EXPANDING THE POTENTIAL OF FILEMAKER WITH XML

Abstract

The Extensible Markup Language (XML) is everywhere. It provides a standardized, versatile, and cross-platform way of describing and structuring data. With nearly 8.5 million units shipped worldwide, FileMaker is the leading workgroup database software for quickly creating and sharing business solutions. XML further extends the reach of FileMaker Pro 6. With the XML support in FileMaker Pro 6, developers and power users can create solutions that connect workgroups and other users with a virtually limitless number of other applications. Building upon earlier support of XML, the new FileMaker Pro 6 has integrated XML import/export in the application, to become even better connected to enterprise applications, systems, and business processes.

I. Why XML?

The Extensible Markup Language (XML) is everywhere. It provides a standardized, versatile, and cross-platform way of describing and structuring data. Since its debut in 1998, XML has been supported in a growing number of systems that store and exchange data. XML-enabled applications can exchange data with any other XML-aware applications and data sources, and as a result it is becoming a critical part of the way that companies transact business. XML is integral to how financial services industries perform crucial transactions and exchange reporting data, and how health care providers service their patients. XML is also essential to the distribution of news and the delivery of content. Soon, XML will become pervasive in all aspects of information technology.

The wide acceptance of XML by many diverse, and often competitive, user communities is a chief part of its pervasiveness. Since when have Microsoft, IBM, BEA, Oracle, HP, Novell, and countless others all agreed on the same representation of data? Older data formatting standards like EDI, SGML, ASN.1, and even HTML did not garner the same overwhelming, comprehensive support. We also now have an information bus that is easy to connect to, and in many ways cheap: the Internet. This global communications platform, and true standards for protocols such as HTTP, FTP, and SMTP allows us to make certain assumptions about how data is transferred that we simply would not have been able to count on in the past. Timing is everything.

FileMaker is also everywhere – from educational institutions andgovernment offices to manufacturing operations and health care establishments. FileMaker has become a critical part of the way many businesses run their daily operations. Yet, in the past it was an isolated part of the corporate IT infrastructure. Now, with XML, FileMaker has become a more connected part of the enterprise. XML and FileMaker together make a potent combination that allows users to choose FileMaker for its productivity and use XML for its ability to integrate with and connect to other corporate systems. XML savvy developers are becoming pervasive in IT departments and beyond. They are quite likely to adopt an application like FileMaker Pro 6 and integrate it in their environments due to its support of XML and its unique ease of use for knowledge workers.

1.1 So, What's So Great about XML?

There are many advantages that XML has over other data formats and methods for tying systems together:

➢ **XML is an open, standards-based technology** – XML is backed by major, world-wide standards organizations including the W3C, ANSI, ISO, OASIS, and other organizations, and is widely endorsed by major software, hardware, and solutions market leaders.
➢ **XML is implementation-independent** – XML can be implemented by any platform,

operating system, language, or object technology that complies with the standard. As a result, it can operate in widely heterogeneous environments.

➢ **XML is self-describing** – XML documents are encoded not only with the data they intend to transfer, but also the metadata that explains what the information means. This means that it carries the data *and* the schema required to help systems understand it. XML is thus self-describing and self-contained.

➢ **XML is human-readable and machine-processable –** XML is specified in a plain-text format that can clearly be read by humans. However, since it contains metadata about its meaning, machines can also process it.

➢ **The "X" in XML means "Extensible"** – XML documents can be implemented in whatever fashion the designer sees fit. It doesn't contain a rigid, fixed structure, allowing the widest possible use of the technology.

➢ **XML allows users to separate content and processing** – Since XML describes only data and the context (metadata) of that data, it doesn't specify how the information should be processed. This allows the user great flexibility for determining how to make use of the XML data.

➢ **XML is easily internationalized**-- Because XML complies with the ISO 10646 Unicode standard, it accommodates the use of any language for markup, thus simplifying internationalization.

➢ **XML builds on other markup languages, making it easy to write** – XML documents, just like its brother HTML, and father SGML, is easy to write and code. This means that just about anyone can create an XML document with little training.

➢ **XML can imbed other data types** – Through the use of references and other techniques, XML can imbed other document and data types without having to "bend" the data format.

