



IBM Systems - iSeries  
Programming  
XML Toolkit for iSeries

*Version 5 Release 3*







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**Note**

Before using this information and the product it supports, read the information in “Notices,” on page 19.

**Third Edition (August 2005)**

This edition applies to version 5, release 3, modification 0 of XML Toolkit (product number 5733-XT1) and to all subsequent releases and modifications until otherwise indicated in new editions. This version does not run on all reduced instruction set computer (RISC) models nor does it run on CISC models.

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## XML Toolkit for iSeries

The XML Toolkit for iSeries™ (licensed program offering (LPO) 5733-XT1) is designed to provide key development enablement components, XML parsers, to assist in the use of XML for general application or business-to-business (B2B) solutions. The XSL transformer allows you to reformat or reorganize XML documents to other formats (for example, XML or HTML).

The XML Toolkit approach allows for a more timely delivery of supported XML parsers as new versions become available.

- | The XML Toolkit for iSeries is based on cross-platform, open-source code that is designed to be compliant with industry standards. Parser version 5.5 corresponds to Apache Software Foundations' Xerces-C Version 2.6. The XSL transformer corresponds to Apache Software Foundations' Xalan-C Version 1.9. In addition to providing the XML for C++ parser and the XSL transformer for C++, a unique iSeries interface called XML Procedural parser is provided to the XML for C++ parser that allows applications written in RPG, C, or COBOL to access an XML parser.
- | Also included with the XML Toolkit for iSeries are XML Script for iSeries and the IBM® Web Services Client for C++. XML Script for iSeries provides an XML based build tool. IBM Web Services Client for C++ is used for building Web Services client applications requiring Simple Object Access Protocol/Hypertext Transfer Protocol (SOAP/HTTP) message handling in C++ environments.

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## What's new for V5R3

This topic describes the XML, XSL, XML Script for iSeries, and Web Services Client for C++ strategy change for version V1R1M0 of the XML Toolkit. These changes are specific to XML Toolkit, version V1R1M0.



- | To ensure the availability of the latest versions of the XML parsers, the XML Toolkit for iSeries (5733-XT1) was developed. The XML Toolkit replaces, both in functionality and support, the integrated XML parsers introduced in i5/OS™ in V5R1. This offering consists of two new parsers: XML4C 5.5 for C++ and XML4PR 5.5 for procedural languages (ILE RPG, ILE C, and ILE COBOL), as well as versions 4.0, 5.0, 5.2, 5.3.1 and their supporting API documentation, sample programs, and include files. This offering includes versions 1.9 and 1.6 of the XSL transformer and their supporting API documentation, sample programs, and include files. The Java™ version of the XML parser is available in the IBM Toolbox for Java (5722 JV1). Older versions of the Java version of the XML parser can be found in the integrated file system directory /QIBM/ProdData/OS400/xml/lib.
- | The latest offering of the XML Toolkit for iSeries consists of two new XML parsers: XML4C 5.5 for C++ and XML4PR 5.5 for procedural languages (ILE RPG, ILE C, and ILE COBOL) and their supporting API documentation, sample programs, and include files. These versions of the XML parsers also include older versions 4.0, 5.0, 5.2 and 5.3.1.
- | This offering also includes the XSL transformer version 1.9 and its supporting API documentation, sample programs, and include files. Newly added are Web Services Client for C++ (based on Axis C++ version 1.5) & XML Scripting for iSeries C++ 1.0 and their supporting documentation, sample programs, and include files.

## What's new as of 23 June 2006

In addition to the XML Toolkit for iSeries, the XML Toolkit for IBM System i5™ (5733-XT2) is now also available. This product is the next generation of XML Toolkit for iSeries. For more information, see the XML Toolkit for IBM System i5 topic in the V5R4 Information Center.

## How to see what's new or changed

To help you see where technical changes have been made, this information uses:

- The  image to mark where new or changed information begins.
- The  image to mark where new or changed information ends.




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## Printable PDF

Use this to view and print a PDF of this information.

To view or download the PDF version of this document, select XML Toolkit for iSeries (about 303 KB). Note that the PDF version of the XML Toolkit for iSeries information does not contain the API documentation. The API documentation is an installable option of the XML Toolkit for iSeries licensed program.

## Other information


- Redbooks™:
  - The XML Files: Using XML for Business-to-Business and Business-to-Consumer Applications (about 3 MB) 
  - XML in Action: PDML and PCML (about 3.5 MB) 
  - Integrating XML with DB2® XML Extender and DB2 Text Extender (about 4.5 MB) 

## Saving PDF files

To save a PDF on your workstation for viewing or printing:

1. Right-click the PDF in your browser (right-click the link above).
2. Click the option that saves the PDF locally.
3. Navigate to the directory in which you want to save the PDF.
4. Click **Save**.

## Downloading Adobe Acrobat Reader

You need Adobe Acrobat Reader to view or print these PDFs. You can download a copy from the Adobe Web site ([www.adobe.com/products/acrobat/readstep.html](http://www.adobe.com/products/acrobat/readstep.html)) .

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## XML introduction

Extensible Markup Language (XML) allows you to describe and organize information in ways that are easily understandable by both humans and computers. You can then share that information and its description with others over the Internet, an extranet, network, or in other ways.

XML, like Standard Generalized Markup Language (SGML), is a metalanguage. A metalanguage allows you to define a document markup language and its structure. For example, both XML and Hypertext Markup Language (HTML) are derived from SGML.

You can use XML to create your own markup language that includes a set of rules and tags that describe information suited to your needs, for example, name, title, address, and zip code. You define this markup language in a document type definition (DTD) or XML Schema file that functions as the standard way to



describe your information. Using XML to share standardized information means you are no longer required to write programs to focus on proprietary software or convert and translate different data formats.

