -
Web 2.0: Decoupled Architecture Returns ..... - 6 -
Percussion CM System: Decoupled *and* Dynamic ..... - 7 -
Managing Dynamic Delivery in Percussion CM System ..... - 8 -
Percussion Online Interaction Services ..... - 9 -
Benefits of Dynamic and Decoupled Architecture ..... - 10 -
Conclusion ..... - 13 -

Introduction

Web Content Management (WCM) systems have evolved over time to feature different types of architecture. Some are "coupled," joining the content management system (CMS) to the Web delivery platform, while others are "decoupled," separating content management from content delivery on the Web. Decoupled architecture provides the flexibility to leverage managed content in a multitude of different ways with no adjustment required to existing Web delivery applications and infrastructures. This allows for an incremental, agile approach to Web application development that is critical for the conversation economy and social Web while improving performance, scalability, and cost-effectiveness.

Percussion CM System features unique, industry-leading decoupled architecture that enables business users to focus on optimizing content to most powerfully impact the building of their Web presence while freeing developers to create rich, independent Web applications for dynamic delivery of the customer experience. CM System's architecture facilitates publishing to a variety of technology platforms, making it easy to publish your content on whatever channel or channels will drive the most visits and the highest conversions. Decoupled architecture makes CM System agile and adaptable, enabling your organization to respond quickly and easily adopt newly developed technologies.

This paper provides background on different CMS architectures, describes the benefits of decoupled architecture, and outlines Percussion's unique approach to the decoupled approach.

Background

Broadly, Web Content Management systems are designed to empower business users to create and manage content for the Web. This is generally accomplished by breaking down site pages into distinct content and format elements. This process might begin by asking business users to look at Web pages and "draw boxes" around the distinct parts of each page they might want to modify. Based on those divisions, a set of "content types" are defined containing the category (such as text, rich text, audio, video, and so on) and data fields that business users will regularly use for content entry. Content types may be specific, such as "press release," or generalized, such as "article," and can usually be modified at a later date.

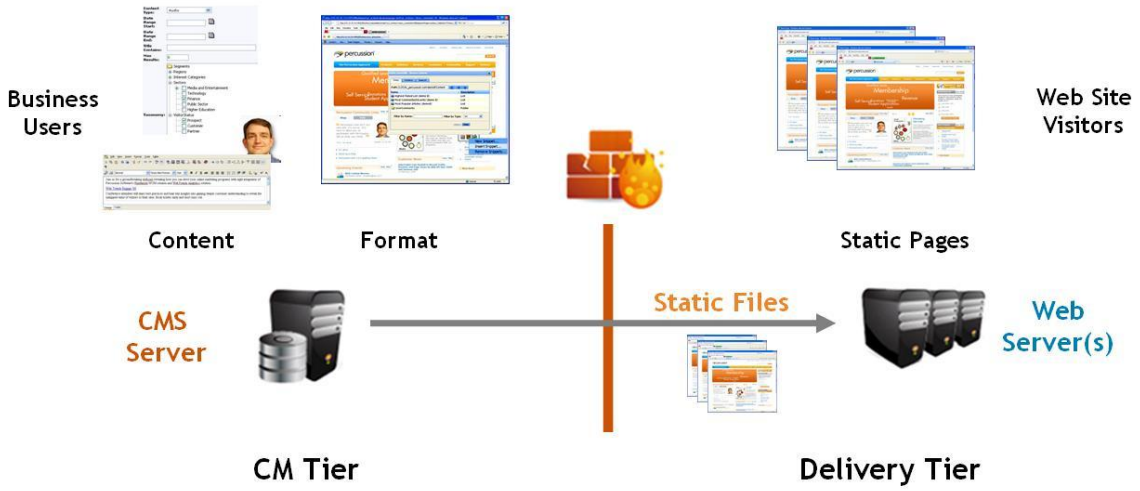
The definition of "format" is usually less rigorous. In general, all page elements not defined as content by business users will be treated as "format." Formatting is most often rendered by a set of "templates." Designers create templates and use them to control the look and feel of Web pages and sites. Designers can place special markup or tags into templates to indicate where individual content fields will appear, or to position open-ended containers for entire content items.