➢ **XML can be transformed** – XML documents can be transformed to other document types such as HTML, PDF, email, CSV, text, or even other XML document formats simply using stylesheets and other transformation mechanisms.

➢ **XML is a portable data format** -- XML lets you extract business data residing in corporate databases into a portable format used in applications, viewed by users, or inspected by search engines and agents. Because XML is self-contained and self-describing, this information can be moved to anywhere it is needed.

1.2 Why FileMaker and XML?

With nearly 8.5 million units shipped worldwide, FileMaker is the leading workgroup database software for quickly creating and sharing business solutions. With a loyal following and many thousands of applications in production, FileMaker has become an indispensable program for those who need to track and manage people, projects, images and information. FileMaker is also cross-platform, running on the Windows, Macintosh, and (for FileMaker Server only) Linux platforms. Thus, FileMaker has become a highly productive tool for workgroups ranging from entire small businesses to departments within the enterprise.

XML further extends the reach of FileMaker Pro 6. With the XML support in FileMaker Pro 6, developers and power users can create solutions that connect workgroups and other users with a virtually limitless number of other applications. Building upon earlier support of XML, the new FileMaker Pro 6 has made integrated XML import/export an inherent part of the application, to become even better connected to enterprise applications, systems, and business processes. FileMaker also satisfies enterprise IT requirements by complying with standards-based environments and policies, thus fitting in to the "IT corporate environment".

II. XML Import and Export in FileMaker

One of the key aspects of making the most of XML support within FileMaker is the use of the XML Stylesheets Language (XSL) for XML document import and export. XSL is a language for expressing "stylesheets" that are used to determining how systems interpret and process XML documents. XSL consists of two parts: a language for transforming XML documents from

one type to another, and an XML vocabulary for specifying formatting semantics. It is the former value of XSL that is the most important for FileMaker users. XSL allows users to create data that is different from the structure of the source information. For example, one could create an XML document from any FileMaker data structure and tailor that document to the requirements of any industry or vocabulary format.

XSL allows users to create, and more importantly, *share* these transformation and definition files in such a way that users can save tons of time. With pre-defined XSL transformation files, users can take advantage of other developer's time by using templates that have been defined for particular industries, applications, or specific needs. XSL provides all the advantages of a standard stylesheet language. It provides the advantages of separating style from content, and it enables both application publishers and users to determine presentation of marked up data. The powerful capabilities provided by XSL allow formatting of source elements based on tree location, position, and uniqueness, the creation of formatting constructs including generated text and graphics, the definition of reusable formatting macros, writing-direction independent stylesheets, and an extensible set of formatting objects. Also, users can produce a variety of output formats using XML. A single stylesheet can be used to generate HTML, XML documents, RTF, raw text, EDI, and many other formats. It is only through the use of XSLT that FileMaker can convert XML documents from one format to another.

Now, one doesn't have to be a rocket scientist to create XSL (although NASA does actually use FileMaker!). In fact, it is relatively straightforward to create basic transformation stylesheets. The syntax for XSL is based on XML, and the display structures that are constructed consist of many familiar HTML flow objects. Learning XSL, therefore, does not require learning a new language. Users can build on their existing knowledge of XML and HTML, enabling them to become fluent in XSL quite quickly. And if even that is too much, there is a wide range of free or cheap tools to help make XSL creation easier.

The integration of XSL within FileMaker makes the process even simpler. A developer can maintain a single stylesheet that can be used across multiple applications and provided to hundreds of knowledge workers. These stylesheets are accessed invisibly due to FileMaker's seamless integration of XML import/export. In fact, this can even be scripted so user has to know nothing about the process. The relative ease by which a developer can author an XSL stylesheet empowers a workgroup of users to gather and share information with others.

Another powerful feature of FileMaker is that the XML documents and XSLT stylesheets can be accessed via HTTP, in order to enable remote access to data. This is a new feature of FileMaker that makes the product quite compelling for use in widely heterogeneous computing environments. FileMaker also includes a wide variety of sample and industry or application-specific XSL stylesheets that are bundled within FileMaker Pro 6. Additional stylesheets are made available for free download at FileMaker XML Central website www.filemaker.com/xml. Since these XSL stylesheets are easily created and integrated with the application, this area of FileMaker's application is sure to continue to grow in value and size.