You and others can use the DTD or XML Schema definition to tag information that you can then use in a variety of ways: printed on an address label, business card, or stationary; displayed in a Web page; or sorted in a list of data with similar attributes. For example, you might want to create an efficient way to share information (such as purchase orders, shipping acknowledgments, order status, and stock status) with your partners and suppliers. You can use XML to share that information by creating and using XML documents that conform to your DTD or XML Schema, in which you specify the standard for the electronic exchange of information.

Although both XML and HTML use tags to describe content, they are also very different:

- HTML describes how to format information for display and is meant for computer-to-human interaction.
- XML describes what the information is and is meant for computer-to-computer interaction.

There are many other sources of information regarding the advantages and uses of XML that are readily available on the Internet and through commercial publications. For a complete and comprehensive understanding of the capabilities of XML, you should consult these sources.

## **Advantages of XML**

Using XML to exchange information offers many benefits.

Advantages of XML include the following:

- XML uses human, not computer, language. XML is readable and understandable, even by novices, and no more difficult to code than HTML.
- XML is completely compatible with Java and 100% portable. Any application that can process XML can use your information, regardless of platform.
- XML is extendable. Create your own tags, or use tags created by others, that use the natural language of your domain, that have the attributes you need, and that makes sense to you and your users.

The following example illustrates, in a simplified way, the readability and extensibility of XML:

HTML example	XML example
<pre> &lt;HTML&gt; &lt;H1 ID="MN"&gt;State&lt;/H1&gt; &lt;H2 ID="12"&gt;City&lt;/H2&gt; &lt;DL&gt;   &lt;DT&gt;Name&lt;/DT&gt;   &lt;DD&gt;Johnson&lt;/DD&gt;   &lt;DT&gt;Population&lt;/DT&gt;   &lt;DD&gt;5000&lt;/DD&gt; &lt;/DL&gt; &lt;H2 ID="15"&gt;City&lt;/H2&gt; &lt;DL&gt;   &lt;DT&gt;Name&lt;/DT&gt;   &lt;DD&gt;Pineville&lt;/DD&gt;   &lt;DT&gt;Population&lt;/DT&gt;   &lt;DD&gt;60000&lt;/DD&gt; &lt;/DL&gt; &lt;H2 ID="20"&gt;City&lt;/H2&gt; &lt;DL&gt;   &lt;DT&gt;Name&lt;/DT&gt;   &lt;DD&gt;Lake Bell&lt;/DD&gt;   &lt;DT&gt;Population&lt;/DT&gt;   &lt;DD&gt;20&lt;/DD&gt; &lt;/DL&gt; &lt;/HTML&gt; </pre>	<pre> &lt;?XML VERSION="1.0" STANDALONE="yes" ?&gt; &lt;STATE STATEID="MN"&gt;   &lt;CITY CITYID="12"&gt;     &lt;NAME&gt;Johnson&lt;/name&gt;     &lt;POPULATION&gt;5000&lt;/POPULATION&gt;   &lt;/CITY&gt;   &lt;CITY CITYID="15"&gt;     &lt;NAME&gt;Pineville&lt;/NAME&gt;     &lt;POPULATION&gt;60000&lt;/POPULATION&gt;   &lt;/CITY&gt;   &lt;CITY CITYID="20"&gt;     &lt;NAME&gt;Lake Bell&lt;/NAME&gt;     &lt;POPULATION&gt;20&lt;/POPULATION&gt;   &lt;/CITY&gt; &lt;/STATE&gt; </pre>

HTML tag names reveal nothing about the meaning of their content. The example above uses an HTML definition list, but the problems inherent in using HTML occur if the data were contained in a table or some other kind of HTML tags. Examples follow:

- Many of the HTML tags are acronyms, so they are not as readable as common language.
- HTML tags represent data (in this example, city names and populations) as items to display, for example, as definitions in a list or cells in a table. This makes it difficult to manipulate the data or to exchange it between applications.

The XML tag names are readable and convey the meaning of the data. The information structure is easily discerned by both humans and computers as each XML tag immediately precedes the associated data. The data structure follows a noticeable and useful pattern, making it easy to manipulate and exchange the data.

## Uses of XML

XML has a variety of uses for Web, e-business, and portable applications.

The following are some of the many applications for which XML is useful:

- **Web publishing:** XML allows you to create interactive pages, allows the customer to customize those pages, and makes creating e-commerce applications more intuitive. With XML, you store the data once and then render that content for different viewers or devices based on style sheet processing using an Extensible Style Language (XSL)/XSL Transformation (XSLT) processor.
- **Web searching and automating Web tasks:** XML defines the type of information contained in a document, making it easier to return useful results when searching the Web:

For example, using HTML to search for books authored by Tom Brown is likely to return instances of the term 'brown' outside of the context of author. Using XML restricts the search to the correct context (for example, the information contained in the <author> tag) and returns only the information that you want. By using XML, Web agents and robots (programs that automate Web searches or other tasks) are more efficient and produce more useful results.

- **General applications:** XML provides a standard method to access information, making it easier for applications and devices of all kinds to use, store, transmit, and display data.
- **e-business applications:** XML implementations make electronic data interchange (EDI) more accessible for information interchange, business-to-business transactions, and business-to-consumer transactions.
- **Metadata applications:** XML makes it easier to express metadata in a portable, reusable format.
- **Pervasive computing:** XML provides portable and structured information types for display on pervasive (wireless) computing devices such as personal digital assistants (PDAs), cellular phones, and others. For example, WML (Wireless Markup Language) and VoiceXML are currently evolving standards for describing visual and speech-driven wireless device interfaces.

## XML standards and extensions

Other standards and extensions to XML work together to make your information more portable and useful. You need to know about these standards and extensions in order to do the following:

- Use XML with your Java, C++, C, RPG, and COBOL programs.
- Perform complex data searches in XML documents.
- Display XML data on different types of devices.
- Provide your XML documents with hierarchical linking capabilities.
- Produce standard structures for related DTDs.

