

Vignette® V7 Content Services Architecture

White Paper
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Vignette® V7 Content Services Architecture

Introduction

Vignette V7 implements the Vignette V7 Enterprise Services Foundation, providing the flexibility, power and scalability necessary to meet the diverse challenges inherent in producing Enterprise Web Applications. It provides a comprehensive solution, from the smallest corporate Intranet to complex Web initiatives that result in large-scale Enterprise Web Applications. An integrated foundation of services, Vignette V7 allows organizations to quickly build, manage and deploy Enterprise Web Applications that streamline their business processes, leverage content infrastructure and deliver a compelling online experience to their customers, partners, suppliers and employees.

The following are components of the Vignette V7 Enterprise Services Foundation:

- **Content Services** – An information hub that defines, collects and organizes content for the Enterprise Web Application
- **Portal Services** – A new kind of desktop that empowers business users to rapidly build robust composite applications
- **Integration Services** – An intelligent broker that quickly transforms content between applications
- **Process Services** – A traffic manager that routes content through systems and applies business rules
- **Analysis Services** – An advanced decision support engine that analyzes the effectiveness of Web initiatives
- **Collaboration Services** – A foundation for proactively managing interactions and communication

Please reference Appendix A for a more detailed description of the Vignette V7 Enterprise Services Foundation.

This paper discusses basic Vignette V7 Content Management concepts and describes the process by which content is created, managed, deployed, delivered in

context and tracked when using a Vignette solution. The intended audience for this white paper is technical, and includes architects and Web site developers who want to see how a Vignette solution can enhance their Enterprise Web Application environment. The following principles are core to the Vignette Content Management (VCM) solution:

- Build on an open, standards-based infrastructure. The Vignette V7 solution provides a robust, scalable content management solution built on the Java 2 Platform, Enterprise Edition (J2EE) technologies.
- Integrate with and manage enterprise assets where they live. "You own your content." Vignette places no specific restrictions on the location, storage mechanisms or format of your content.
- Unify the management and delivery of content and applications across the natural lifecycle of your organization's assets.
- Deliver and track content assets as they move from environment to environment using integrated enterprise-grade deployment.
- Allow customization of user interfaces to meet the end user's requirements. While the Vignette Content Management and Command Center Software Development Kits (SDKs) allow the extension of the look and feel, as well as the functionality, of user interfaces; this solution also protects those extensions across product upgrades.
- Understand your customers' interaction with your content, as this knowledge is key to maximizing your return on



investment (ROI). Empower business users to manage personalized interactions with their constituents. Vignette Content Management does not stop with how the content is stored, but rather how and why it is used. A set of interaction services, as provided by the Vignette Application Portal, allows you to define and control the end-user site experience by giving you the ability to define and record content interactions within your Web sites and portals, manage presentation behavior, track site visitor interactions and analyze the effectiveness of your initiatives.

Vignette V7 provides best-in-class features and capabilities that enable content owners to assemble, manage and publish content; technical users to quickly deploy and manage site operations; and business managers to monitor and improve interactions with their customers, partners, suppliers and employees. Vignette V7 also allows you to streamline and coordinate the many tasks required to plan, develop, produce, deliver and manage Enterprise Web Applications.

By integrating content management – including aggregation of static and dynamic content from multiple sources – with integration to legacy and back-office applications and a sophisticated profiling and reporting subsystem, the Vignette solution brings the process of creating, maintaining and enhancing Enterprise Web Applications under your control. When combined with the full extent of interaction services, the entire user experience can be managed, measured and enhanced to return real business value.

Vignette V7 Native Java/J2EE Architecture

Vignette V7 embraces the J2EE specification, which provides a component-based approach to design, development, assembly and deployment of enterprise applications. The J2EE platform supports the Vignette V7 product family by providing a multi-tiered distributed application model, the ability to reuse components, integrated Extensible Markup Language (XML)-based data interchange, a unified security model and flexible transaction control.

Vignette V7 takes advantage of the J2EE platform in the following ways:

- Vignette Content Management is written entirely in Java, and makes use of Enterprise JavaBeans (EJBs), the Java

Transaction API (JTA) and other J2EE specifications to ensure reliability, availability and scalability.

- Java Database Connectivity (JDBC) Connection Pools and Java Naming and Discovery Interface (JNDI) Data Sources for data persistence.
- Java Message Service (JMS) for distributed, massively scalable content deployment with guaranteed delivery.
- Java API for XML Parsing (JAXP) services to facilitate the exchange of data between disparate sources, creating a standard format for universal sharing of data.
- Java Management Extensions (JMX) to integrate with systems management frameworks.
- Java Authentication and Authorization Service (JAAS) provides standards-based user management and integration to LDAP directory servers.

This architecture makes application development easier by abstracting low-level details from the business logic. By leveraging J2EE, Vignette developers concentrate on creating the best business solution and leave the rest of the work to platform technologies.

Vignette V7 and the Virtual Repository

In today's world, content does not always reside in traditional repositories and even less often in the same repository. An enterprise's information assets are no longer defined solely as the employee database or the customer database.