With this separation of content and format established, business users are free to select a template or content type to create before entering content without any knowledge of the markup required to produce the desired formatting. The

fundamental job of any content management system thus consists of recombining or "assembling" content and format during the publishing process. This assembly and publishing process generates an end result: a web page, a mobile application, a printed document, or another form of published output.

Static Sites and Decoupled Delivery Architecture

Because page assembly is a performance-intensive task, content management systems traditionally adopted a "baking" approach for static sites. In the "baking" approach, the CMS assembles and publishes all the pages in advance (before users access them), based on currently approved content in the CMS. Whenever content is entered or modified in the system, the affected pages are re-assembled and re-published. This was the first kind of "decoupled delivery" architecture, as no interaction between the Web site and the CMS is needed to deliver pages once they are assembled and published.



Static, decoupled Web architecture has many benefits, including performance, scalability, security and limited points of failure.

Today's Web, however, demands a more interactive experience for the customer. Whether through personalization, visitor participation, or random interactions such as multivariate testing, Web sites increasingly require dynamic effects to be implemented as visitors interact with the site. This means business users need ways to go beyond editing and publishing static content to editing the dynamic customer experience itself.

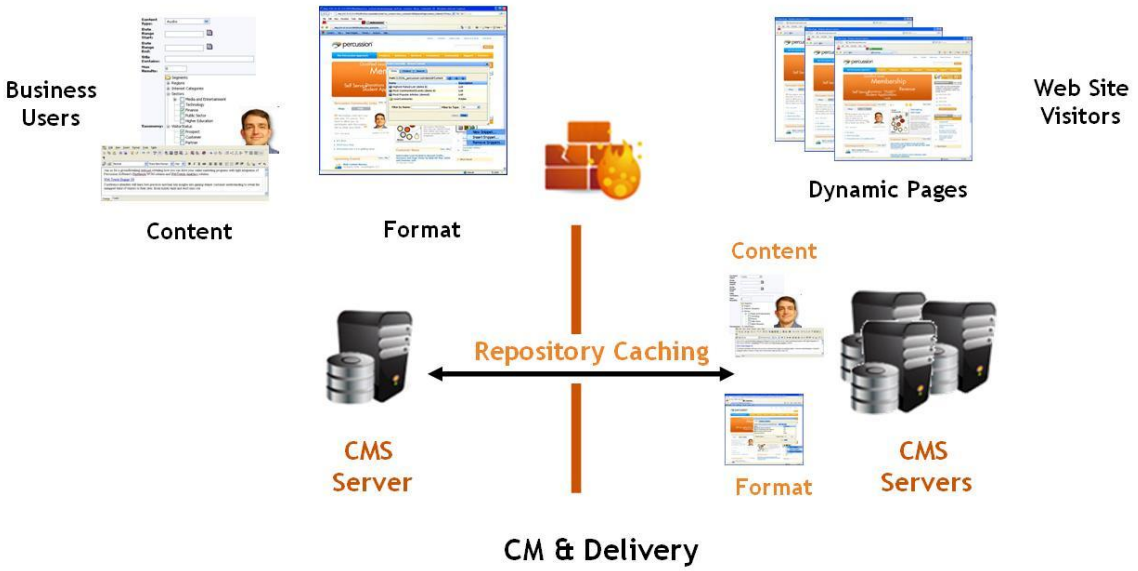
Dynamic Sites and Coupled Delivery Architecture

Dynamic sites incorporate content that changes based on the site visitor's click behavior, referring page, or other session-specific information, such as time of day

or geographic location. Incorporating dynamic content not only improves the site visitor's user experience, but also requires a dynamic Web application for content delivery.

Despite the unique demands of dynamic sites, many Web Content Management systems continue to adopt the same basic content-format separation used with static sites, implementing the dynamic presentation entirely as extended functions within the formatting templates. This approach merges the traditional WCM assembly application with the dynamic Web delivery application, producing a single "coupled" application that powers both content editing and dynamic delivery of content to site visitors.