XML is good for describing information, but it cannot do everything. For example, XML documents do not contain the kind of information that current browsers and many other devices require to display it in a useful way. The same is true for linking to other information, transporting XML data so that it can be used in a meaningful way by the receiving application, and so on.

The XML community has and continues to develop standards and extensions to expand the capabilities of XML:

- DOM and SAX APIs
- Namespaces
- XSL and XSLT
- XLink
- XPath and XPointer
- XML Schema

## APIs

Application programming interfaces (APIs) allow applications to work with XML information using a standard set of portable interfaces.

### DOM 1.0 and DOM Level 2.0

The Document Object Model (DOM) API enables you to build XML documents as well as parse them. These interfaces enable you to access, manipulate, and create XML documents (and the data within) as programming objects that have methods and events. Your programs can construct or change a DOM tree in memory and then persist that DOM tree to a file or stream. DOM is best suited for instances where you will parse few XML documents but require extensive control over the contents.

## Namespaces

Namespaces are pointers that enable you to differentiate between duplicate XML elements or attribute names, a situation that can occur when using XSLT style sheets or more than a single DTD. For example, the `<code>` element from one DTD might mean something different from a `<code>` element in another

DTD. To avoid name collisions and ambiguity, give each pointer a unique local name. This makes it simple to distinguish between the different namespaces.

## **SAX 1.0 and SAX 2.0**

The Simple API for XML (SAX) is a read-only, single-pass interface best suited for processing many documents or very large documents. You can use this API to extract information from the XML documents, but you cannot use it to add new data to or to change the content of the XML documents. The SAX API is event-driven, notifying your application when certain events happen as it parses your document. For example, your application might need to know when the parser encounters the start or end of an element node. Note that it is your application that must keep the necessary state information to determine the content and context of these XML events.

## **XSL and XSLT**

Extensible Stylesheet Language (XSL) and XSL Transformation (XSLT) work in combination to enable you to display XML data in a variety of ways, for example, displayed in a browser or on a PDA, or printed in a brochure. XSL and XSLT processing also enable you to transform an XML message or document from one XML markup language to another, which has key applications in e-business.

See “XSL introduction” on page 7 for more information.

## **XLink**

XML Linking Language (XLink) enables you to link your XML document to other resources on the web, including files of just about any format, database searches, and so on. Moreover, you can link to the structure of the resource, not a predetermined place holder, like an HTML <A NAME> anchor tag. Multiple links allow users to traverse the linked information in any order according to restrictions that you specify.

## **XPath and XPointer**

XML Path Language (XPath) and XML Pointer Language (XPointer) enable you to search for and identify data in the hierarchical XML document structure.

XPath defines a syntax for locating data in an XML document. Both XSLT and XPointer use XPath. XPath defines an XML document as a hierarchy of nodes, with the top node being the root. Just like using a regular expression finds one or more patterns in text, using XPath finds patterns in data within the nodes of one or more XML documents.

XML Pointer Language (XPointer) extends XPath to enable locating specific portions of data, called fragments, based on XML attribute values, types, content, or relative position. These fragments can be discrete pieces of data, a range of information between two points, or a continuous series of elements.

## **XML Schema**

XML Schema Language defines the logical structure of an XML document, much like a document type definition (DTD).

The significant difference between DTDs and XML Schemas are that schemas do the following:

- Are written as XML markup language itself, making them extensible, unlike DTDs
- Focus on the problem of cardinality, enabling the enumeration of minimum and maximum allowed elements
- Allow constraints on values
- Allow additional data types and definitions of data types that can be inherited

All of these enhancements give you more control over the allowable content of the XML document or message. For example, you can add a different type of element to an existing schema as long as your addition does not break the original schema. Schemas also have many more available data types than do DTDs, making importing and exporting data somewhat easier.

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## XSL introduction

Extensible Stylesheet Language (XSL) allows you to format and reorganize existing XML documents into another format (for example, XML or HTML).

You can use XSL to reformat an XML file to specify the how the data is to be presented on the web via XSLT stylesheets. You can also write XSLT stylesheets to reorganize an XML document to remove or add elements or to change it into another XML document. XSLT stylesheets are written in XML to achieve this.

This process has two basic components:

- Use XSL stylesheets to define a set of patterns and templates you want to use to replace XML elements. A pattern identifies the XML element, and the corresponding template is used by an XSL processor to actually replace the XML element. For example, you can transform data elements in an XML document to display appropriately in a browser or mailing label.
- Use XSLT documents to transform the hierarchy of XML data into a different kind of tree, reordering elements as you prefer. For example, you can add a table of contents or an index to a set of data that does not have one. You can also use XSLT to transform the grammar of XML documents. For example, you can transform the grammar for a set of incoming XML request documents to a different XML grammar required by the receiving application.

These technologies do more than format the display of an XML document. They change it so that it becomes a different kind of document. In conjunction with other XML tools and extensions, such as parsers and XML Linking Language (XLink), you can produce new documents formats such as specific word processing formats, portable document format (PDF), HTML, and more.

## Uses of XSL

XSL can be used for many XML transformation and reformatting tasks.

The transformation and reformatting tasks that you can do with XSL include the following:

- XML to HTML rendering
- XML vocabulary conversion
- XML to plain text conversion
- Simple XML queries

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## XML Scripting for iSeries introduction

| XML Scripting for iSeries uses an XML formatted file to accomplish a set of tasks on an iSeries. These  
| tasks are grouped in "targets" which allow a different set of tasks to be run in different invocations of the  
| XML Scripting for iSeries tool. The targets can have dependencies on each other.

| The XML Scripting for iSeries tool is inspired by Apache Ant, but it is not compatible with that product  
| and has a different focus. Currently, the tool is available only in the English language and has no  
| extension API.

