XFA Technical Summary

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Introduction

This document is intended to provide a high-level overview of JetForm's XML Forms Architecture (XFA) and eXtensible Markup Language (XML). As organizations move to Web-based applications to address their business processes the issues of document capture, presentation, processing and retention become paramount. The current paradigms used within paper-based processes are insufficient to address the new requirements for Web-based information. XML is a powerful and flexible tool that allows for the creation of self-describing documents. XML provides a framework upon which the format of a document, the structure of a document and the data contained in a document can be defined such that many applications can take full advantage of the information. XFA is an application of XML and provides form specific document definitions in order to address the specific needs of organizations as they shift their form-based processes to the Web.

User Requirements

The shift from client/server applications to Web-based applications has generated a new set of organizational needs. As applications are developed to address the requirements of different processes using Web-based technologies, organizations need to improve how they share and distribute information. The need to share documents and information extends beyond the organization's employees to their partners and suppliers through to their customers. In order to effectively address the diverse requirements of all these groups, applications that use the Web must support industry standards for data and document interchange. The leading candidate for this standard is the eXtensible Markup Language (XML) which provides a standard method of describing documents, their structure and the data that the documents contain.

But treating a document as a single, whole element within an application is often inappropriate for the application. Many applications need the ability to separate the data from the document for other uses, such as posting the data to databases or inclusion in other documents. This need to re-use data, outside of the document, is also reflected in the need to present information in different ways to different people at different times. The application may simply need to restrict an employee's ability to change certain information, but the presentation may be significantly more complicated, for example when security or confidentiality issues are considered, for example when presenting employee salary information.

Another consideration for organizations trying to address the needs of Web-based applications is how the documents and data captured and produced by the applications will be retained and archived. Most organizations are bound by specific

rules regarding document and record retention. Currently most organizations archive the original documents in a paper format. As more applications become Web-based, new methods for retention and archive must be developed. The applications that capture and present the information and documents must provide a format for archive that will address the long term requirements of all organizations.

And even for those organizations that are aggressively implementing Web-based applications to address the needs of their customers, their partners and their employees, the need to produce high quality legally-compliant printed documents has not diminished. For many organizations the production of printed documents is a core method of reaching and communicating with their customers, and may be the only method of presenting and communicating to the customer the value provided by the organization. This continuing need to produce printed documents side-by-side with Web-based presentation is a driving force in any discussion of document definitions.

The eXtensible Markup Language (XML) and JetForm's XML Forms Architecture (XFA) can help organizations address these needs as they shift to Web-based applications and business processes.

eXtensible Markup Language (XML)

XML is the next generation markup language based upon SGML (Standard Generalized Markup Language). HTML (HyperText Markup Language) is a specific implementation of SGML and has been widely "extended" by browser vendors. The limitations, and subsequent changes, to HTML prompted the standards bodies to create a new definition that would promote extension without sacrificing the standardization and simplicity that HTML provides. XML was the result of that effort.

One of the critical differences between HTML and XML, a difference that is very important when considering applications, is that HTML is commonly focused on the format of the document, whereas XML deals with the structure. Another way of looking at this difference is that HTML can describe how the contents of a page should look, but XML can describe what the contents of a page are. This connection between structure, format and data is perhaps the most important aspect of XML when its use within applications is considered. An example of this difference is how HTML and XML would treat the following extract from a document.

Summary
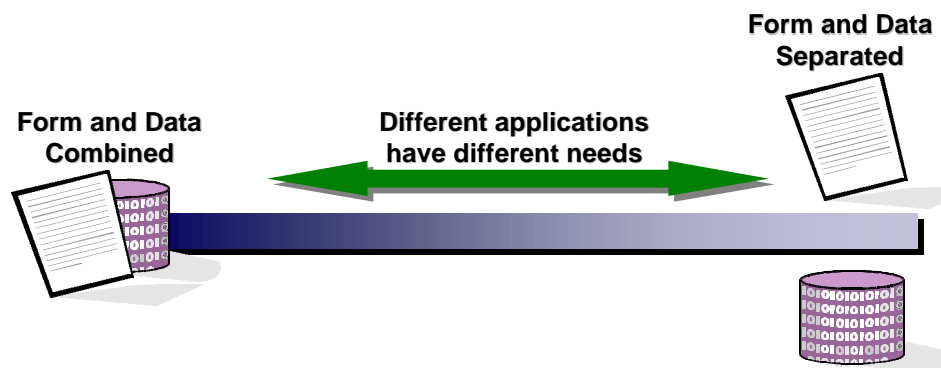This document discusses JetForm's XML Forms Architecture (XFA)