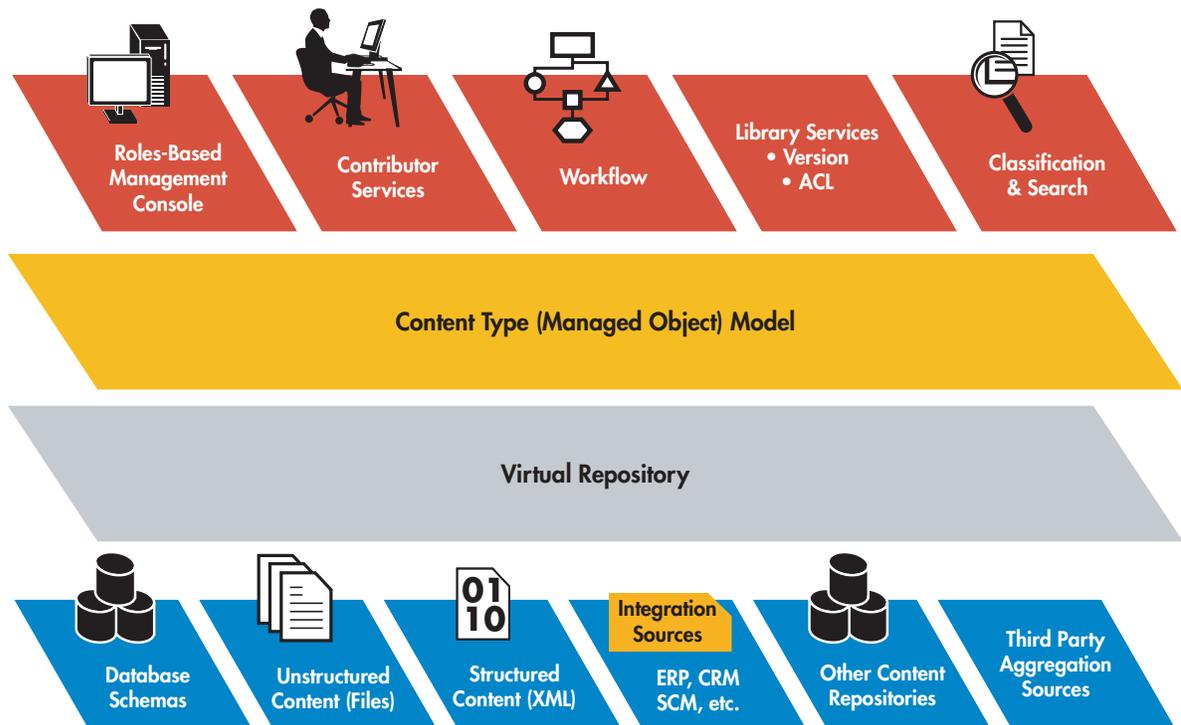
Organizations currently maintain all types of content: engineering documentation, technical manuals, product descriptions and operating procedures in document management solutions; rich media assets in media servers and digital asset management solutions; business information in proprietary asset management systems or enterprise application systems, as well as the more traditional assets commonly thought of as "database content" and files.

While some vendors of content management applications require content repositories, forcing a sometimes painful import and transformation of data, Vignette does not. Instead of confining you to a particular or proprietary content storage mechanism, Vignette Content Management (VCM) can interact with content in a variety of business repositories.

For example, the VCM can manage content in file systems, relational databases, rich media servers such as Artesia, legacy applications and enterprise application databases such as those provided by J.D. Edwards, SAP, Siebel and PeopleSoft. In this way, you decide the best location and format to store your data, corporate information assets and applications. If you have legacy content, you don't need to move it to a consolidated central repository. The Vignette Content Manager can access content where it lives: in files and database records, or through the use of the Vignette Business Integration Studio (VBIS) adapter processes. Once retrieved, the content can be manipulated and sent to a Content Delivery Application, such as the Vignette Application Portal, other Web application environments, external touch points including print and wireless devices or to a B2B trading network. In addition, assets from a variety of information sources and formats can be brought together as a compound asset or a business-level object, such as an Article or a Catalog, and managed as a unit (also known as a business object).

Wherever and however actual physical assets are stored, the Virtual Repository provides an abstraction that allows knowledge managers to create business object definitions (for example Article, Case Study, Personnel Record, etc.) that reflect how your content contributors and other users actually work and think. Content contributors no longer have to track and manage the individual physical assets that make up the more sophisticated business objects.

The Virtual Repository is composed of four logical layers: Services, Content Model, Abstraction and Persistence. The top layer, or Services layer, provides the set of services with which content contributors and content owners interact. The Services layer includes the Command Console, among other functions; this is used by content contributors to create, manage and publish content objects, as well as to report on a content object's usage on a live site. At this layer, workflow, versioning, taxonomy and search services are provided. The Content Model contains Content Modeling services that allow knowledge managers to create the business object definitions that map business objects, such as Articles and Case Studies, used by the content contributors to the actual physical assets.



Below the Content Model layer is an abstraction layer. This holds all of the XML metadata associated with business objects, for example the dependencies and serialization rules that are required to deploy the individual assets that make up the higher level business object that is published and deployed by content owners. The physical assets themselves form the bottom layer of the Virtual Repository, the persistence layer.

By integrating with your non-Vignette applications and repositories, Vignette Content Management not only improves access to content, but leverages and protects your investment in existing software infrastructure and business processes, allowing you to reduce cost and implementation time.

The Virtual Repository is a unified information access and management solution that provides content integration and content-type modeling capabilities that enable enterprises to manage content where it lives, without having to migrate content into a centralized repository.

Content Modeling with Vignette V7

In the Vignette environment, a Content Type is a structured definition of a business object (content item). Through the use of the Content Type Modeler, a component of the Command Console, you can extend the default content types provided with the Vignette Content Manager to include new content type definitions. These definitions model your organization's business objects and are appropriate to the organization's applications and business processes.

The Content Type Modeler allows you to define and represent business objects according to your own vocabulary. Your developers, architects and knowledge managers use the Content Type Modeler to create a mapping between actual persistent data objects and the more sophisticated business objects understood and manipulated by the content contributors.

Content attributes that make up a single defined content type may exist in multiple physical repositories. For example, consider an Article content type, made up of a title, subtitle, abstract, body, author, image and video clip. The title,

subtitle, abstract and body might be in a database table. The author might be another content object type defined to the content management environment. The image is a file reference, and the video clip resides in a rich media server. Definition of compound content types, such as the Article type described above, allows the content contributor to think about and manage the Article as a natural unit, not as individual assets that must be tracked independently. Through the services of the Content Type Modeler, the Virtual Repository and the Vignette Deployment Model, the Vignette Content Manager supports the definition, creation, management, deployment and delivery of this content object as a unit, managing all necessary serialization rules and dependencies, without requiring custom coding.

As the content type is being defined, multiple objects are created within the Virtual Repository, including: 1) the Content Object Editor (COE) screen, i.e., the content entry form for that content type, and 2) all of the dependencies and serialization rules that apply to that content type. Each content object has three facets within the Vignette environment that are also created as part of the modeling process:

- The persistent nature of the asset
- The Java object that represents the asset
- The XML form that defines the asset

When a compound object is published, all parts of that object are deployed to their individual targeted endpoints. For example, in the Article mentioned above, the image might be deployed to an image server, while the database attributes of the Article would be deployed to a database table and the video clip to a streaming server.