Under this Coupled application model, every dynamic page delivered to visitors is created by a dynamic query to the WCM system for the appropriate content. The CMS applies any remaining presentation logic or template instructions, incorporates visitor and session properties, and then outputs dynamic page results. The business user similarly uses the coupled application to edit properties for the dynamic presentation, such as which parts of the page are dynamic and how behavior, geography or other visitor properties are used to change content presentation.



This approach places the entire web visitor load on the coupled WCM application. Since assembling content with format involves a great deal of processing, the WCM application must incorporate complex page element caching to pre-assemble as much as possible, as well as server clustering and session management across applications to distribute the load of today's high traffic high change websites.

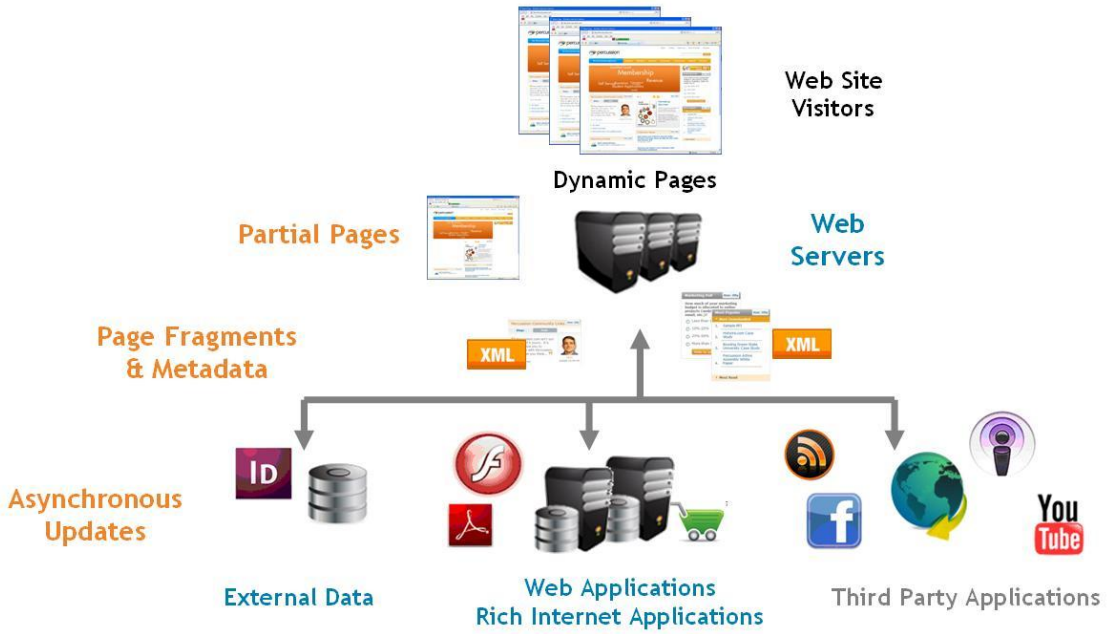
This coupling means all Web application development becomes completely dependent on the underlying APIs and content delivery functions of the coupled web content management system. In short, all Web applications are WCM applications and vice versa. The inevitable result is larger and ever more complex WCM systems with vendor-supplied modules embedding everything from Web analytics to semantic processing, to behavioral targeting of visitors, to e-commerce shopping carts, to

social marketing and online communities – all in a single set of massive coupled applications!

Web 2.0: Decoupled Architecture Returns

While Web 2.0 today is popularly understood as comprising the collaborative, participatory functionality demonstrated in social networks and blogs, there was an underlying technological revolution that came first. It began with a grab bag of seemingly unrelated technologies; "mash-ups," the reapplication of JavaScript and browser add-ins with asynchronous approaches like AJAX, Web services, even development processes such as "agile development" or "the perpetual Beta." The real change was a profound new driving principle for Web applications: each new initiative, experience, or technology must deliver measurable results – visitors, purchases, memberships, etc. – before further investment was justified.

