

Software Sharing Enables Smarter Content Management

Originating Technology/NASA Contribution

As NASA's leading organization for information sciences, the Intelligent Systems Division at Ames Research Center conducts world-class computational research to enable out-of-this-world capabilities. In particular, this division is dedicated to ushering in a new era of autonomous spacecraft and robotic exploration, as well as extending abilities in space through human-computer interactions and data analysis.

In addition to supporting NASA's missions, the Intelligent Systems Division is focused on supporting national needs by finding practical uses on Earth for its space-driven technologies. Like many of NASA's branches, it accomplishes this goal through partnerships with private industry, collaborative research initiatives with academia, and resource sharing with other U.S. Government agencies.

One of the division's latest space-based technologies that has proven practical for terrestrial use is a database storage software system called Netmark. Offering an extensible, clientless, schema-less, information-on-demand framework for managing, storing, and retrieving unstructured and/or semi-structured documents, Netmark was created to help NASA scientists query and organize complex research documents. Netmark utilizes a hybrid approach to database management by combining object-oriented data creation with relational models, using SQL (Structured Query Language) queries. This enables efficient keyword searches that cover a broad range of content, context, and relationship concepts among documents. Furthermore, it provides a single-format, virtual database view of multiple heterogeneous data sources without user-supplied database code.

All of these features make Netmark a powerful tool for managing and accessing NASA's enormous stock of complex, constantly changing unstructured and semi-structured data, as well as an open-source enterprise capable of bearing boundless commercial benefits.

Partnership

In 2004, NASA, through Ames, established a technology partnership with [Xerox Corporation](#), in which the world's largest document management company is helping the Space Agency develop high-tech knowledge management systems, while providing new tools and applications that support the Vision for Space Exploration. In return, NASA is providing research and development assistance to Xerox so that the Stamford, Connecticut-based company can progress its product line.

"This joint venture combines the best software technology from NASA and Xerox," said G. Scott Hubbard, director of Ames from 2002 to 2006, following the announcement of the partnership. "Since both partners bring new technology to the project, we will get new tools tailored specifically for NASA needs in a very cost-effective way."

The first result of the technology partnership was a new system called the NX Knowledge Network (based on Xerox DocuShare CPX). Created specifically for NASA's purposes, this system combines the Netmark content management software created by the Intelligent Systems Division with complementary software from Xerox's global research centers and DocuShare. In its pilot stages, the NX Knowledge Network was tested at the NASA Astrobiology Institute, where researchers used it on a distributed basis across several universities to sort and analyze data. Currently, it is widely used for document management at Ames, Langley Research Center, within the Mission Operations Directorate at Johnson Space Center, and at the Jet Propulsion Laboratory, for mission-related tasks. These applications are ultimately helping NASA to manage project risk, investigate mishaps, and analyze anomalies.

Product Outcome

The research and development support Xerox has received thus far through the joint technology partnership

with Ames has allowed the company to integrate the information-on-demand organizational elements of the NX Knowledge Network/Netmark software into its commercially available DocuShare enterprise content management (ECM) solution.

According to Xerox, DocuShare delivers document and content management to an organization's knowledge workers in a flexible, easily deployed, Web-based software application. The company noted that these workers are accustomed to handling vast amounts of diverse business content as part of routine operations, and are frequently asked to engage in impromptu activities to generate paper and electronic documents, as well as discussions and e-mails, from a variety of content resources. With DocuShare, the organization gives knowledge workers the necessary toolset to unlock information stored throughout the enterprise, be it in e-mail systems, filing cabinets, or network drives. Workers can then bring these diverse content types together in a searchable, indexed repository, enabling optimal information flow and rapid turnkey solutions that can translate into reduced costs and risk for the organization.

The enterprise management tool also enhances organizational collaboration and information sharing through document routing and review and Web-publishing abilities. There are also multiple levels of security built in, including password management and password rules enforcement, to protect content as necessary.

According to Xerox, the core technology simplifies deployments and reduces information technology complexity, even in the face of the typical heterogeneous mix of databases, servers, directory services, and storage systems prevalent in today's enterprises. Unlike competitive content management products, Xerox adds, DocuShare is entirely Web-based, so it works across multiple operating systems and can integrate with popular infrastructure databases and Internet browsers. Essentially, this enables DocuShare to support a mix-and-match enterprise content infrastructure and scale from small



Xerox DocuShare CPX allows users to leverage the content that fuels transactional business functions—contracts, invoices, applications, and forms—more effectively and with greater flexibility than ever before.

installations to large installations (involving thousands of users) without extensive replanning or infrastructure overhauls by the customers.

In January 2006, the 4.0.1 version of the DocuShare software was named “Best Document Manager” in InfoWorld magazine’s “2006 Technology of the Year Awards.” Later in the year, Xerox unveiled DocuShare 5.0 and DocuShare CPX, two ECM software products built on a single technology platform. According to Xerox, organizations can use one or both applications to

handle their content and document management needs, such as financial record keeping or disclosure-related government regulations.

Xerox DocuShare, now at version 6.0, was created to meet the requirement for basic, widespread content management that can scale across an organization, whereas DocuShare CPX 6.0 provides more advanced ECM features required for high-end, process-centric content applications. DocuShare CPX offers a new content assimilation and reuse feature—generated from the

technology partnership with Ames—that allows XML (eXtensible Markup Language)-based content within documents to be repurposed for future use. The feature is called XDB (eXtensible Database). Xerox stated that this feature lets workers organize and manage semi-structured data, such as business forms or templates, by leveraging existing user interfaces in commonly used applications, such as Microsoft Word, Excel, and PowerPoint. With version 6.0, Xerox ships out-of-the-box applications that make the XDB content aggregation and summarization capabilities readily available in Word and Excel templates, without sophisticated programming.

“With our dual product strategy, Xerox is challenging the current enterprise content management paradigm,” said David Smith, vice president and general manager of the Xerox DocuShare Business Unit. “We give customers the flexibility to mix and match both types of content management solutions on one easy-to-use platform.”

This flexibility accommodates educational, financial, health care, legal service, and government organizations, among many others. In education, for example, it helps faculty and staff search and store student records, instructional guidelines, and program certifications, as well as distribute course materials for traditional and interactive e-learning initiatives. Additionally, in health care, it enables organizations to engage in document management and quickly retrieve items such as patient charts, signed consent forms, laboratory results, X-rays, caregiver notes, and clinical policies. DocuShare also provides the key capabilities for health care organizations to ensure that any potential document management solutions support compliance with procedural and regulatory standards and requirements, such as those set by The Joint Commission and the Health Insurance Portability and Accountability Act. ❖

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