Deployment

Mirroring our customers' complex environments, a single Vignette Content Manager (VCM) instance may have several associated stages. These stages might include Development, Test, Staging and/or Live Production, such as Intranet, Internet and Extranet. The deployment process automates, with full audit trail capabilities, the movement of content to multiple, targeted endpoints in an orderly and controlled

fashion, according to a defined Deployment Workflow Process. An asset may move to several stages, but is managed by a single instance of the VCM.

Content items can be brought under management through the use of the Command Center, imported through the use of Vignette Business Integration Studio (VBIS) or aggregated from automatic feeds. Whatever the method used for collecting and aggregating assets, information and content is controlled by the VCM, and can be associated with a Site/Channel, assigned classification and versioned.

Content objects travel along an associated workflow approval process and eventually are ready to be published. Content producers initiate a publish action, which causes the content to be deployed via an automated workflow-driven process, known as the Deployment Workflow Process. This process delivers content and applications to multiple destinations, such as a Content Delivery Application, a Web server's document root or perhaps a wireless device.

As previously mentioned, once the content contributor has published the content, it may go to any number of destinations: a staging environment, test site, live production site, etc. Many IT departments have defined and implemented their own ways to handle the deployment of assets (traditional content, as well as application assets) from one environment to another, including scripts, policies and procedures. Recognizing that deployment is an essential part of the content management process, Vignette has implemented the operational requirement of deployment as an integral part of the entire Vignette V7 architecture.

Since each asset is unique and can be one of several deployment types, multiple assets typically need to be deployed to different storage locations. As an example, record-based assets might be deployed to a database, a static file might be deployed to a document root, and a dynamic asset (for example a .war or .ear file) might be deployed to the application server document root.

Vignette V7's asset deployment solution tracks and manages data dependencies, enabling content to retain context

throughout its lifecycle. This helps to ensure reliable, efficient and secure delivery to globally distributed environments, including development, testing, production, Internet, Intranet and Extranet. In addition, the Vignette V7 architecture supports post-processing capabilities that can trigger a set of custom, user-defined actions, based on your definition of a successful deployment of content or application code.

Engineered Extensibility

Because no product can service all of the requirements of your Enterprise Web Application, Vignette V7 provides a powerful set of software development kits (SDKs) to support the extension, modification, configuration and customization of Vignette graphical interfaces, supported object types and services.

The Command Center can be extended through the use of XML. For example, XML definitions can be easily created to add new menu tabs, buttons and other customizations.

Should you want to include custom features within the content management application provided by the Command Center, or should you wish to provide a more custom content management application, customer-written JSP templates can easily be "hooked" into the Command Center by associating them with the content type during definition of that type.

In addition, as mentioned in the previous section, you may extend automated deployment activities by creating a set of custom, user-defined actions that implement any pre- and/or post-processing actions required to successfully complete deployment of your content.

Vignette V7 provides an elegant and innovative approach to extending its packaged management application that preserves the power of this application across product upgrades, while allowing them to be easily tailored to the specific needs and requirements of the enterprise. This extensibility is designed to provide "future-proof" customizability and reduce maintenance costs as business requirements evolve.

The Vignette Content Management Environment and Architecture

As described above, Vignette V7 represents a product architecture that fits naturally into the content production business processes, change management processes and the IT infrastructure of an enterprise. The Vignette solution provides a complete solution for managing the content lifecycle through a set of services that specifically address complex business problem such as:

- Content aggregation, management and production services
- Content and application deployment workflow and automation services
- Integration with third-party, legacy and back-office systems
- End-user and content profiling and personalization
- Business intelligence for analysis and reporting of end-user behavior and content usage

Vignette Content Management Environment

Vignette Content Management is organized around the concept of Sites. In the Vignette Content Management environment, a Site is a logical unit that contains the content and application components necessary to deliver an end-user experience. A Site will typically be managed through multiple stages, for example: the Content Management Stage, a Test

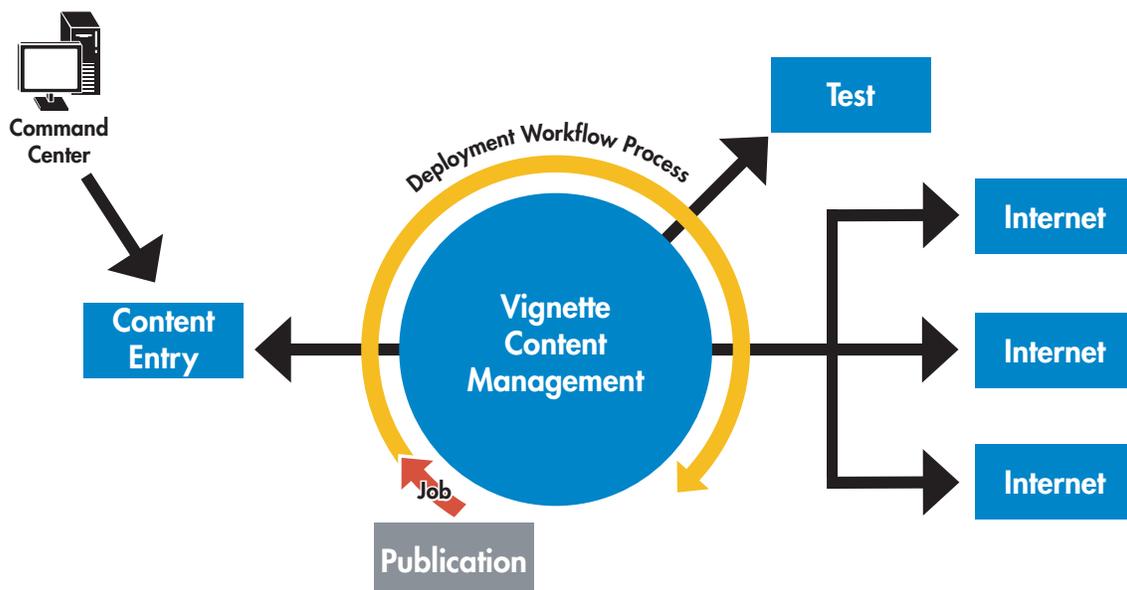
Stage, and one or more Live Stages, such as an Internet, Intranet and Extranet.