The common technical thread is the embrace of a new Web application architecture that is distributed, incremental, and most of all decoupled. Where previously, decoupling meant entirely static applications that ran alone, Web 2.0 introduced the idea of decoupled yet dynamic applications. Applications may request content or invoke services from other applications to be dynamic, but the interactions are processed asynchronously, through standard simplified requests such as URLs over HTTP. Dependencies on response, syntax and API behaviors are dramatically reduced, if not completely eliminated. New applications are still easily added while others are just as easily dropped without damaging the reliability of the whole. This applies across platforms including J2EE, .Net and LAMP because the difference is in architectural handshake between the participating applications, not in the code base.

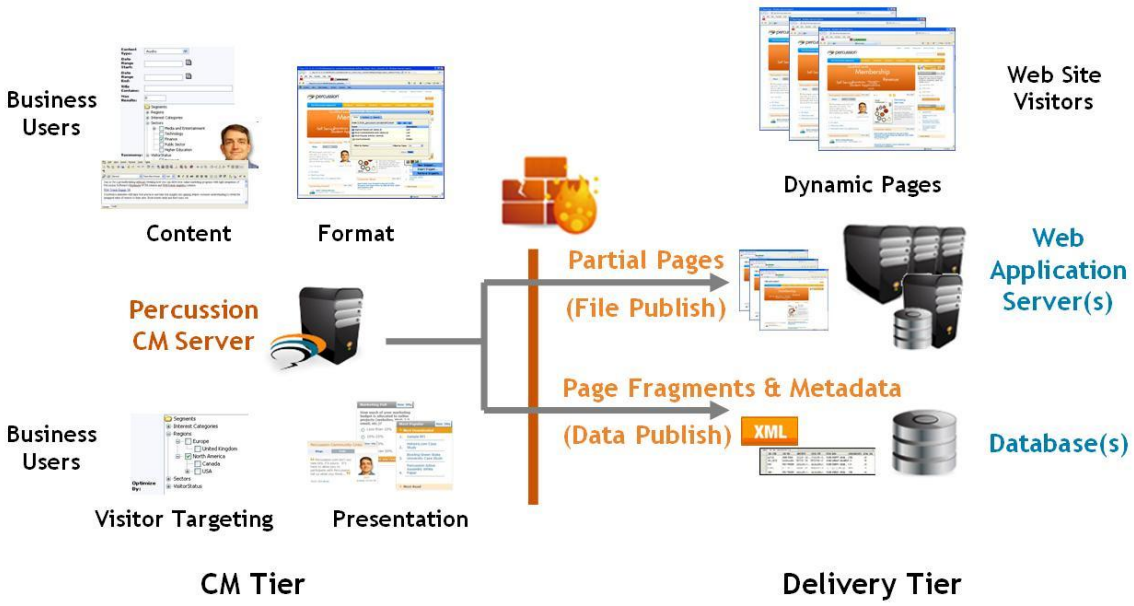


Not only do the performance, scalability, or points of failure benefits of decoupling return, but dynamic decoupling provides essential support for incremental investment and agile modular development.

Percussion CM System: Decoupled *and* Dynamic

Embracing incremental, results-driven Web investment requires both dynamic, interactive Web functionality and a decoupled architecture to provide agility. All services must be delivered independently, each providing an incremental piece of the overall dynamic experience. Every service must be easily incorporated or excluded as part of a "whatever works" assessment based on actual results, tracked and measured with flexible technology. Fault tolerance and scalability are achieved through optimized, independent operations, ensuring the overall Web experience will remain functional should any constituent service become unavailable.

This demand for flexible, multi-part web technologies drives Percussion's unique decoupled architecture. Percussion not only decouples the CM Server component from the Web delivery tier servers, but also decouples each aspect of the dynamic Web experience from the others. This includes decoupling our own Online Interaction Services from those of existing applications, third party products, and custom delivery code, maximizing responsiveness while retaining all of the decoupled benefits discussed previously.