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## Web Services Client for C++ introduction

A Web service consists of one or more methods that share a common point of reference, and that can synchronously communicate, using Simple Object Access Protocol (SOAP) protocols, with other similarly enabled applications.

IBM Web Services Client for C++ (WSSC) provides a set of libraries and Java tools that enable you to build C++ Web service client applications from existing Web Service Description Language (WSDL) files. These applications are able to communicate over Hypertext Transfer Protocol (HTTP) with other applications that are configured in a similar way, using transmission control protocol/internet protocol (TCP/IP) with SOAP protocols.

WSSC has the following capabilities:

- Support for Web Services Description Language (WSDL) - document literal only
- Supports Web Services Invocation (WSI) 1.0 basic profile compliance
- Support for Secure Sockets Layer (SSL)
- Java API for XML-based remote procedure call (JAX-RPC) style implementation

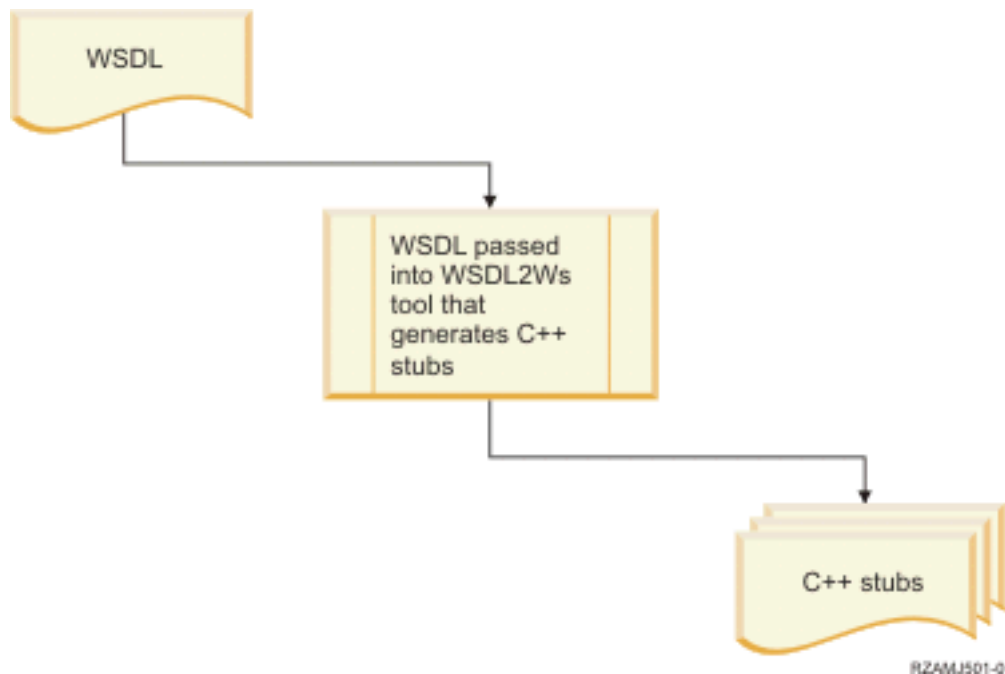
## How Web Services Client for C++ works

Web services are based on files called WSDLs, which are XML files containing all the information relating to services that are available at a particular location on the internet. At their simplest level, WSDLs describe request/response message pairs in detail, and contain everything relevant to the service.

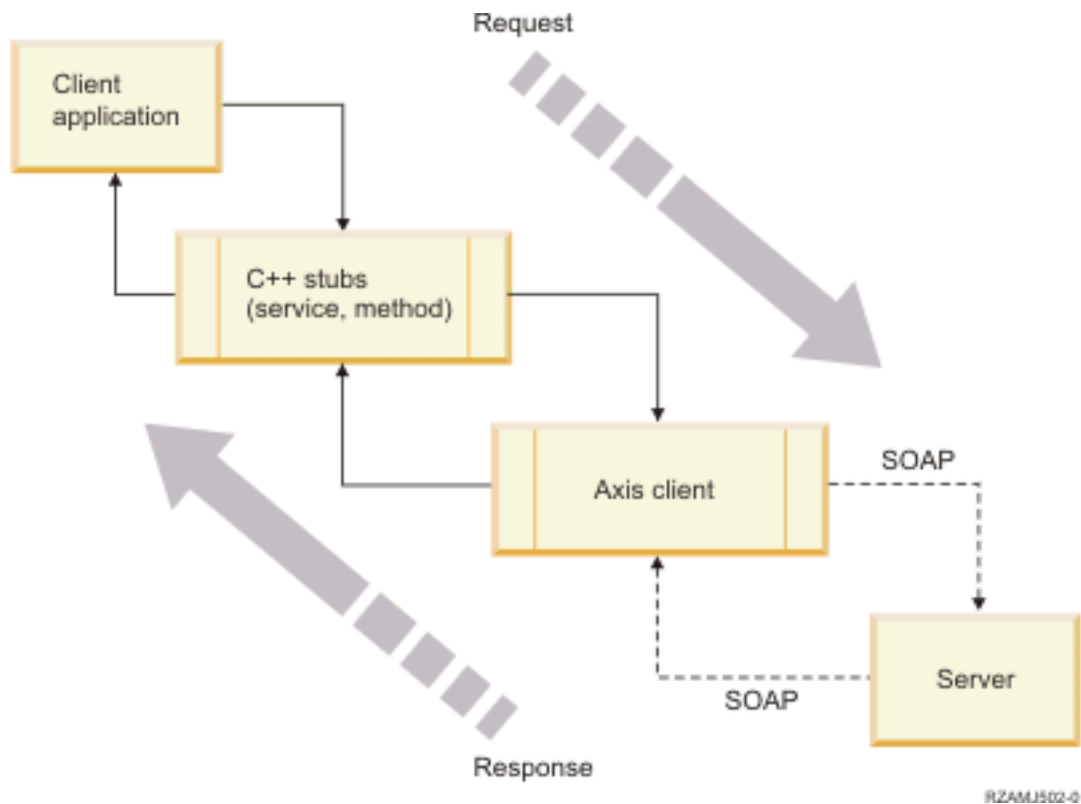
A Java program, WSDL2Ws, which is part of the Web Services Client for C++ package, is used to turn the WSDL into a suite of C++ stubs and data objects that you can call and pass information to, and that request information from the server and then wait for the corresponding reply before passing the response data objects back to the client. The stubs hide the internet communication from the application writer. All you need to know is the name of the service, the method it contains, and the structure of any data objects that are passed.