The Deployment Workflow Process associated with the Site defines the sequence or order of the movement of assets among the Stages. As defined by the Deployment Workflow Process, jobs are used as a container (or vehicle) for deploying and/or un-deploying content among the Stages. Once a Stage is defined and known to the VCM, that Stage can be associated with a Site. Once two or more Stages are associated with a Site, the publication process can begin.

Vignette Content Management Architecture

Vignette Content Management is composed of several component subsystems:

- **Vignette Content Manager (VCM)** – Provides core content management services to enable centralized management of diverse content types (e.g., file types, databases, database records, etc.) that may be scattered across multiple systems and platforms. Please reference the Vignette Content Management Group Suite, Business Suite or Enterprise Suite Datasheets for a comprehensive list of key capabilities.
- **Command Center** – Provides a simple and intuitive interface for users to manage sites, site content and the tasks associated with developing and publishing a site through a browser-based interface.



- **Integration Services** – In support of the Virtual Repository and as an integral part of the Vignette content management solution, Vignette Business Integration Studio (VBIS) provides access to content housed in third-party, back-office, legacy and external systems.
- **Virtual Repository** – An abstraction of the physical data layer that supports management of enterprise content in virtually any data format.
- **Content Delivery Services** – Provide targeted delivery of content to a specified destination.
 - **Integration Services** – The Vignette Business Integration Studio (VBIS) provides access to content housed in external management, back-end and legacy systems in support of Vignette Delivery Services.
 - **Vignette Content Delivery SDK** – Supports in-context access to content by the Content Delivery Application.
 - **Analysis and Interaction Services** – Provide user and content interaction profiling, analysis and reporting. Provide metrics analysis and reports that allow a site coordinator to determine the effectiveness of a site.
- **Configuration Services** – Provide centralized control, whether or not the Vignette product has been installed. Provide remote configuration control. Handle the configuration aspects of the Vignette V7 environment.

These subsystems produce high performance, dynamic applications: knowledge managers define content types that represent assets in the ways that content owners think about them; content owners control and monitor the process for creating and deploying content; application developers

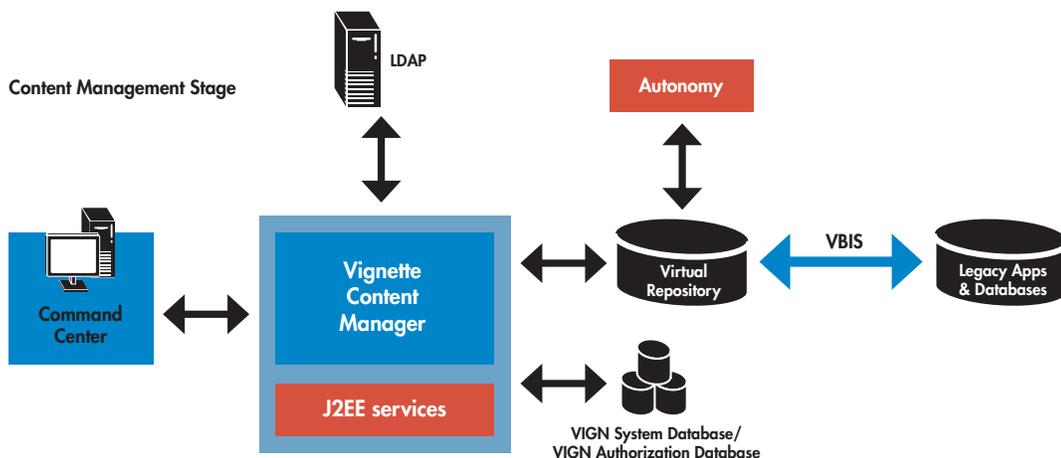
create and maintain applications using development processes of their choice; content and application assets flow through a set of interim stages under the control of a defined deployment process. All assets come together in the Live Production stage(s) to deliver a high-quality end-user experience that can then be tracked and analyzed.

Vignette Content Manager

The Vignette Content Manager (VCM) is highly scalable and reliable, designed for a demanding enterprise environment. A single VCM instance can manage very large numbers of content items and handle requests from thousands of users. This scalability eliminates the need to maintain multiple, independent environments in order to support a large number of content contributors that manage geographically distributed content items throughout a natural lifecycle.

When restricted network connectivity exists between the content management stage and any other stage, or when a separate VCM is required for development purposes, multiple VCM server instances might be deployed. Content can be sent from one VCM to another using the packaging functionality provided by the VCM. Any desired assets can be pulled into a defined structure that is then exported from the source VCM and imported into the destination VCM.

Implemented as a native J2EE application, the VCM implements the following core content management functions and library services:



- Roles-based access across components, operations and content
- Site and channel management
- Workflow definitions, automation and task management
- Asset deployment
- Versioning
- Auditing/history
- Taxonomy management and association
- Packages for inter-VCM transfer

The VCM manages three data stores: the Virtual Repository, the System database and the Authorization database. The System database holds the content metadata kept by the VCM, including taxonomy and classification, versioning information and extended attributes.

Command Center. The Command Center is a configurable management console that allows business and technical users to manage content management objectives, according to their role within the enterprise. In addition to providing robust content management capabilities, the console supports third-party plug-in applications for content entry, document management, digital asset management and other solutions, enabling users to manage multiple Web applications with a single, browser-based user interface.

A thin-client application built on top of the Command Center APIs, the Command Center is a browser-based user interface that allows users to manage sites, site content and the tasks associated with developing and deploying a site. Most functions within the Command Center can be removed, extended or modified using the Command Center SDK.

Integration and Aggregation Services. The Vignette V7 family of products provides a robust, easy-to-use way of exposing legacy, often proprietary, data sources such as Siebel, SAP, PeopleSoft or J.D. Edwards for use within Enterprise Web Applications. For example, if a Web page or portal needs an account balance from SAP or a call center record from Siebel, the site designer can extract that

information and place it on the Web site or within the portal, making it easily available to the business user.