III. Application Integration with XML

One of the best features of XML is the fact that it is completely agnostic to whatever system will be "consuming" the XML data. The same XML data can be consumed by Windows desktops, Linux servers, Mac OS computers, and the full range of application types that run on these machines. Through the use of XSLT (Extensible Stylesheet Language Transforms), inherently supported by FileMaker, XML can be converted to HTML format for display on the web or other XML formats. Many of the database and enterprise applications vendors now have support for XML, making it almost the de-facto language for any data exchange. This allows the format to be used to seamlessly connect systems without having to go through the

costly, time-intensive, and complex steps of converting data and working through different communications protocols and adapters. This is in addition to ODBC, which is still one of FileMaker's primary means for connecting with external data sources. XML can be used to tie together applications of different types without having to worry about coordinating what data types or systems are to be used.

FileMaker can now be simply tied to such major desktop applications such as Microsoft Office, QuickBooks, email applications, and spreadsheets with relative ease. XML can also be used to connect to major enterprise and legacy applications as well, including ERP, CRM, and other applications such as SAP, PeopleSoft, Siebel, among others. In this manner, FileMaker can serve as a "client" for these applications, using XML to exchange data and business process logic.

Couldn't we perform this same sort of interchange with ordinary flat-files? The very nature of XML is that it is a structured document format, in that it represents not only the information to be exchanged, but the metadata encapsulating its meaning, and the structure of the information to be exchanged. Most text files simply cannot offer that clear advantage. They either represent simply the information to be exchanged without metadata, or include metadata in a flat, one-level manner. Common file exchange formats such as comma- or tab-delimited text files merely contain data in predefined locations or delimitations in the file. More complex file formats such as Microsoft Excel contain more structured information, but are machine-readable, platform-specific, and still do not contain the level of structuring present in XML. Basically, XML enables you not only to exchange data, but the structure of that information in a single, self-contained file.

FileMaker, just like every other type of application, needs to be able to integrate with other applications and systems such as desktop productivity applications, enterprise software packages, accounting and finance systems, and other databases. Prior to the emergence of XML, the only means for accomplishing this goal was to use import/export capabilities, flat file transfers, direct connections to the applications' APIs, SQL connectors, or other, more exotic methods. These methods introduced unnecessary cost, complexity, and time into the process of connecting applications.

XML offers a universal way to simplify that mess, and assure that compliant applications like FileMaker Pro 6 fit even better in the corporate IT environment. Developers can integrate FileMaker with other desktop systems that support XML, such as QuickBooks, Microsoft Office, and Lotus Notes. XML can integrate FileMaker with enterprise software packages such as SAP, Siebel, and PeopleSoft. Basically, anything that supports XML is FileMaker's integration oyster.

IV. Business-to-Business and Industry Integration with XML

If connecting to applications within the enterprise isn't exciting enough, XML also allows FileMaker to connect to external business partners, industry groups, and government in ways easier than before. There are over 450 different XML vocabularies for different business and government applications ranging from manufacturing and logistics to travel and health care. If you have a need to exchange information with businesses, industries, or colleagues, XML is increasingly becoming the de-facto way to do it.

Through XML, FileMaker can connect organizations to their trusted business partners and integrate supply and value chains much easier than before. Rather than having to send catalog information to suppliers, print and mail invoices, and wait for purchase order information, users can directly integrate FileMaker system with suppliers, using XML as a means for exchanging invoice, purchase order, catalog, and payment information. XML is quickly replacing EDI as the primary way to exchange trading information with your partners, so leverage FileMaker to make this happen for your users. XML has made major inroads in e-
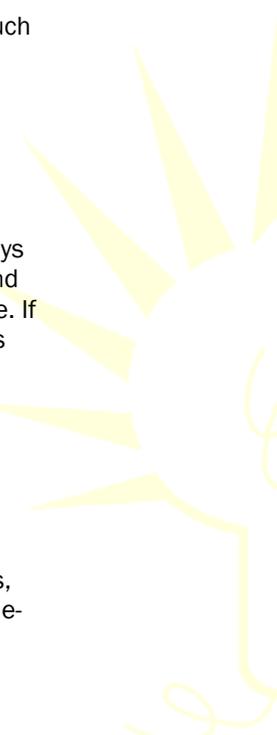
Business and e-Commerce. Major initiatives such as ebXML, RosettaNet, and a number of other efforts are making it significantly easier to work with customers, suppliers, partners and employees.

