



XML

The eXtensible Markup Language (XML) provides a processor-independent way of encoding data for interchange between diverse systems. XML has no predefined meanings associated with its tags. Instead, XML is a set of rules for construction of tag-delimited information. Different sets of tag definitions that use XML syntax have been developed for different application environments. Some of the tag sets or schemas that have been defined include schemas for digital media, chemical engineering, vector graphics, electronic invoicing, weather information and spreadsheet formulas. A specific XML schema or tag set may be defined by a single organization and published for others. For example, Microsoft has defined a set of XML tags for exchanging spreadsheet and word processing documents with the Office 2000 product suite. Industry standards groups sometimes jointly define schemas such as has happened with vector graphics, consumer electronics and chemical engineering groups.

RomXML

For an embedded device, it may be useful to exchange XML-based information with other embedded devices or with general-purpose desktop, workstation or mainframe computers. However, the processing requirements for a general purpose XML parser may be prohibitive. Additionally, the tag set or schema for a particular embedded device does not change dynamically, as the embedded device is typically a dedicated-purpose device. For embedded devices, therefore, the primary need for an embedded XML parser is to efficiently translate data between XML syntax and an internal format (such as a C structure). The Allegro RomXML Parsing-Framing tool provides a lightweight translation between *pre-defined* C-language structures and XML-based representations. By defining the rules for data translation external to the embedded device, it is possible to build a small special-purpose XML translator that uses dedicated schema definitions to reduce code size and data storage size. This allows the embedded device to move data to other machines as an XML standard format document without carrying the overhead of general-purpose XML tools.

The RomXML package uses a special set of XML tags to define an XML object. The RxSchema language is similar to the XML Schema Definition language and allows the XML object to be defined with both the C-language internal storage format and the set of XML elements and attributes that will be used for the XML-based data interchange. The RomXML TagBuilder utility program analyzes the RomXML object definitions and produces an object definition file in C-language source that is compiled with the RomXML Parser-Framer code. The object definition file contains the transformation tables that the runtime RomXML code uses to perform specific translations for each XML object between the defined C structures and the associated XML schema or tag set definition.

The RomXML TagBuilder program is delivered in executable form as a Windows program. Since TagBuilder uses C-language standard library calls for reading and writing the XML object definition files, it is also available in source format for developers who wish to host it in a particular Unix environment.

The RomXML runtime code which is delivered in ANSI-C source code form provides a series of calls that the developer uses to handle the XML objects. A developer can pass an incoming XML document and the XML object definition to the RomXML toolkit and it will parse the XML document into a C structure. A developer can pass a C structure and the XML object definition to the RomXML toolkit and it will prepare an XML document by framing the data from the C-language structure with the appropriate XML tags.

RomXML is ideally suited for limited resource embedded devices, since it provides sequential translation for XML documents so that they can be parsed or framed a buffer at a time. This means that the entire XML document does not need to be resident in memory all at the same time.

XML documents may be transmitted to and from other systems in a number of ways. RomXML is integrated with the other Allegro products so that XML documents may be transmitted as HTTP objects using a RomPager embedded Web server, or a RomWebClient embedded HTTP client toolkit. This means that support for Web services such as SOAP or XML-RPC is also available when using RomXML with RomPager or RomWebClient. XML documents may also be sent and received as email attachments using the RomMailer or RomPOP embedded email packages.

RomXML is also available as a stand-alone package to handle XML datastreams that are transmitted using other techniques. RomXML works with any RTOS and TCP environment including those of our partners: ARC MQX, Enea OSE, Express Logic ThreadX, Green Hills INTEGRITY, Kadak AMX, Mentor VRTX and Nucleus, Microsoft Windows CE/95/98/NT/Me/XP, QNX, Radisys OS-9, SNMP Research, Treck TCP and WindRiver pSOS and VxWorks.

Applications

XML syntax is a standard way to exchange data, yet it is flexible enough to handle any application. It is machine independent and a powerful computer-to-computer data exchange mechanism, yet the syntax is simple, so it can easily be read by a human. RomXML brings these benefits to the embedded world. These are some examples of RomXML applications:

Agilent is using Allegro RomXML to control the software upgrade process of test equipment using a central Web server. The Allegro RomWebClient is used to retrieve both the software update files and the XML control files from the Web server. Because XML is readable both by man and machine, the control files may be easily prepared with XML tags to tell the download software in the test equipment which update files are applicable.

A data collection vendor is using RomXML to exchange information between data collecting devices and a master control station. They are using XML because it allows them to easily add future extensions to their data structures and allows them to easily change technologies in the data collecting devices or the master control station without worrying about the processor type.

Cisco uses RomXML along with the RomPager Web server and RomWebClient software to support the operation of the IP Phone 7960 Voice Over IP unit. Among other benefits from using XML based services, Cisco has published their schema definitions to open up management and reporting information from their phones and gateways to their business partners.

RomXML is an asset in all these cases, because it is simple to use in an embedded environment. With a small memory footprint of 10Kb, and a simplified tag definition syntax, RomXML makes adding XML support to embedded devices easy.