The most common use of Web Services Client for C++ is to create a WSDL source file that describes the communication between the client and server, and then use the WSDL2Ws tool to generate stubs that you can use to communicate with the Web service server.

The following diagrams describe the actions that are required to turn a WSDL into a Web service. Figure 1 illustrates the first step, which is to convert the WSDL into a set of C++ client stubs that can be called by the client application:

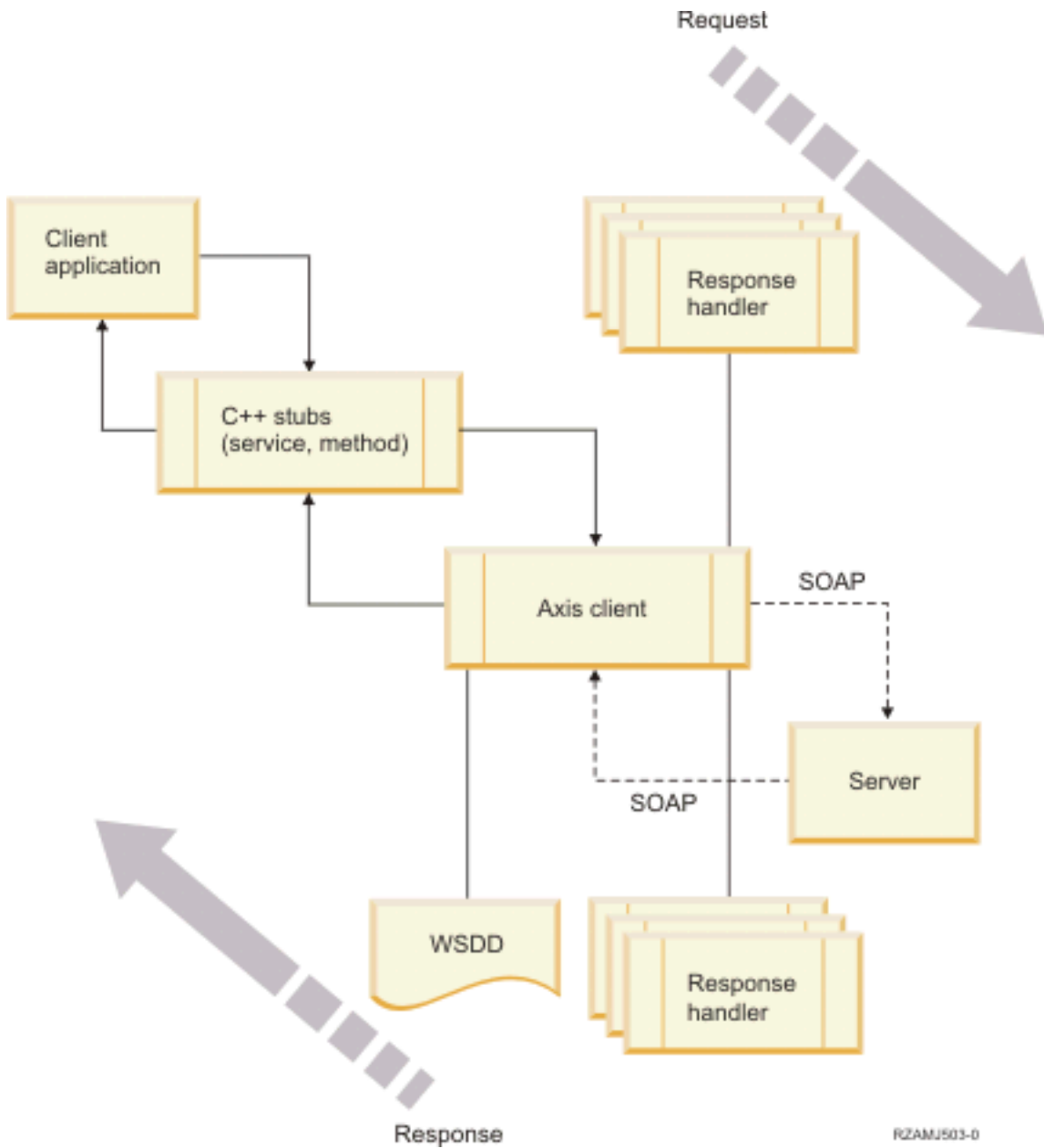


As shown in Figure 2, the client application calls a method on a service in the stubs. This method calls a number of underlying methods in the AxisClient library, which generates the SOAP message that communicates with the server:



You can add Web service handlers to the AxisClient library to allow further processing of the SOAP message, either before it is transmitted to the server or after the corresponding reply has been received from the server. The Web Service Deployment Descriptor (WSDD) file controls how handlers are used.

| Figure 3 is an amended version of Figure 2, showing how handlers can be hooked into the AxisClient library:  
 |



| For more detailed explanations and examples, see the docs sub-directory in the install directory for Web Services Client for C++, which is /QIBM/ProdData/xmltoolkit/wsc-1.0-OS400.  
 |

## XML Toolkit introduction

To ensure the availability of the latest versions of the XML parsers, XSL transformer, XML Scripting for iSeries, and Web Services Client for C++, the XML Toolkit for iSeries (5733-XT1) was developed. Each available version of the XML parser for both the C++ and the procedural languages and the XSL transformer consists of two installation options in the 5733-XT1 product.