With XML, systems can also communicate with others in a particular industry and governmental bodies that are increasingly standardizing on XML. Hospital administrators, pharmaceutical companies, and insurance providers alike have found tremendous value in XML. Users can download biological and pharmaceutical research information, exchange electronic patient records, and file claims in XML format. It has become trivial now to download and submit resumes, exchange time and billing forms, communicate professional service, and work with employee benefits in XML format through major initiatives such as HR-XML. The SEC, NASDAQ, and most accounting firms are now standardizing on XML to exchange financial reporting data. XML has even found its way into K-12 and higher education. Everything from daily academic schedules to enrollment and school lunches are being encoded in XML and exchanged with state and federal agencies. Soon, XML will be part of working with the "e-Government". The government is making it simpler than ever to submit forms such as tax filings and voter registrations, and integrate their workflows in your business processes using XML.

The below table shows just a few of the industries that are making use of XML for critical business-to-business interchange:

Industry	XML Initiatives
Health Care	Hospital administrators, physicians, doctors and dentist offices, and insurance providers alike have found tremendous value in XML. In particular, HL7 and other XML-based formats are being used to exchange electronic patient records, lab results, and insurance filings.
Biotech and Pharmaceutical	Biotech companies are using XML to comply with federal regulations and facilitate their research. Companies are using it to exchange genomic information, drug discovery and research, track pharmaceutical processing steps, regulatory filings, and drug distribution.
Human Resources	It has become trivial now to download and submit resumes, exchange time and billing forms, communicate professional service, and work with employee benefits in XML format through major initiatives such as HR-XML.
Financial Services and Accounting	Many countries' governments are standardizing on XML as the way they exchange business financial reporting data. Soon, most financial systems you will be working with will have XML built-in.
Education	XML has even found its way into K-12 education as well as higher education. Everything from daily academic schedules to enrollment and school lunches are being encoded in XML and exchanged with state and federal agencies.
Government	Soon, XML will be part of working with the "e-Government". The government is making it simpler than ever to submit forms such as tax filings and voter registrations, and integrate their workflows in your business processes using XML.
Travel	The airlines, hospitality, and leisure entertainment industries have all agreed that XML, and especially the Open Travel Alliance (OTA) format will be the way that reservations, scheduling, and information is shared in the travel industry.
Customer Information	XML is increasingly becoming the way that customer information of all types is being exchanged between vendors and participants in many different industries.
Real Estate	Real estate listings, mortgage applications, and disclosure filings

	of all sorts are being filed in XML format.
Scientific	Many different scientific disciplines ranging from astronomy and chemistry to physics and biology are adopting XML as the way in which they communicate their findings, perform research, and collaborate.
Many Others	Over 450 vocabularies exist to satisfy the requirements of many industries for data interchange. A large part of this list can be viewed in the ZapThink XML Standards Poster visible at the ZapThink web site (www.zapthink.com).

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In practice, it's likely that most organizations will adopt many of these standards, but also come up with XML vocabularies of their own. As such, these differences between XML grammars will be handled utilizing the eXtensible Stylesheet Language Transformations (XSLT) specification, which is part of the larger eXtensible Stylesheet Language (XSL) specification. XSL stylesheets describe how to represent or visualize XML data. XML, combined with XSLT, results in an end format such as XML, XHTML, or some other format. XSLT provides a subset of XSL that describes how to transform a particular XML grammar into a different form. The end result of these transformations can be other XML documents or PDF, HTML, Word, RTF, CSV, or other text formats.