To achieve this "decoupled and dynamic" approach, the traditional concept of page "decomposition" (or breakdown) into content and format is extended to the entire online experience. The online experience can be broken down into the following four areas:

Content – Content retains its existing properties, but a dynamic environment also requires the careful management of metadata to describe what the content is, who it is for, and other properties that will drive the dynamic presentation.

Format (Channel) – The "format" of content on a dynamic page is limited to ONLY the markup required to display or render content in a given channel or output format (such as print, mobile, or Web). This markup might include HTML, CSS style references, XML, and so on. Format should not be confused or combined with Presentation as described below.

Visitor (Targeting) – Capture and organize visitor targeting information, including implicit visitor behavior such as click tracks and Geo-location, in addition to explicit information such as secure login and/or user preferences captured directly from Web forms. Separating the business logic around Visitor Targeting from the Presentation rules enables adoption of different methods for managing different types of visitors.

Presentation – These rules combine Visitor Targeting information with Content properties to determine what to dynamically present to Web visitors as they interact online. The key to decoupled and dynamic delivery involves separating the business logic of Presentation from the purely display-oriented markup controlling the Format or Channel. This separation enables the "preassembly" of content and format to occur independently from any final dynamic presentation to site visitors.

With dynamic, decoupled architecture, all these pieces combine in different steps to provide the ultimate personalized, interactive and two-way web experience for each visitor—while still decoupling the dynamic delivery of content from the day-to-day changes made by the business users in the content management tier. Percussion's unique structure allows for an efficient yet effective combination of correct content with targeted personalization rules, creating an engaging and exciting web experience.

Managing Dynamic Delivery in Percussion CM System

Defining the Dynamic Experience

How does the CM System relate to the dynamic process? Business users can work within the CM System to carefully craft each aspect of a site visitor's online experience. Editors can not only enter content that may be presented dynamically, but also perform other important tasks related to dynamic presentation, such as selecting the desired format for any given part of a page, specifying the type of visitor to target with specific content, and even establishing the conditions or rules that govern how to best present to that visitor the dynamic elements on the page.

Once content and format have been outlined, page elements are processed by CM System. To enable dynamic applications, content elements are published to the delivery tier as snippets (page fragments) or "partial pages" (static pages with dynamic elements left blank). Along with these partially pre-assembled page elements, a full set of metadata will be published, typically into a delivery-side database to power the dynamic part of the page. This metadata describes the conditions for matching visitors to dynamic page elements. The structure or schema

for this presentation and visitor metadata can be predefined entirely in CM System, or mapped to the schema used by existing Web delivery applications.

By publishing the information out of the CM Server and into a database or Percussion's Online Interaction Services on the web delivery tier, the CM System stays completely decoupled from any of the visitor load occurring in the delivery tier, enabling it to retain the decoupled advantages of speed and scalability.

Dynamic Delivery in Action

Finally, as visitors use the site and interact with pages, the delivery system tracks their behaviors implicitly or takes in information through explicit means. Partial pages or page fragments are processed with a separate delivery-only code that uses the pre-published metadata information to ensure the dynamic page elements shown are the "best match" with the given visitor. Meanwhile, the visitor's reaction to the dynamic presentation is also tracked, updating the visitor's profile and enabling a constant re-optimization of the site based on their behavior and the established business rules.

This process of page element breakdown, creation of targeted content, publishing of pre-assembled elements, and the dynamic recombination of content enables maximum agility and personalized targeting. Each area controlling the customer experience online can now change independently:

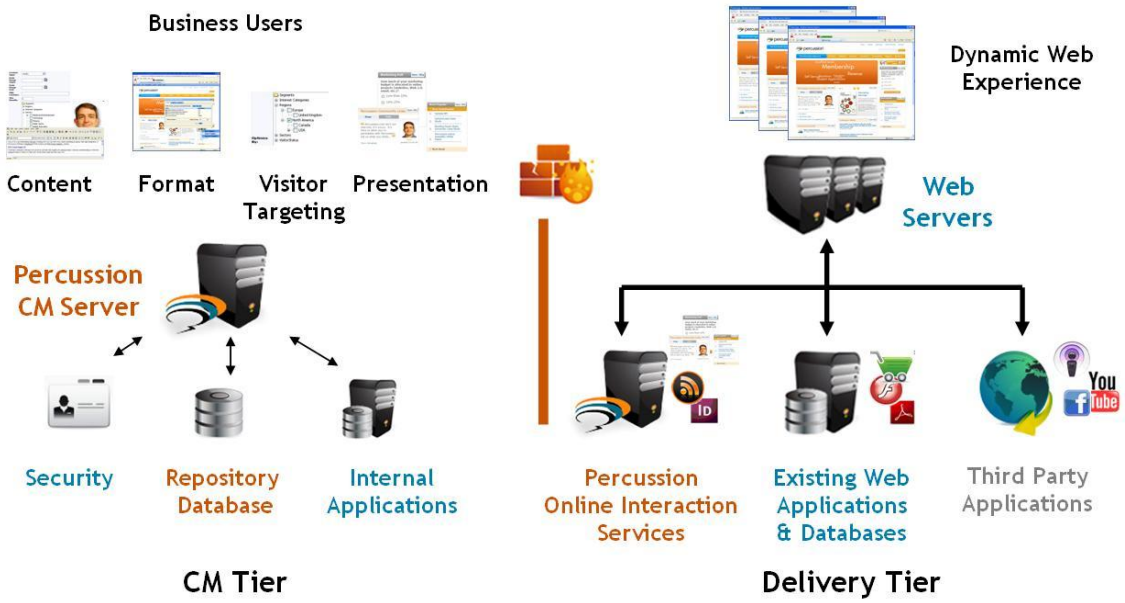
- **Content** – Pages can show new promotions or product information.
- **Format (channel)** – The placement and number of elements on a page can be changed to either focus or diversify the effort, or the amount of detail showing for any given element can be controlled to optimize for different channels or form factors.
- **Visitor Targeting** – The segments used to group and classify visitor interests can be updated, subdivided, or recombined.
- **Presentation** – The criterion for matching, the number of matches possible, and other conditions for correlating Content to Visitor information can be easily changed. This may include conversion of some elements from dynamic to static and back again as visitor usage requires.

None of these changes requires any modification or redeployment of site delivery code from CM System to the delivery tier. The CM System component of the larger setup is completely decoupled from the dynamic delivery components, yet still empowers the business user to control dynamic behavior on the web site.

Percussion Online Interaction Services

While decoupled architecture allows any existing or third-party application to provide the web delivery, Percussion also offers optional pre-packaged components for use in the delivery tier. Called Online Interaction Services, these provide "black box" decoupled application services that Web pages or web applications can invoke for certain dynamic functions. The functionality of the Services themselves is enabled by CM System's decoupled architecture.

Online Interaction Services are generally available through one or more of Percussion's add-on Solutions. For example, within the Personalization Solution, the Behavior Tracking Service can be used to maintain user profiles of any site visitor based on their click path, login or other session information, while the Dynamic Matching Service can be invoked to dynamically replace page fragments with the "best" content that matches the visitor's user profile. In the Community Marketing Solution, the Feed Importer Service is used to automatically cull content from external sites and post it into the CM Server for use.



These are just some of the Online Interaction Services currently available. Percussion's full suite of Solutions takes advantage of the decoupled architecture to delivery carefully targeted content in a flexible, efficient manner.