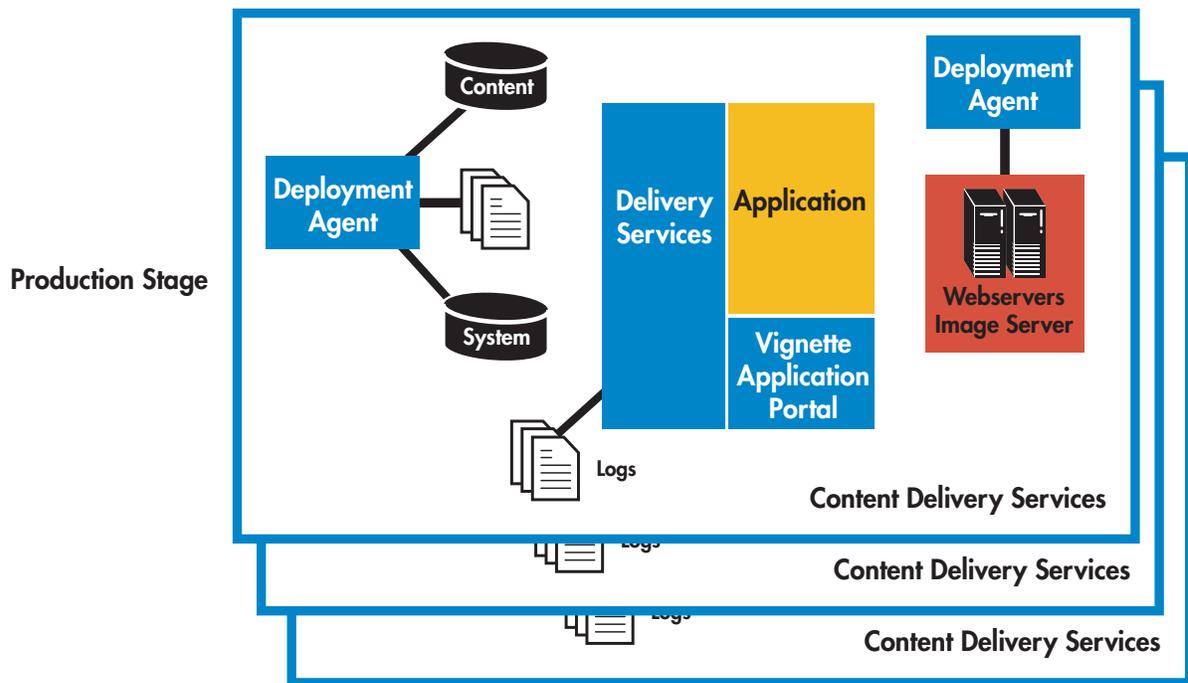
The Vignette Business Integration Studio (VBIS) provides an interactive environment to create data transformations as visual programs called "adapter processes." Among other deployment types, VBIS can be used to define the adapter processes needed for this extraction and deploy them as Java beans, EJBs or Web Services. Multiple deployment options are provided for the technology adapters including:

EJB	Free-standing executable
.jar file	COM client
EJB client	COM server
EJB server	Web Services

VBIS Technology Adapters: A set of plug-ins to VBIS allowing access to legacy systems. Among them is an adapter exposing public functions of the VCM.

VBIS includes visual integration wizards and can leverage a full set of Vignette Technology Adapters, enabling organizations to connect Vignette-powered Enterprise Web Applications, Web sites and portals to the following types of technologies:

XML	FTP
EDI	SMTP
LDAP	Microsoft Exchange
SNMP	Lotus Notes
Web/HTTP	Lotus Domino
Java Bean	JMS
Enterprise Java Bean (EJB)	IBM MQSeries
IBM 3270 and 5250 Emulation	Oracle Advanced Queuing
Artesia	Microsoft MSMQ
COM Automation	CORBA
Flat File	Microsoft Office: Word, Excel
JDBC	Microsoft Project
ODBC	IBM Content Manager



Content Delivery Services

Content Delivery Services (CDS) are composed of a number of Deployment Agents, Delivery-Side Application Services, deployed content and associated metadata that can be used in conjunction with application servers, servers and other runtime services to build an Enterprise Web Application. Vignette V7 Content Delivery Services can be leveraged in a variety of application frameworks, including J2EE and Microsoft .NET.

A Deployment Agent (DA) is a standalone Java program that listens for messages from the VCM. DAs are typed, based on the type of content they handle. Out-of-the-box, Vignette Content Management provides the following DA content handlers:

- File source
- Record source
- For these and other deployment types, the DA can also be configured to map custom processing scripts to deployment of specific content types.

Delivery-Side Application Services. In addition to providing out-of-the-box content management functionality, Vignette Content Management also offers a rich set of delivery-side application services, packaged as the Content Delivery

Services (SDK.) These services allow application developers to access content, search criteria, classification and other options, as well as to take advantage of Content Tracking Services and Interaction Services.

Deployed as a set of Java beans within a J2EE servlet engine, the delivery-side application services support Content Delivery Applications (CDA) by providing in-context access to assets. For example, content contributors associate assets with sites/channels and taxonomy. The CDA might want to access that content by associated classification. The Application Services API supports this type of contextual access, among other functions.

The Vignette Application Portal, or a custom CDA will make use of the Delivery-Side Application Services to gain contextual access to content and to record end-user interactions with the portal modules.

Interaction, Analysis and Reporting Services. Offered as part of the Delivery-Side Application Services, a comprehensive set of Interaction Services allows the Content Delivery Application (CDA) to record Web site or portal visitor interactions using that CDA. This profile data enables

business users to define and control the end-user site experience by giving them the ability to record content interactions within their Web sites, portals or any other delivery medium; manage presentation behavior; and analyze the effectiveness of their initiatives. Interaction logs are regularly uploaded to the “datamart” for processing by Vignette V7 Analysis Services.