V. Expanding FileMaker Internal Capabilities

One of the most exciting advancements that XML brings to the FileMaker platform is the expansion of its native capabilities. XML allows FileMaker to do things that it was not capable of doing before – or even thought of by its developers. In particular, FileMaker can take advantage of external "services" that can enrich and expand the FileMaker experience. FileMaker is now capable of taking advantage of external data sources and services through the power of XML. One recent demonstration of the power of XML showed a FileMaker application connecting to an external web service to validate postal and email addresses. Without XML, the user would need a local copy of the entire U.S. Postal Service database in order to validate mailing addresses. Other demos illustrated FileMaker capability to connect to Amazon.com to look up book titles, availability, and authors. There would have been no way that FileMaker could have done this if it weren't for XML (and a little help from the web protocol – HTTP). Using FileMaker XML import feature (over http), allows users to take advantage of Web Services to send a request to these external data sources and bring the resulting data into FileMaker.

XML can also be used to bolster the ability to synchronize FileMaker databases. With XML and other technologies such as SyncML and synchronization software, FileMaker can be made to effectively sync between clients or with other data sources such as PDAs, cell phones, databases, and other data sources. Since XML treats all data the same, it no longer matters what the original format and platform the data resided on.

No longer is FileMaker desktop-bound. Other interesting expansions of the FileMaker platform include the ability to include data of all sorts into databases, such as geo-spatial data, integration with GPS devices, and other data and services that not only enrich the FileMaker experience, but also change the way in which users interact with the product.

VI. Examples of XML Use with FileMaker

The use of XML within FileMaker is more than just theory and possibilities. A number of major businesses and industries are making use of the XML features within FileMaker to add significant value to their operations. In this section of the whitepaper, we will briefly explore three such examples.

6.1 Volvo Action Services

Volvo Action Service is a communication support provider for the entire Volvo family of products, including heavy trucks, marine engines and construction equipment. Coordinators are on duty 24/7/365 to provide critical service support to Volvo customers experiencing a problem. Forming the heart of that extensive Volvo database system is FileMaker Pro. Volvo uses FileMaker Pro as the platform for building all of their Customer Care applications. FileMaker allows Volvo to build intuitive, easy-to-use systems to interact with the company's legacy systems. FileMaker Pro databases fill a wide range of functions within the company -- from call tracking to monitoring the flow of parts and supplies.

The advent of FileMaker Pro 6 has opened additional possibilities, especially the new XML Import/Export feature. Volvo receives real-time updates from one of their client companies in XML via HTTP requests over the Internet. These updates include new vehicles and vehicle owner information. Volvo's client generates XML datasheets and transmits them to our web server -- where FileMaker Pro 6 processes and imports the data. This would not have been possible without such integrated XML support.

6.2 The Associated Press

Associated Press (AP) uses FileMaker Pro to make editorial databases available to member news organizations who link to these databases in order to provide information via their own websites. These other news sources, such as hometown newspaper websites, link to the AP news distribution sources, and thus get access to the information in the database."

Getting data into the news industry's standard format is another challenge. And this is where the XML Export feature of FileMaker Pro 6 will prove useful. Since AP uses the News Industry Text Format (NITF), which is basically the default format for all media outlets, FileMaker can produce XML-formatted data compliant with the NITF specification. AP is now using an XSLT stylesheet that will allow them to use FileMaker to export to NITF. Once they have that stylesheet written, FileMaker will make it much easier to convert to NITF or any other version of XML. This faster processing of data means timelier data for Associated Press subscribers. And that means the information is there for readers, viewers, and web-surfers when they want it -- easy to search and easy to use.

6.3 National Disaster Communications Response Team

The National Disaster Communications Response Team (NDCRT) provides electronic communication resources during a disaster event. Behind the scenes, the NDCRT stays organized with FileMaker Pro. The NDCRT is developing a database-driven chat room, which will allow us them to maintain a record of discussions, responses, and more discussions. The NDCRT anticipates that this chat room system will be of great value – not just in keeping team members up to speed but also in providing hard documentation of their in-the-field activities.

FileMaker Pro 6's XML capabilities will also streamline NDCRT's administrative functions. Their ability to manage a volunteer database of approximately 1,300 records has been dramatically simplified due to their ability to share it with a number of users on a number of platforms locally and remotely, thanks to XML support. They can also keep a database of stories and quickly publish them to NDCRT websites, speeding development and publishing. Previously, HTML was hand-coded before moving to a PHP solution. Now, the use of XML and XSL stylesheets allow them to replace that option with a simpler solution.