Benefits of Dynamic and Decoupled Architecture

Percussion CM System can push consistent, correct content for use in a variety of applications, formats and channels. Today, the end goal might be a web page, but tomorrow, it might be a mobile site, an interactive application, or a custom kiosk. CM System's decoupled architecture publishes optimized content to the preferred platform with minimal development effort. This decoupled yet dynamic architecture can benefit Web properties in the following ways:

- **Easy Integration with Existing Solutions**
- **Incremental Agile Implementation**
- **Cost-Effective and Empowering**
- **Future-Proof for New Technologies**
- **Improved Performance**
- **Significant Scalability**
- **Increased Security**

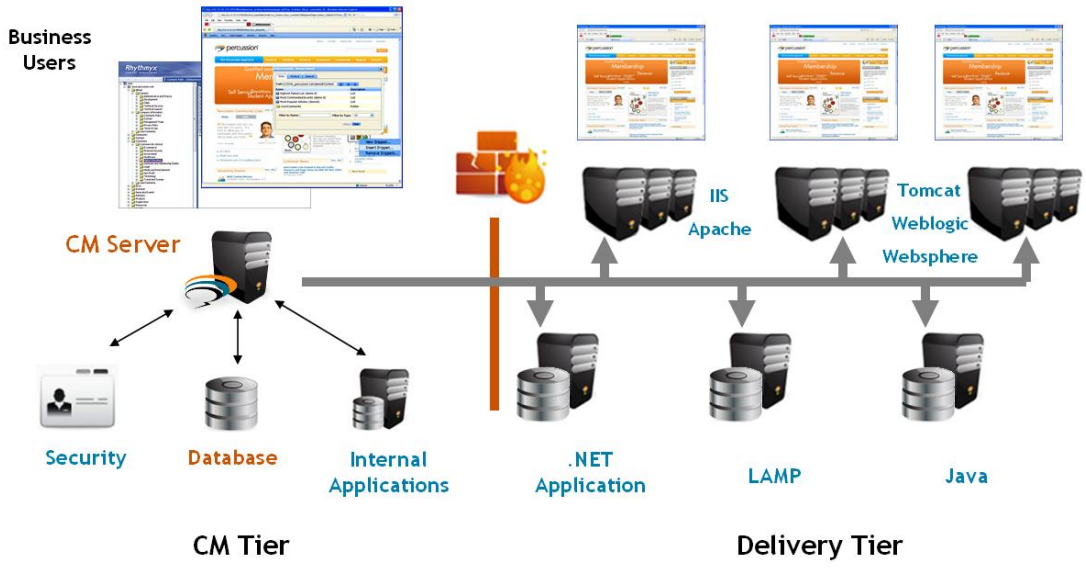
- **Limited Points of Failure**

Easy Integration with Existing Solutions

Organizations develop expertise and economies of scale with their preferred technologies and vendors. Decoupled architecture allows organizations to take advantage of existing skill and infrastructure investments and does not introduce non-standard technology into the data center. With decoupled architecture, web servers, application servers, portals, and third-party software can all work together with the CMS to create the ultimate user experience for visitors and customers.

Decoupling between the content management tier and the delivery tier makes it possible to integrate CM System into the overall architecture of any existing Web application infrastructure, instead of adapting or modifying applications to fit the CMS. In fact, Percussion CM System's architecture is uniquely built to easily integrate with the various technologies (CRMs, DMs, search engines, analytics solutions, and so on) required to build a sophisticated website.

CM System also integrates tightly with organizations that have standardized on a specific technology development stack, such as LAMP, .net/.aspx, or JSP/J2EE. The decoupled delivery system can push content out to database records using a process called "Database Publishing." This keeps the output abstract from the delivery tier applications, enabling any type of application to be used. Diverse applications can query the database records to retrieve approved content in the form of HTML fragments, metadata, keywords, XML structures, and binaries. The structure of the content will depend on the application and not Percussion. Database publishing can also be used with combined or mixed technology stacks.



Incremental, Agile Implementation

Decoupled delivery also speeds up the implementation process. Keeping the design and implementation of the CMS and delivery tiers separate increases the efficiency of

each process, enabling the tiers to be put into practice progressively or simultaneously depending on the needs of the project.

Most organizations have at least part of their delivery tier operational today. While coupled architecture would require at least some reconfiguration of the delivery tier to accommodate the CMS, decoupled architecture allows for freedom of implementation on the delivery end. Percussion does not produce server-side code or require any code to be run on the front-end and has no requirements for particular web server technologies (such as JDKs, servlet containers, .NET frameworks, or portlet containers), opening the door to a multitude of effective solutions.