Within HTML the first line "Summary" would be tagged as a header and the browser would present the first line using its internal definition for this header. The second line would be tagged as body text and would be presented by the browser using its internal definition for the format of body text. In the case of HTML the definitions and tags used are specific to the format, or appearance, of the document.

The situation changes when XML is used to describe this information. While the first line will still be tagged as a header, the second line will be tagged as "Summary". Attached to this tag not only is there information on how it is to be presented, but it also acts as a label that identifies this information as summary information This allows applications to read through this document, and all other documents, and extract all of the summary information. Using HTML only the heading information could be extracted. No other method of identifying what the information was and why it was tagged as a header is available. XML provides the ability to label the information in a document in such a way as to allow for the extraction and use of the information in multiple different ways.

Another difference between HTML and XML is that XML can be easily read, in fact it can be generated to be completely human readable. This provides a language that is easily included in applications, using pre-built, off the shelf parsers (the tools that read the files). XML was also designed with the needs of international users in mind. This ensures that documents can be created with XML that use the different characters required by different languages without compromising the integrity of the document or adding new elements to XML.

XML Forms Architecture - XFA

JetForm's XML Forms Architecture (XFA) is a form definition language and specification. XFA is an application of XML that provides for the specific needs of electronic forms and the applications that use them. XFA addresses the needs of organizations to capture, present, move, process, output and print information associated with electronic forms and the applications that use and produce electronic forms.

Form and Data

XFA is aware of both the on-screen presentation of electronic forms and the printed output presentation. XFA also provides the application, and thereby the user, with the ability to connect or separate the form and the data.

This allows for a range of application requirements to be addressed by one specification. For example, a linked form and data object may be required for a citizen filling out a government form. Both the government department and the citizen need to ensure that the data is received "in context". XFA provides for this "merging" of form and data into one object, while allowing for the re-use of the data for other applications and purposes. This linkage of security and convenience ensures that organizations can use the data received in the most efficient and effective manner, while also ensuring that the data and the context within which the data was captured is maintained.

At the other end of the spectrum is the requirement to separate the form and the data. An example of this might be during a new employee entry process. By providing a method of linking the employee's data from one form to many, the application can save the employee the effort of filling many forms with the same name and address information. And by providing a mechanism to separate the data from the form, XFA lets the application distribute and present the data in the manner that is most appropriate for the tasks required.
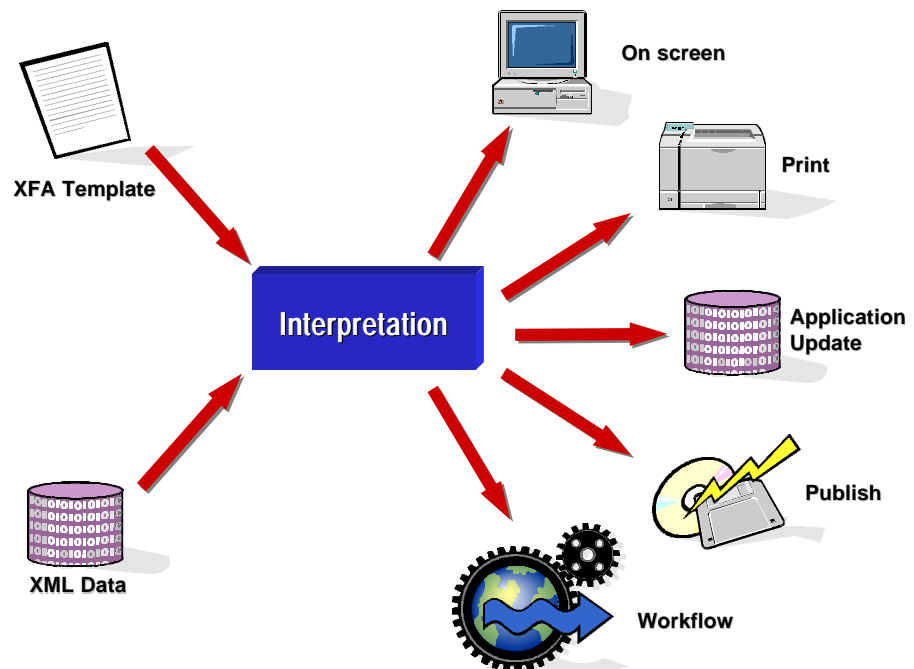
Digital Signatures