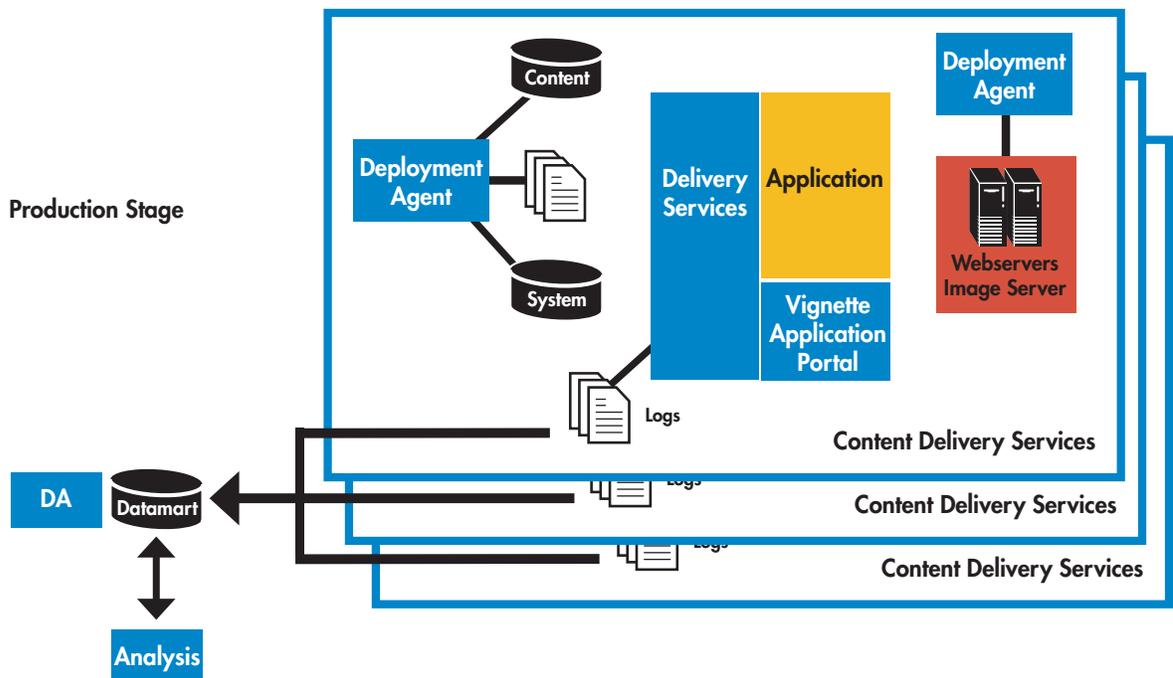
Vignette Analysis and Reporting and Vignette Web Log Reporting provide comprehensive analysis and reporting functionality. Interaction logs and Web server logs are automatically uploaded to the “datamart.” The analysis engine, executing as a result of a command from the Configuration Manager on a customer-defined schedule as defined by your business process, receives the parsed and session-managed output from the Interaction Services logs. It then computes reportable interaction data, which are then written back into the Vignette V7 “datamart.” Please refer to the Vignette Analysis and Reporting and Vignette Web Log Reporting collateral for more information on the functionality of these unique services.

Because the scope of the VCM spans multiple stages, content and user behavior can be tracked in an independent and

useful manner. Content and user profiling, information collection, analysis and reporting can be defined specific to a stage. What you collect in the quality assurance stage is distinct, and can be analyzed separately, from what you collect in the production stage. In addition, since content can be tracked independent of its profile (category tagging), you can change the categorization and re-run the analysis without recollecting the interaction data.

Integrated content reporting and audience segmentation capabilities enable business users to analyze content interactions throughout all of their Web sites and portals; this allows them to better understand and tailor offerings that meet the preferences of their constituents. The analytics capabilities within Vignette V7 help business managers measure and monitor ROI for new and existing Web initiatives.

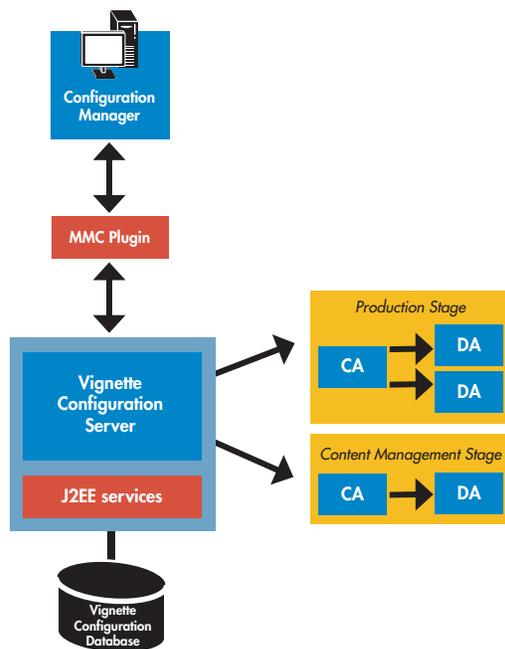
Vignette Dialog supplies advanced Interaction Management for the Vignette environment. Multistep, multichannel communications with your end users that deliver relevant content at the correct time can be automated and controlled by Vignette Dialog. For more information on Vignette Dialog, please reference “Vignette Dialog: Technical White Paper.”



Configuration Services

Configuration Services are composed of the Configuration Manager (a Microsoft Management Console snap-in), the Configuration Server and a number of Configuration Agents. The Configuration Server handles the configuration aspects of the Vignette Content Management environment, and manages the global repository of configuration information for the Vignette Content Management components.

A Configuration Agent (CA) is a stand-alone Java program that listens for updates from the Configuration Service. The CA is responsible for maintaining the local configuration information base for any Vignette component. Configuration Agents are deployed on multiple hardware systems where Vignette Content Management components are installed. The CAs listen for, and receive, configuration update events from the Configuration Server and are responsible for local configuration changes.



Configuration Server

The Configuration Manager is a Windows-based application that provides useful status information about the Vignette

Content Management components. Used primarily by the system administrator, the Configuration Manager provides the necessary functionality to install, configure, tune and monitor the Vignette Content Management components. The functionality provided by the Configuration Console is also available through a command line utility for those who prefer not to use the GUI-based Console.