The first installation option provides the service programs that support that parser version and the XSL transformer. The second installation option provides include files, samples, API documentation, and bind instruction associated with the parser version and transformer. XML Scripting for iSeries contains a



program, service program, samples, and documentation under option 11. Web Services Client for C++ contains service programs, include files, samples, and documentation under option 12.

## Available XML parsers, XSL transformers, XML Scripting function, and Web Services Client for C++ function

The XML Toolkit currently consists of the XML parser, XSL transformer, XML Scripting function, and Web Services Client for C++ versions listed on the table below.

Each version of the parser consists of two installation options: service programs (parsers and transformers) and development environments (API documentation, samples, and include files). New versions of the XML4C and XML4PR parsers and XSLT4C transformers will be added as additional installable options, and the product will be periodically refreshed as these new parsers are released. This provides a single point of contact for the latest in iSeries XML-related technologies.

Install option	Contents	Apache Software version	Highlights
1	XML4C and XML4PR version 4.0 service programs	1.6	New XML Schema support
2	XML4C and XML4PR 4.0 development environment	Not applicable	Not applicable
3	XML4C and XML4PR version 5.0 service programs	2.1	New DOM parser
4	XML4C and XML4PR 5.0 development environment	Not applicable	Not applicable
5	XML4C and XML4PR version 5.2 service programs	2.2	Miscellaneous C++ enhancements
6	XML4C and XML4PR 5.2 development environment	Not applicable	Not applicable
7	XML4C and XML4PR version 5.3.1 service programs, XSLT4C version 1.6 service program	2.3 (XML), 1.6 (XSL)	Miscellaneous C++ enhancements, added XSL transformer
8	XML4C & XML4PR 5.3.1 and XSLT4C 1.6 development environment	Not applicable	Not applicable
9	XML4C and XML4PR version 5.5 service programs, XSLT4C version 1.9 service program	2.6 (XML), 1.9 (XSL)	Miscellaneous C++ enhancements
10	XML4C & XML4PR 5.5 and XSLT4C 1.9 development environment	Not applicable	Not applicable
11	XML Scripting for iSeries 1.0	Loosely based on Ant Java 1.5.4	Based on C++ instead of Java
12	Web Services Client for C++ 1.0	Axis C++ 1.5	Initial i5/OS release

For Java language versions of the XML parser, see the XML for iSeries home page.

### Related information

XML for iSeries home page

## Installation

The XML Toolkit allows multiple XML parsers, XSL transformer versions, XML Scripting, and Web Services Client to be installed on the same iSeries platform simultaneously.

The installation procedures are structured to allow you to separately install the parsers and transformer (service programs) or the development environment (API documentation, include files, and samples) or

both for each XML parser and XSL transformer version you want.

XML Toolkit Options	Contents
*BASE	Base code functions
Option 1	XML version 4.0 parser service programs. This option is installed as QXML4C400 and QXML4PR400 in library QXMLTOOLS.
Option 2	XML version 4.0 parser API documentation, sample, and include files. The C, RPG, and COBOL development environment is installed in library QXMLDEV400. The C++ development environment is installed in the integrated file system directory /QIBM/ProdData/xmltoolkit/xml4_0_0.
Option 3	XML version 5.0 parser service programs. This option is installed as QXML4C500 and QXML4PR500 in library QXMLTOOLS.
Option 4	XML version 5.0 parser API documentation, sample, and include files. The C, RPG, and COBOL development environment is installed in library QXMLDEV500. The C++ development environment is installed in the integrated file system directory /QIBM/ProdData/xmltoolkit/xml5_0_0.
Option 5	XML version 5.2 parser service programs. This option is installed as QXML4C520 and QXML4PR520 in library QXMLTOOLS.
Option 6	XML version 5.2 parser API documentation, sample, and include files. The C, RPG, and COBOL development environment is installed in library QXMLDEV520. The C++ development environment is installed in the integrated file system directory /QIBM/ProdData/xmltoolkit/xml5_2_0.
Option 7	XML version 5.3.1 parser service programs. This option is installed as QXML4C531 and QXML4PR531 in library QXMLTOOLS. In addition, XSL version 1.6 transformer service program is installed as service program QXSL4C160 in library QXMLTOOLS.
Option 8	<ul style="list-style-type: none"> <li>• XML version 5.3.1 parser API documentation, sample, and include files. The C, RPG, and COBOL development environment is installed in library QXMLDEV531. The C++ development environment is installed in the integrated file system directory /QIBM/ProdData/xmltoolkit/xml5_3_1.</li> <li>• XSL version 1.6 transformer API documentation, sample, and include files. The development environment for this is installed in library QXSLDEV160. The C and C++ development environment is installed in the integrated file system directory /QIBM/ProdData/xmltoolkit/xsl1_6_0.</li> </ul>
Option 9	XML version 5.5 parser service programs. This option is installed as QXML4C550 and QXML4PR550 in library QXMLTOOLS. In addition, XSL version 1.9 transformer service program is installed as service program QXSL4C190 in library QXMLTOOLS.

XML Toolkit Options	Contents
Option 10	<ul style="list-style-type: none"> <li>XML version 5.5 parser API documentation, sample, and include files. The C, RPG, and COBOL development environment is installed in library QXMLDEV550. The C++ development environment is installed in the integrated file system directory /QIBM/ProdData/xmltoolkit/xml5_5_0.</li> <li>XSL version 1.9 transformer API documentation, sample, and include files. The development environment for this is installed in library QXSLDEV190. The C and C++ development environment is installed in the integrated file system directory /QIBM/ProdData/xmltoolkit/xsl1_9_0.</li> </ul>
Option 11	XML Scripting for iSeries version 1.0 program and service program. This option is installed as QXMLSCR10 for both the service program and program in library QXMLTOOLS. The supporting files and documentation are installed in the integrated file system directory /QIBM/ProdData/xmltoolkit/scripting1_0.
Option 12	Web Services Client for C++ 1.0 client engine, documentation, tooling, include files, and samples. The C++ development environment is installed in the integrated file system directory /QIBM/ProdData/xmltoolkit/wsc-1.0-OS400. Associated service programs are in library QXMLTOOLS and start with the prefix QAXIS10.