In conjunction with the ability to "merge" the form and the data is the ability to electronically sign the completed document. XFA provides for the definition of electronic signature blocks on the form templates and for the use of digital signatures to electronically sign the form, the data and the combined document. Digital signatures provide organizations with a method of ensuring that the form, the data and the combined document have not be tampered with and that the document was signed by the person linked to the electronic signature. The use of digital signatures and the merging of form and data also provides organizations with a secure document for long-term archiving and retention.

XFA also extends the security model to include situations when the form and the data are separated. Through the use of XFA and digital signatures organizations can use electronic forms for the capture and presentation of information, separate the data and still maintain a secure, authenticated connection between the data and the context of the data entry and signature. This flexibility ensures that the security needs of the organization will be respected and enforced, while providing the maximum level of re-use and efficiency.

Multiple Views

The ability to separate form and data also provides XFA with the ability to encapsulate multiple views of the data inside one definition. Views may be device dependent (on-screen vs. printed), may be user specific (employee vs. manager) or may be data dependent (confidential vs. public). The ability to encode multiple views within one definition ensures that the proper view is used, and allows the application to make that determination. This relieves the designer from having to consider all the possible application scenarios. They can simply decide what views are appropriate and then rely on the application to select the correct view.

An additional benefit of separating form and data is the ability to "roll back" the form and the data to a previous point in time. The ability to connect the data and the task is a critical requirement of workflow applications and, when combined with the ability to present the data in a view that is specific to the user, provides a powerful connection between presentation, data and the work required by the business process.

Why a new specification?

XFA is not intended to replace existing recommendations or specifications, rather it provides a definition of those elements critical to forms and the processing of forms. It is an attempt to address the unique requirements of forms and the multiple interpretation engines that need to process forms and the data that results from the completion of forms. XFA provides a common definition for multiple different application tools and environments, for example Web browsers, printers and workflow engines.

But XFA only addresses the needed extensions for forms. XFA does not propose a proprietary data specification. This has been done for two reasons. First, XML encoded data is appropriate for use in form-based applications. Second, using an industry standard for data exchange will allow applications to exchange data with other applications without required modifications or translation. For those organizations that wish to create a closer linkage between XML data and XFA forms, JetForm will provide data formatting suggestions that will simplify the close integration of forms and data and ensure that the data is interpreted in the manner needed by each application.

Open Specification

XFA is an open specification and will be publicly available. JetForm encourages organizations to create new tools that use the XFA specification and provide customized, dynamic modification to the forms defined by XFA.

Self Describing

XFA is cross platform and self-describing. These two characteristics, inherited from XML, ensure that the forms created using XFA can be archived and retained by organizations. In order to improve an organization's ability to archive and retain electronic versions of their forms and data, XFA includes the ability to "merge" the form and the data together into a single document. In addition, XFA provides support for digital signatures, so that the documents formed through the merging of form and data can be signed by the appropriate persons and retained as electronically signed documents. XFA extends this concept to include the requirement for security for those documents where form and data are separated. This allows organizations to be assured that the data is not modified out of context, but still provides the organization with the maximum flexibility in the use and re-use of the data.