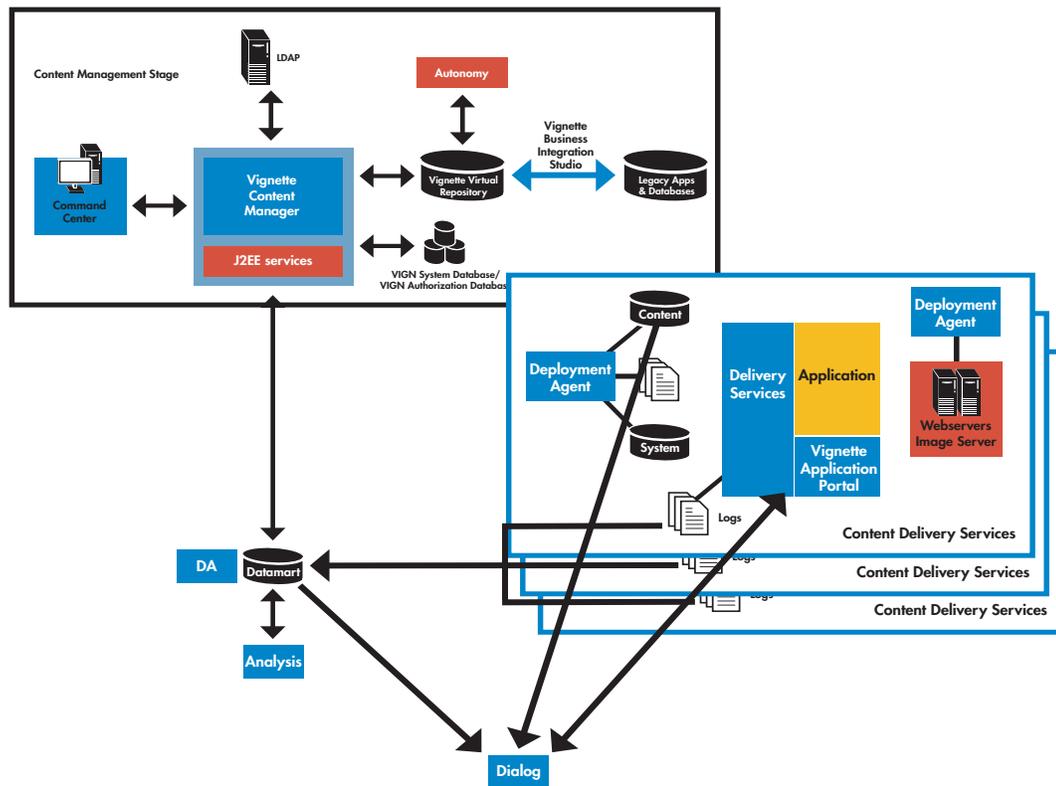
Please refer to the Vignette Content Management Administrator's Guide for more information on the Configuration Console.

Deployment Architecture for Vignette Content Management

As mentioned previously, the scope of a single Vignette Content Manager (VCM) may be composed of several Stages. The deployment workflow process controls the movement of content to multiple endpoints in an orderly and controlled fashion, according to a defined deployment workflow process. Any asset may be targeted at and moved to several endpoints, but it is managed within the scope of a single instance of the VCM.

The Site and its deployment workflow process specify how content moves among the Stages associated with the Site, and requires a robust, reliable delivery mechanism. That mechanism is the Java Messaging Service (JMS).

The VCM and its Deployment Agents communicate with each other using JMS. JMS handles the movement of objects between the two points and is designed to guarantee delivery of its messages to the Deployment Agents. As implemented in the Vignette Content Management solution, in most cases the JMS "message" is simply the asset itself. To help gain a better understanding of the JMS "publish/subscribe" model, please reference www.java.sun.com. Since each asset is unique and can be one of several deployment types, multiple assets typically need to be deployed to different locations. As an example, a static file may get deployed to a document root, as compared to a dynamic asset, which may be deployed as a Web application to the application server document root. When sophisticated business objects are published, the individual physical assets are deployed according to deployment type, and the serialization rules and dependencies kept by the Virtual Repository.



The Deployment Agents subscribe to VCM messages appropriate to the Stage in which the DA is defined and the types of content they are configured to handle. As assets are moved from Stage to Stage (as defined in the Deployment Workflow Process), the Deployment Agents that make up the CDS(s) of that stage will pick up and process the content, moving it to the correct destination for that content type. For example, war files might be directed at the application server's document root, image files to an image server, HTML files to the Web server document root, and record-based content to a database. In this way, assets can be targeted to a specific destination.

The metadata associated with the asset, for example taxonomy classification and Site/Channel association, are deployed along with the asset. In this way, the Content Delivery Application (CDA), whether implemented with Vignette Application Portal, another portal server or a custom-written CDA, can access the content with full context.

For more information on the Vignette Application Portal, see "Vignette Application Portal White Paper."

The CDA can specify that end-user interactions be recorded through the use of the Delivery Services SDK. User and content profile data are written to Vignette Interaction Logs that are downloaded, along with Web server logs, for analysis. Once the analysis engine has written its results back into the Interactions Datamart, your administrators and marketing users can use the Command Center, or the analysis and reporting tool of your choice, to generate and view reports based on this interaction data.

Summary

Built on an open, standards-based infrastructure, the Vignette Content Management solution provides a robust, scalable, manageable and secure content management and deployment solution built on the Java 2 Platform, Enterprise Edition technology.

Vignette V7 allows organizations to quickly build, manage and deploy Enterprise Web Applications that streamline their business processes, leverage content infrastructure and deliver a compelling online experience to their customers, partners, suppliers and employees. The process analysis capabilities of Vignette V7 allow the identification of process bottlenecks, which can then be removed, thus providing measurable productivity improvements.

Vignette's ability to manage and access content independent of its location or storage format allows you to store content in varied locations and to use the correct storage methodologies that make sense for the specified content types. Vignette's commitment to openness and the support of standards allows the Virtual Repository to be accessible to virtually any application, thus helping to ensure that your content belongs to you.