All samples and documentation are distinguished by the XML parser, XSL transformer, XML Scripting, and Web Services Client for C++ version. For XML, this is library QXMLDEVnnn and integrated file system directory /QIBM/ProdData/xmltoolkit/XMLn\_n\_n, where nnn and n\_n\_n refer to the XML version.

For XSL, this is library QXSLDEVnnn and integrated file system directory /QIBM/ProdData/xmltoolkit/XSLn\_n\_n, where nnn and n\_n\_n refer to the XSL version.

For XML Scripting, this is integrated file system directory /QIBM/ProdData/xmltoolkit/scriptingn\_n, where nnn and n\_n refer to the XML Scripting version.

For Web Services Client for C++, this is library QXMLDEVnnn and integrated file system directory /QIBM/ProdData/xmltoolkit/wsc-n.n-OS400, where nnn and n.n refer to the Web Services Client for C++ version.

To install the XML Toolkit, insert the XML Toolkit for iSeries CD-ROM into the device drive. Install the \*BASE option and any other required options by using the Restore Licensed Program (RSTLICPGM) command. For example:

**RSTLICPGM LICPGM(5733XT1) DEV(xxxxxx) OPTION(\*BASE)**

Installs the \*BASE code required for all other options.

**RSTLICPGM LICPGM(5733XT1) DEV(xxxxxx) OPTION(9)**

Installs the XML version 5.5 parser service programs and the XSL version 1.9 transformer service program.

**RSTLICPGM LICPGM(5733XT1) DEV(xxxxxx) OPTION(10)**

Installs the XML version 5.5 parser development environments and the XSL version 1.9 transformer development environments.

To delete a portion of the XML Toolkit, run the Delete Licensed Program (DLTLICPGM) command. For example:

**DLTLICPGM LICPGM(5733XT1) OPTION(4)**

Deletes Option 4 (development environment for XML version 5.0 parsers).

## API documentation

The documentation for each XML parser version is available in browser format when you install the appropriate licensed program development option for the XML parser version of your choice.

To view the documentation, map a network drive to your target iSeries and, using your browser, open the file location specified in the table below.

The documentation includes API descriptions, information about how to create and run the sample programs, some programming information, and frequently asked questions (FAQ).

*Table 1. Documentation locations*

Version	Documentation location in the Integrated File System
XML4C version 4.0.0	/QIBM/ProdData/xmltoolkit/xml4_0_0/doc/xml4c/index.html
XML4PR version 4.0.0	/QIBM/ProdData/xmltoolkit/xml4_0_0/doc/xml4pr/index.html
XML4C version 5.0.0	/QIBM/ProdData/xmltoolkit/xml5_0_0/doc/xml4c/index.html
XML4PR version 5.0.0	/QIBM/ProdData/xmltoolkit/xml5_0_0/doc/xml4pr/index.html
XML4C version 5.2.0	/QIBM/ProdData/xmltoolkit/xml5_2_0/doc/xml4c/index.html
ML4PR version 5.2.0	/QIBM/ProdData/xmltoolkit/xml5_2_0/doc/xml4pr/index.html
XML4C version 5.3.1	/QIBM/ProdData/xmltoolkit/xml5_3_1/doc/xml4c/index.html
XML4PR version 5.3.1	/QIBM/ProdData/xmltoolkit/xml5_3_1/doc/xml4pr/index.html
XSLT4C version 1.6	/QIBM/ProdData/xmltoolkit/xml5_3_1/doc/xsl4c/index.html
XML4C version 5.5	/QIBM/ProdData/xmltoolkit/xml5_5_0/doc/xml4c/index.html
XML4PR version 5.5	/QIBM/ProdData/xmltoolkit/xml5_5_0/doc/xml4pr/index.htm
XSLT4C version 1.9	/QIBM/ProdData/xmltoolkit/xml5_5_0/doc/xsl4c/index.html
XML Scripting 1.0	/QIBM/ProdData/xmltoolkit/scripting1_0/docs/index.html
Web Services Client for C++ 1.0	/QIBM/ProdData/xmltoolkit/wssc-1.0-OS400/docs/api/index.html and /QIBM/ProdData/xmltoolkit/wssc-1.0-OS400/docs/wssc-1.0.pdf

For information about mapping network drives, see Accessing iSeries NetServer™ File Shares with a Windows® PC client.

**Related concepts**

Accessing iSeries NetServer File Shares with a Windows PC client

“Samples”

Samples for each XML parser, XSL transformer, XML Scripting, and Web Services Client for C++ version provided with the XML Toolkit are available by installing the appropriate development option for each.

## Samples

Samples for each XML parser, XSL transformer, XML Scripting, and Web Services Client for C++ version provided with the XML Toolkit are available by installing the appropriate development option for each.

For XML, C++ samples are provided through integrated file system files. RPG, C, and COBOL samples are provided through iSeries source physical files.

For XSL, the C and C++ samples are provided through integrated file system files.

For XML Scripting, the samples are provided through integrated file system files.

For Web Services Client for C++, the C++ samples are provided through integrated file system files.

The version for these is indicated in either the integrated file system path location (n\_n\_n or n\_n) or in the name of the tools development library (QXMLDEVnnn for XML or QXSLDEVnnn for XSL). Information describing the function of each sample and how to create, bind, and run the samples for a given supported language are provided. See the “API documentation” on page 14.