VII. The Future — It's Up to You

There is an increasing need to be able to transmit content and application functionality to an expanding class of devices. XML is the natural choice to accomplish this goal. XML is not only

being used as the format by which content and application data are sent to the device, but also as an internal data representation format. Companies are using XML increasingly to be able to transmit content and application functionality to an expanding class of devices. Enterprises are not only using XML as the format by which content and application data are sent to cell phones, PDAs, kiosks, and information devices of all sorts and types, but also as an internal data representation format.

XML-based efforts including Jabber, XHTML, SyncML, and Universal Plug-and-Play are using XML to help make communicating between devices even simpler. Rather than having to create your own code to communicate between devices, just use XML!

Through XML, you can make FileMaker do things you've never thought of before. For example, many telephony systems are now being enabled with XML. This means you can log phone calls automatically into your database, as well as use your system to place phone calls, drive voicemail prompts, and even store voicemail messages. FileMaker can also now integrate with XML-based instant messaging platforms and deliver content to a wide range of devices. Rather than having to create your own code to communicate between devices, just use XML.

XML is enabling all sorts of new classes of applications such as online bill payment and presentment (through OFX and IFX), the automated exchange of information about chemicals, their properties, uses and suppliers (via CML), and XML is even being used to facilitate mathematical communication (MathML). However, there are even more new and exotic applications of XML such as SMIL for online media presentations (ala Flash or PowerPoint), RDF for understanding semantics and library-style cataloging, and P3P to allow web browsers to automate decisions based on their individual privacy preferences.

VIII. Conclusions

The adoption of XML has been rapid and pervasive. There are currently more than 450 XML grammars defined in a diverse set of industries and organizations such as local and federal government, military, chemicals, pharmaceuticals, packaged goods, finance, legal, medicine, and music. Through XML, FileMaker Pro 6 fits with the corporate IT infrastructure, better than ever. XML allows users the ability to pick the application that makes them most productive (increasingly, FileMaker) yet stay connected and integrated with the rest of the enterprise. With the addition of XML capabilities, FileMaker is giving its users an almost limitless set of possibilities for integrating with enterprise applications and data sources.

As Dan Connolly once stated, "XML by itself is just a simple text-based document format; but together with all the ways it's being used to share structured information, it's a revolution that promises to make the [world] a whole lot smarter."

About ZapThink, LLC

ZapThink is an IT market intelligence firm that provides trusted advice and critical insight into XML, Web Services, and Service Orientation. We provide our target audience of IT vendors, service providers and end-users a clear roadmap for standards-based, loosely coupled distributed computing – a vision of IT meeting the needs of the agile business.

ZapThink's role is to help companies understand these IT products and services in the context of SOAs and the vision of Service Orientation. ZapThink provides market intelligence to IT vendors who offer XML and Web Services-based products to help them understand their competitive landscape and how to communicate their value proposition to their customers within the context of Service Orientation, and lay out their product roadmaps for the coming wave of Service Orientation. ZapThink also provides implementation intelligence to IT users who are seeking guidance and clarity into how to assemble the available products and services into a coherent roadmap to Service Orientation. Finally, ZapThink provides demand intelligence to IT vendors and service providers who must understand the needs of IT users as they follow the roadmap to Service Orientation.

ZapThink's senior analysts are widely regarded as the "go to analysts" for XML, Web Services, and SOAs by vendors, end-users, and the press. They are in great demand as speakers, and have presented at conferences and industry events around the world. They are among the most quoted industry analysts in the IT industry.

ZapThink was founded in October 2000 and is headquartered in Waltham, Massachusetts. Its customers include Global 1000 firms, public sector organizations around the world, and many emerging businesses. ZapThink Analysts have years of experience in IT as well as research and analysis. Its analysts have previously been with such firms as IDC and ChannelWave, and have sat on the working group committees for standards bodies such as RosettaNet, UDDI, CPExchange, ebXML, EIDX, and CompTIA.

Call, email, or visit the ZapThink Web site to learn more about how ZapThink can help you to better understand how XML and Web Services impact your business or organization.

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