Percussion CM System itself is configured independently of the front-end, so content types, workflow configurations, CM System security access, and publishing configuration can all be defined with limited knowledge of the actual delivery tier implementation. This makes it possible to begin implementation of CM System without a delivery tier established, and to streamline strategy even after the initial implementation has been completed. Decoupled architecture also makes it easier to adjust either tier for new technologies later on.

Cost-Effective and Empowering

The listed benefits will naturally minimize costs during the entire lifecycle of a WCM solution, saving money on implementation, hardware, third-party software, expertise, maintenance, support, and related tasks. Some of these needs can be supported with existing expertise, due to CM System's neutrality. Decoupled architecture also decreases your reliance on vendor expertise, enabling independent choices about CMS functionality.

Future-Proof for New Technologies

Technology often advances too quickly for organizations to respond. Taking advantage of new technologies can be prohibitive in terms of the initial cost, implementation cost, and effort required, particularly when taking into account changes that must be made to an existing system to accommodate them. In a decoupled environment, the technology used by the delivery tier can be independent of the CMS environment, thus making the architecture more open to taking on new technologies on either tier. "New technologies" can include those that are already available today (for example, social media, mobile applications, web analytics, and personalization techniques) but were not compatible with your existing content management approach, or new technologies that have yet to be developed. By breaking the dependent relationship between the CMS and delivery tiers, Percussion enables content to be delivered in the best way possible.

Improved Performance

By decoupling content management and delivery, decoupling opens up the door for improved web performance. Websites can accommodate more visitors and offer them better load times with the assistance of decoupled delivery. Improved performance can be achieved with easy scaling, as outlined below.

Significant Scalability

Improved performance will be achieved largely through scaling the Web application, which, in a decoupled architecture, is free from CMS-imposed limitations. New servers can be added and enabled in as little time as it takes to integrate the machines into existing architecture. The publisher can simply push site content out to the various servers and the new servers will be operational.

Increased Security

In a decoupled architecture, the delivery tier does not pull content directly from a content repository. Instead, the CMS publishes approved content from behind the firewall to the delivery servers. This limits the ability of hackers to use intrusive techniques like SQL Injection and Cross-Site Scripting (XSS) to access CMS data. The front-end delivery still requires protection, but the CMS tier will be fully protected within the network and behind the firewall, making it more secure.

Limited Points of Failure

The CMS will not be a point of failure for live web properties in decoupled systems. If the CMS encounters issues such as a hard drive failure or database crash, website visitors will not be affected. The site will function normally while the issue is resolved independently in the (decoupled) CMS. Additionally, the redundancy and failover solutions implemented on the delivery tier can use any technology desired, including those currently in effect.

Conclusion

The necessary architecture of Web content management systems has evolved over time in response to the demands of the Internet. No longer can massive up-front requirements gathering, planning, and revenue projections of large scale projects guard against the risk of "thick," centralized application platforms that control every aspect of Web site operation. Decoupled architecture provides the essential flexibility to use what you have, the agility to change what doesn't work, and the ability to adopt new unproven technologies incrementally.

Percussion CM System features a dynamic yet decoupled architecture that offers effective personalization without slowing down delivery. With help from CM System and Online Interaction Services, any organization can power a dynamic Web property with the appropriate content, format, targeting and presentation to appeal to each individual visitor.

About Percussion Software

Percussion provides Web Content Management systems that drive business results through multiple online channels including websites, intranets, blogs, and mobile devices. Percussion's Adaptive Architecture allows non-technical users to take control of content and presentation, provides a low-friction path to access and re-use third party content, and allows a business to pursue new opportunities without being encumbered by legacy technology. Percussion has been helping a broad cross-section of corporations, institutions and agencies generate online results, including Hotwire.com, Virginia Tech University, Kohl's, Computer Associates, AutoTrader.com, and the U.S. Department of State.

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