A source file, QCLSRC, is provided in the tools development library and contains members that create the samples provided for each language version.

XML parser version	Samples location
XML4C version 4.0.0	Integrated file system location: /QIBM/ProdData/xmltoolkit/xml4_0_0/samples. The include files are located in the /QIBM/ProdData/xmltoolkit/xml4_0_0/include directory.
XML4PR version 4.0.0	Library: QXMLDEV400. This library contains the QRPGLSRC, QCBLESRC, QCSRC, and H source files. The include files are contained in the corresponding file member QXML4PR400.
XML4C version 5.0.0	Integrated file system location: /QIBM/ProdData/xmltoolkit/xml5_0_0/samples. The include files are located in the /QIBM/ProdData/xmltoolkit/xml5_0_0/include/xercesc directory.
XML4PR version 5.0.0	Library: QXMLDEV500. This library contains the QRPGLSRC, QCBLESRC, QCSRC, and H source files. The include files are contained in the corresponding file member QXML4PR500.
XML4C version 5.2.0	Integrated file system location: /QIBM/ProdData/xmltoolkit/xml5_2_0/samples. The include files are located in the /QIBM/ProdData/xmltoolkit/xml5_2_0/include/xercesc directory.
XML4PR version 5.2.0	Library: QXMLDEV520. This library contains the QRPGLSRC, QCBLESRC, QCSRC, and H source files. The include files are contained in the corresponding file member QXML4PR520.
XML4C version 5.3.1	Integrated file system location: /QIBM/ProdData/xmltoolkit/xml5_3_1/samples. The include files are located in the /QIBM/ProdData/xmltoolkit/xml5_3_1/include/xercesc directory.
XML4PR version 5.3.1	Library: QXMLDEV531. This library contains the QRPGLSRC, QCBLESRC, QCSRC, and H source files. The include files are contained in the corresponding file member QXML4PR531.
XSLT4C version 1.6	Integrated file system location: /QIBM/ProdData/xmltoolkit/xsl1_6_0/samples. The include files are located in the /QIBM/ProdData/xmltoolkit/xsl1_6_0/include/xalanc directory.
XML4C version 5.5	Integrated file system location: /QIBM/ProdData/xmltoolkit/xml5_5_0/samples. The include files are located in the /QIBM/ProdData/xmltoolkit/xml5_5_0/include/xercesc directory.
XML4PR version 5.5	Library: QXMLDEV550. This library contains the QRPGLSRC, QCBLESRC, QCSRC, and H source files. The include files are contained in the corresponding file member QXML4PR550.
XSLT4C version 1.9	Integrated file system location: /QIBM/ProdData/xmltoolkit/xsl1_9_0/samples. The include files are located in the /QIBM/ProdData/xmltoolkit/xsl1_9_0/include/xalanc directory.
XML Scripting 1.0	Integrated file system location: /QIBM/ProdData/xmltoolkit/ant1_0/samples.

XML parser version	Samples location
Web Services Client for C++ 1.0	Integrated file system location: /QIBM/ProdData/xmltoolkit/wsc-1.0-OS400/samples. The include files are located in the /QIBM/ProdData/xmltoolkit/wsc-1.0-OS400/include/axis directory.

### Related concepts

“API documentation” on page 14

The documentation for each XML parser version is available in browser format when you install the appropriate licensed program development option for the XML parser version of your choice.

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## Getting support

Review the statement of support for the XML Toolkit.

Support services for the IBM XML Toolkit for iSeries are provided under the typical terms and conditions for iSeries software products. Support services include program services, voice support, and consulting services. Use the online information provided at the iSeries Home Page under the topic Support for more information, or contact your local IBM representative. These terms and conditions include the following:

- You may, at IBM direction, be required to obtain a more current level of the XML Toolkit for iSeries and move to a newer version of the XML parser, XSL transformer, XML Scripting, or Web Services Client for C++ 1.0 to receive Continued Program Services (CPS) support.
- Resolving defects with the XML Toolkit for iSeries parsers are supported under program services or voice support. Resolving application programming or debugging problems is supported under consulting services.
- XML Toolkit application programming interface (API) calls supported under consulting services unless:
  - It is clearly an XML Toolkit API defect as demonstrated by recreation in a relatively simple program.
  - It is a question that asks for documentation clarifications.
  - It is a question about the location of samples or documentation.
- All programming assistance is supported under consulting services. This includes the program samples that are provided in the XML Toolkit licensed program.
- If you believe that there is a potential defect in the XML Toolkit APIs, a simple program that demonstrates the error is required.

### Related concepts

iSeries Home Page



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## Related information for XML Toolkit for iSeries

The XML community continually improves existing tools, adds new tools, and helps evolve new standards and extensions that increase the usefulness and flexibility of XML.

Use these Redbooks and Web sites to keep up to date on developments in the XML community and to see more information about XML, including introductory information, tutorials, advanced and reference materials, evolving XML standards, and XML tools that you can download.

### Redbooks


- Redbooks:
  - The XML Files: Using XML for Business-to-Business and Business-to-Consumer Applications (about 3 MB) 
  - XML in Action: PDML and PCML (about 3.5 MB) 

- Integrating XML with DB2 XML Extender and DB2 Text Extender (about 4.5 MB) 

## Web sites

- W3C - XML 
- www.xml.org 
- www.xml.com 

## Other information


- developerWorks® XML Zone 
- IBM eServer™ Solutions Enablement: XML Support on iSeries 

## Saving PDF files

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1. Right-click the PDF in your browser (right-click the link above).
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3. Navigate to the directory in which you want to save the PDF.
4. Click **Save**.

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## Appendix. Notices

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## Programming Interface Information

This Extensible Markup Language publication documents intended Programming Interfaces that allow the customer to write programs to obtain the services of XML Toolkit.

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