Whether you collect and aggregate content into the Virtual Repository or access legacy systems and databases interactively as part of the Content Delivery Application, the Vignette Technology Adapters provide immense flexibility for easily integrating with the multiple, disparate applications that appear in your enterprise.

Recognizing the importance of controlled deployment of assets within an enterprise, the Vignette Content Management solution unifies the management and delivery of content and applications across the natural lifecycle of your organization's assets. The Vignette Content Management solution defines a mission-critical Deployment Model that supports the delivery and tracking of assets as they move from environment to environment.

Recognizing that no out-of-the-box application can satisfy every organization's requirements, the Vignette Command Center and Content Management SDKs allow the extension of the look and feel, as well as the functionality, of the Vignette Content Management user interfaces in a supported fashion that also protects those extensions across product upgrades.

Vignette's unique analysis and interaction management capabilities allow you to measure, understand and take informed action based on your customers' interactions with your content.

Appendix A: Enterprise Services Foundation

The Vignette Content Management product set is based on a "services-oriented architecture." A services-oriented architecture is one in which the underlying provider of the "service" provides the service to a loosely coupled requestor:

- In a manner that is appropriate to the requestor's state, session, role and requesting mechanism
- Independent of having detailed knowledge of the requestor

A services-oriented architecture fundamentally represents a loosely coupled architectural model. By this we mean that the Vignette V7 product set could be thought of as a set of pieces, each of which:

- Performs a specific function
- Can operate independent of each other (with some dependencies)
- Communicates with each other through a known calling routine
- Can therefore be replaced with other components of equivalent, different or greater functionality provided by either Vignette V7, a third party or custom development.

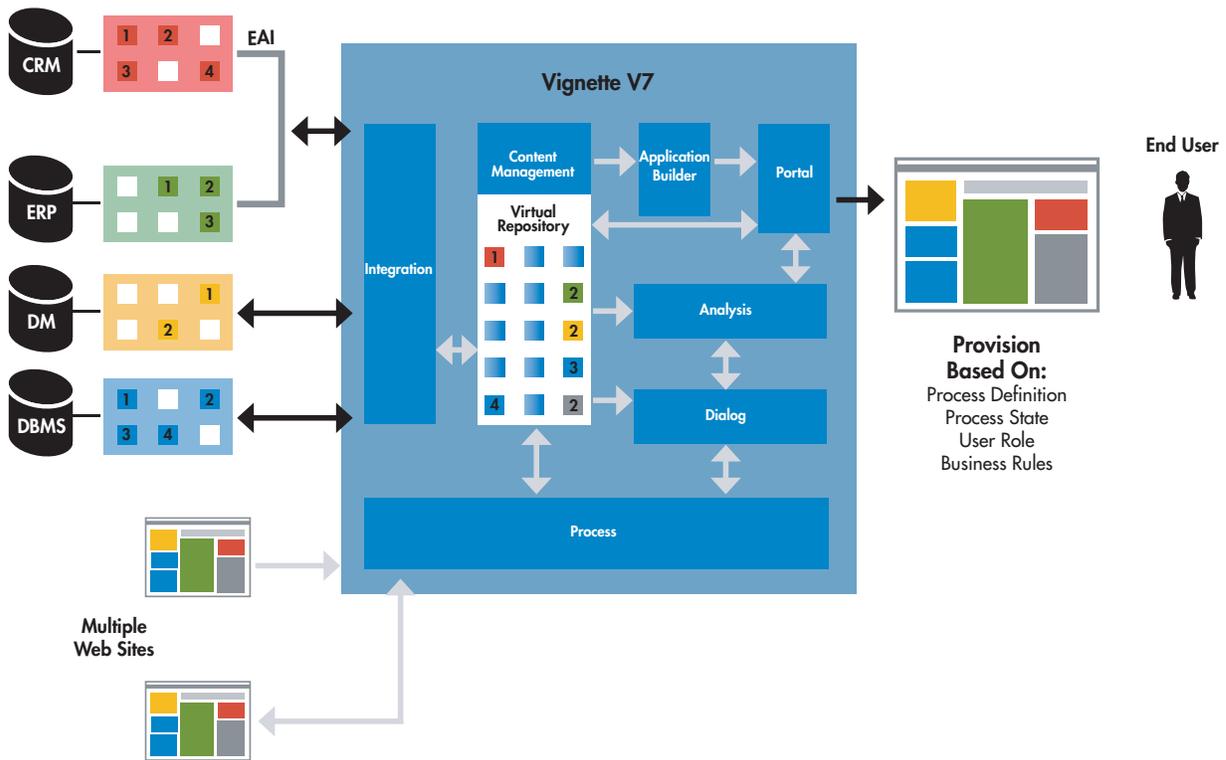
This loosely coupled architecture also allows our customers great flexibility in determining where each of the pieces will operate, thus optimizing use of hardware and management costs while simultaneously molding into their existing IT environment without disruption.

Vignette V7 has implemented the following underlying application services: Content, Integration, Analysis, Collaboration, Interaction and Process. This services-oriented architecture is what Vignette terms its Enterprise Services Foundation.

Vignette's packaged suites build higher value functionality on top of these core architectural components. This approach allows Vignette to build and provide to our customers applications that will be scalable, easy to maintain and quick to extend.

It is only possible to realize the value of the Real-Time Enterprise through a services-oriented architecture, which will establish an Enterprise Services Foundation for creating, managing and deploying Enterprise Web Applications.

Referencing the figure on the next page, which depicts the



Vignette V7 Enterprise Services Foundation, our customers have within their enterprise a portfolio of applications, middleware and Web sites (1). Each application consists of specific functions and services (2), which through Vignette V7 Integration Services register their respective functions and services (3) in the Virtual Repository (4). Those functions and services are then provisioned to end users, based on:

- Business process definitions
- State
- User's role

In putting together a foundation for constructing Enterprise Web Applications, IT departments go through a process of assembling a service foundation for each of the Web application functions. What Vignette has done with Vignette V7 is to implement and package a comprehensive set of services in one foundation, thus providing a solid basis for any organization that desires to construct Enterprise Web Applications, and realize the value of real-time operations.

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