Output Aware

XFA is output-aware and has provision for both absolute and relative object positioning for all views, including the production of the form on a printed page. Many applications require the ability to merge the form and data and to produce high quality legally-compliant printed forms. To define the position of objects XFA provides: relative positioning and absolute positioning. These two mechanisms can be used separately or together. Absolute positioning allows for the placement of objects within a view, for example a printed page, in a specific location using standard, view-oriented measurements. Relative positioning allows for the "flowing" of objects with respect to other objects on the form. This allows for the definition of views that change with the information presented or with the device used, for example an on-screen representation versus a printed page. The combination of these two positioning mechanisms allows XFA to define dynamic documents that change appearance based on the data to be included.

Calculation Flexibility

XFA includes a description of a "spreadsheet like" calculation engine, but also provides for the use of industry standard scripting and calculation engines, such as VBScript and JavaScript. By providing a built-in calculation engine, XFA ensures that intelligent forms, with calculations and validations, can be defined without the need to produce code with the form. However, for those organizations who have selected a specific scripting engine, XFA supports the use of these industry standards. In addition, XFA allows for the selection of multiple scripting engines, each object defined on a form may have a different scripting or calculation engine attached to it. This flexibility allows the organization to build a library of objects, designed by the appropriate specialist that will interoperate on the form.

Summary

For years the needs of the users and developers have been at odds with the underlying definition environments used within the applications. Users want a standard language that provides for easy upgradability and support for long term retention. Developers need to support the powerful features within the application and need a language that is easy to implement and support. In the past developers have generally carried the day and have implemented proprietary definition formats.

With the advent of the eXtensible Markup Language (XML), it is now possible to address the needs of both the users and the developers of applications. XML provides a robust and flexible document and data definition environment that can handle the needs of the most demanding application, while providing users with an industry standard definition that can easily be exchanged between different applications.

User Requirements

Organizations need electronic forms, and applications that use them, to be able to:

- Leverage the use of Web technologies
- Define forms using a standard language in order to ensure interoperability
- Link form and data, while providing for the re-use of the data outside of the form
- Present the form and data to different users in the most appropriate way
- Retain and archive the form, the data and the combined document
- Exchange data with many different applications
- Ensure security and authentication regardless of how the form and data are being used

The Value of XML

eXtensible Markup Language (XML) provides significant value because it is:

- An industry standard
- Platform (both operating system and application) independent
- Aware of multiple locales and languages
- Suitable for long term retention and archive
- Easy to implement
- Designed to be extended

XML Forms Architecture

JetForm's XML Forms Architecture (XFA) is an application of XML for electronic forms. XFA describes:

- Multiple views of the document and the data (on-screen, print, Web, publish, etc)
- Support for both merging of form and data and separation of form and data
- Absolute and relative positioning of form objects and data
- Support for multiple scripting and calculation engines
- Support for Digital Signatures, regardless of how the form and data are used
- The use of XML data definitions for interoperability

About JetForm

JetForm Corporation makes Web-based software solutions that automate business processes and transform them into "e-processes." Our value is that we help companies and government operate efficiently and effectively to grow revenues, lower operating costs and reduce cycle times. Our strength is in intelligent XML forms, process automation and customer-focused document creation. With operations in 11 countries and a global network of partners, JetForm is uniquely positioned to address the needs of international business.

For more information about JetForm, please call: 1-800-JETFORM (538-3676) or 1-613-751-4850, or visit the JetForm Web site at www.jetform.com.

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or call 1-800-JETFORM (538-3676).

Headquarters 560 Rochester Street, Ottawa, Ontario K1S 5K2 Canada
+1 (613) 230-FORM (3676)

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JetForm's professional services team offers an integrated services program that ensures your success with JetForm technology. Services include: Systems Analysis, Design, Development and Integration, Training and Support. For more details about JetForm's Services Program, phone (613) 751-4884 or e-mail servops@jetform.com.

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